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RISK PREFERENCES AND INTRA-HOUSEHOLD FINANCIAL DECISION-MAKING IN RURAL VIETNAM:

A COMPARISON OF THEIR ELICITATION METHODS AND DETERMINANTS

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EXECUTE SUMMARY

Although it is widely accepted that risk preferences and women's empowerment influence how decisions are made and have tangible outcomes, such as on livelihood strategies, food security, and poverty traps, there is no consensus on their measurement or determinants. Improved methods to elicit risk preferences and decision-making power as well as a better understanding of their determinants can allow development policy to better match smallholders' risk preferences and to increase women's empowerment. This thesis has two main objectives: 1) To identify influencing factors of risk preferences and intra-household decision-making power using a conceptual framework; 2) To improve methods to measure risk preferences and intra-household decision-making by comparing widely used methods to more innovative ones. This thesis is based on data collected in 2011 from both household heads and spouses in a random sample of 300 households, representative of Yen Chau district, Son La Province in northwestern Vietnam. On average, respondents are poor, have a low level of education, worry about food security, produce maize for cash income and rice for home consumption, and rely heavily on social networks to obtain credit. Households in Yen Chau face significant risks from idiosyncratic and covariate shocks, such as illness, drought, animal death, and yield losses from pests and diseases.

The thesis contains five chapters: the introductory chapter explains the conceptual framework and research objectives, outlining the importance of a better understanding of determinants of risk preferences and decision-making power for poverty traps, income, and food security; the second chapter examines determinants of risk preferences, including several proxies of social capital and other individual-level and household-level variables; the third chapter examines determinants of changes in risk preferences across the lean season and the harvest season, focusing on whether shocks cause individuals to become more risk averse; the fourth chapter analyzes influencing factors of husbands' and wives' intra-household financial decision-making power; and the final chapter concludes and offers recommendations for research and policy.

After establishing the importance of risk preferences and women's decision-making power within a conceptual framework in the first chapter, the second chapter examines determinants of risk preferences using a cross-section dataset. Five widely applied methods to elicit risk

preferences (a non-hypothetical lottery game, financial risk tolerance question, self-assessment scale, and hypothetical income and inheritance gambles) and four innovative methods (maize and rice gambles of yields and prices) are compared. We find that respondents are, on average, very risk averse. Moreover, correlations between most risk preference measures are statistically highly significant, although most are weak. This suggests that risk preference measures related to various decision domains should be compared with caution. Using a conceptual framework, we outline the hypothesized determinants of risk preferences: the decision domain, prior experiences, and the asset base including human, financial, and social capital. Given the importance of social capital in Yen Chau, we use several proxies of to capture its various dimensions: norms of helping and of sharing with others (cognitive social capital), the ability to rely upon various social networks in times of need (structural and cognitive social capital), membership in organizations (structural social capital), connections to local authorities (linking social capital), and the village population and its square (to capture low vs. high closure). The results show that significant determinants of risk preferences across most elicitation methods are gender, age, idiosyncratic shocks, education, social norms, network-reliance with extended family, and connections to local authorities. The significance of several social capital proxies suggests that people's risk preferences are embedded in social institutions. Moreover, we find that greater network-reliance with first-degree relatives has an increasing effect on risk aversion, providing evidence that strong familial attachments may discourage individuals from taking risks. Given the high degree of risk aversion, we recommend ex-ante and ex-post mitigation and coping policies such as agricultural insurance and other safety nets which could target the most risk averse individuals. In addition, we recommend opportunities for smallholders to participate in the hands-on operations of local field trials to help overcome risk aversion to new production systems and technologies.

Despite the emphasis in the literature that shocks cause households to fall into poverty traps and that risk averse individuals can remain trapped in poverty, there has been no attempt yet to discern whether shocks influence risk aversion. Moreover, there is no consensus on whether risk preferences are stable over time. Thus, the third chapter examines whether risk preferences remain stable from the lean season to the harvest season and then analyzes whether shocks change individual risk preferences. Risk preferences were assessed from the same respondents seven months apart using three widely applied elicitation methods (a lottery game, financial risk

tolerance question, and self-assessment scale) and four innovative methods (maize and rice gambles of yields and prices). To obtain a better understanding of how shocks may affect risk preferences, we examine both the time component of a shock – i.e., how soon the shock had occurred before risk preferences were elicited – and the specific characteristic of shock – i.e., if the shock were a drought, livestock death, another covariate shock, or idiosyncratic. The results indicate that for all but one assessment method – the financial risk tolerance question – risk preferences are not stable across seasons. Correlations between risk preferences across seasons in the lottery game and self-assessment scale are rather weak, while those in the maize and rice gambles are stronger. Respondents became less risk averse according to the lottery game and self-assessment scale, yet they became more risk averse according to the rice and maize gambles. The regression analyses find that characteristics which are unlikely to change between seasons, such as gender, education and social capital proxies, and characteristics which do change across seasons, such as idiosyncratic and covariate shocks, are significant determinants of changes in risk preferences between seasons, although determining factors differ by elicitation method. Factors determining risk preference changes across seasons based on the two self-assessment methods (the financial risk tolerance question and self-assessment scale) tend to have the opposite effect compared to the methods involving gambles. This provides further evidence of the importance of the decision domain when analyzing risk preferences. Examining the influence of shocks by type and by time in separate analyses highlights the importance of separating various shocks to examine their impact on risk preference stability. Contrary to expectations, more recent shocks did not have a greater effect on risk preferences. In regressions which analyzed impacts of specific types of shocks, losses from livestock deaths had no significant effect on changes in risk preferences across seasons, although losses from other covariate shocks and idiosyncratic shocks did. Nevertheless, in all analyses the relative impact on changes in risk preferences across seasons as a result of shocks is quite small. The chapter concludes with recommendations to help prevent households from falling into poverty and remaining trapped in poverty based on findings that shocks change individual risk preferences.

Women's empowerment can also influence important outcomes for livelihood strategies. Previous research has demonstrated positive impacts of women's empowerment on food security, child nutritional status, and education. Several studies have explored the impact of exposure to financial programs on women's empowerment. Missing from the literature, however, is

examining influencing factors of women's intra-household decision-making power for a variety of financial decisions. Thus, the fourth chapter examines influencing factors of wives' and husbands' decision-making power in taking out and repaying four different sized loans, as well as in saving and family budgeting to obtain a better overview of household financial decision-making dynamics. Rather than aggregating all decisions together in an index as most studies do, the chapter focuses on examining each decision separately. The identification of sources of decision-making power in specific decisions can help direct policies to improve women's decision-making power in distinct financial domains. Based on theories and previous research, we hypothesize that individual-, household-, and institutional-level factors may influence women's decision-making power for financial decisions. The results show that determinants of decision-making power vary by decision and demonstrate that important findings are lost altogether in aggregated indices composed of several decisions. We find that being able to speak Vietnamese, completing more education, living in a relatively poor household, and having more network-reliance with extended family increases wives' odds of being empowered in most financial decisions, whereas being married longer, living in a household with a relatively high child dependency ratio, and living in a household with greater women-controlled income decreases wives' odds of being empowered. Although this latter result may seem counterintuitive based on the theory that the more women control, the greater their intra-household power, previous studies and follow-up interviews suggest that the more successful the woman's domain becomes, the greater the chance men take it over. Based on the results, we provide the following policy recommendations to increase wives' empowerment in financial decisions: ensuring fluency by women in Vietnamese, increasing education, supporting at-home employment opportunities for women, lengthening the school day, and requiring that children eat lunch at school. Recommendations specific to the formal financial sector are to target financial services to both husbands and wives, offer mobile banking, and reduce red tape for conducting financial transactions. Because sources of empowerment from the individual-, household-, and institutional-levels may mutually reinforcing, a multi-level approach is needed to improve wives' empowerment.

There are two main contributions that this thesis makes. The first is that we develop more suitable and informative methods for measuring risk preferences and decision-making power as well as provide suggestions for future research. Because risk preferences were elicited from such

a wide range of techniques – one non-hypothetical lottery, two self-assessment techniques, and six hypothetical gambles – we are able to offer specific suggestions for improving the measurement of risk preferences, particularly for smallholder farmers in a developing country. We find that the self-assessment scale and hypothetical maize and rice gambles are the most suitable methods, yet they should be improved. For example, the easily identifiable middle category should be removed from the self-assessment scale and more refined choices should be provided in the maize and rice gambles. The fourth chapter demonstrated the drawbacks of the status quo which relies on analyzing intra-household decision-making power based on an index composed of several decisions. Moreover, the advantages of asking about specific types of loans rather than about loans in general were evident: We found stark and important differences between decision-making power in small loans as opposed to loans of greater value. In addition, the three main chapters revealed that social capital can have varying effects on risk preferences and decision-making power depending on its proxy. Thus, we recommend that several proxies of social capital should be used rather than one only. To aid future research, an appendix contains the questionnaires used to elicit risk preferences, decision-making power, and social capital.

The second contribution is that the results can be used to target safety nets, encourage investments, and improve women's financial decision-making power. The recommendations may help prevent households from falling into poverty and remaining trapped in poverty. Given the finding that most respondents are very risk averse and that the current livelihood strategy – maize production on steep slopes which highly degrades the soil – is perceived by farmers in Yen Chau to be a low-risk activity, respondents should be supported in adopting new production systems which do not entail as much environmental degradation, yet which they view as risky. Support for adopting new production systems could be in the form of credit, subsidized inputs, and local field trials. Based on the finding that shocks can cause individuals to become even more risk averse, effective cash or food transfer programs, more expansive health insurance, and agricultural insurance may help reduce the increasing effect of shocks on risk aversion by helping households mitigate the effect of adverse shocks. The above recommendations for increasing women's power in financial decisions may also have tangible outcomes important for food security. In summary, support should be provided to encourage the adoption of new production systems, to help households better cope with shocks, and to increase women's clout in financial decisions, thereby opening the door to new livelihood strategies.

ZUSAMMENFASSUNG

Obwohl es weithin anerkannt ist, dass Risikopräferenzen und die Stärkung der Rolle der Frau Einfluss darauf haben wie Entscheidungen gefällt werden und sich auch konkret auf beispielsweise Lebensunterhalt, Nahrungssicherheit und Armutfallen auswirken, gibt es in der Wissenschaft keinen Konsens über deren ausschlaggebende Faktoren oder ihre Erhebung. Durch verbesserte Methoden zur Ermittlung von Risikopräferenzen und der Entscheidungsmacht als auch ein besseres Verständnis über deren ausschlaggebende Faktoren kann Entwicklungspolitik besser auf kleinbäuerliche Risikopräferenzen ausgerichtet werden und zur Stärkung der Rolle der Frau beitragen. Diese Dissertation hat folgende zwei Hauptziele: 1) Identifizierung der Einflussfaktoren von Risikopräferenzen und der Entscheidungsmacht innerhalb eines Haushaltes anhand eines konzeptuellen Rahmen und 2) Verbesserung der Messungen von Risikopräferenzen und der Entscheidungsprozesse innerhalb eines Haushaltes durch den Vergleich weithin verbreiteter Methoden mit innovativen Ansätzen. Diese Dissertation basiert auf Daten, die im Rahmen einer repräsentativen Zufallsstichprobe von 300 Haushalten des Yen Chau Distrikts, Son La Provinz im nordwestlichen Vietnam, im Jahre 2011 durch Befragung sowohl der Haushaltsvorstände als auch der Ehegatten erhoben wurden. Die Befragten sind im Durchschnitt arm, besitzen ein niedriges Bildungsniveau, sind in Sorge um Nahrungssicherheit, produzieren Mais als Quelle für Geldeinkommen und Reis für den Eigenbedarf und sind bei der Versorgung mit Krediten auf soziale Netzwerke angewiesen. Haushalte in Yen Chau sind mit erheblichen Risiken aus idiosynkratischen und kovarianten Schocks wie Krankheit, Dürre, Tiersterben und Ernteverlust durch Schädlinge und Pflanzenkrankheiten konfrontiert.

Die Dissertation umfasst fünf Kapitel: Das Einführungskapitel erklärt den konzeptuellen Rahmen und die Forschungsziele, welche die Bedeutung eines besseren Verständnisses der Determinanten von Risikopräferenzen und der Entscheidungsmacht in Bezug auf Armutfallen, Einkommen und Nahrungssicherheit zusammenfassen; das zweite Kapitel untersucht die ausschlaggebenden Faktoren von Risikopräferenzen, darunter mehrere Stellvertretervariablen (proxies) für Sozialkapital sowie andere Variablen auf Individual- und Haushaltsebene; im dritten Kapitel werden die Determinanten von Veränderungen in Risikopräferenzen über die magere

Jahreszeit bis über die Erntezeit hinweg untersucht, wobei ein besonderer Fokus auf Wetterschocks gelegt wird, welche dazu führen dass Individuen risikoscheuer werden; das vierte Kapitel analysiert Einflussfaktoren der finanziellen Entscheidungsmacht von Ehemann und Ehefrau innerhalb eines Haushaltes; das letzte Kapitel zieht Schlussfolgerungen und gibt Empfehlungen für Politik und Forschung.

Nachdem im ersten Kapitel die Bedeutung von Risikopräferenzen und der Entscheidungsmacht von Frauen innerhalb eines konzeptuellen Rahmens verdeutlicht wurde, untersucht das zweite Kapitel auf Basis von Querschnittsdaten die Determinanten von Risikopräferenzen. Es werden fünf weit verbreitete Methoden zur Bestimmung von Risikopräferenzen (nicht-hypothetisches Lotteriespiel, finanzielle Risikotoleranz-Frage, Self-Assessment-Skala, und hypothetische Szenarien zu Einkommen und Erbschaft) mit vier innovativen Methoden (Szenarien zu Erträgen und Preisen bei Mais und Reis) verglichen. Wir stellen fest, dass die Befragten im Durchschnitt sehr risikoscheu sind. Darüber hinaus sind die Korrelationen zwischen den meisten Risikopräferenzen statistisch höchst signifikant, obwohl die meisten schwach ausfallen. Dies weist darauf hin, dass Risikopräferenzmessungen, welche sich auf verschiedene Entscheidungsdomänen beziehen, nur mit Vorsicht verglichen werden sollten. Auf Grundlage eines konzeptuellen Rahmens, fassen wir im Folgenden die vermuteten Determinanten von Risikopräferenzen zusammen: die Entscheidungsdomäne, vorangegangene Erfahrungen, und der Vermögensbestand welcher Human-, Finanz- und Sozialkapital umfasst. Angesichts der Bedeutung von Sozialkapital in Yen Chau, verwendeten wir eine Reihe von Stellvertretervariablen (proxies) für Sozialkapital um dessen verschiedene Dimensionen zu erfassen: Normen des Helfen und Teilens mit andern (kognitives Sozialkapital), die Fähigkeit sich in Zeiten der Not auf verschiedene soziale Netzwerke zu verlassen (strukturelles und kognitives Sozialkapital), Mitgliedschaft in Organisationen (strukturelles Sozialkapital), Beziehungen zu lokalen Behörden („linking“ (vertikal verbindendes) Sozialkapital), und die Dorfbevölkerung und ihr Quadrat (zur Erfassung von starker und schwacher Zusammengehörigkeit). Die Ergebnisse zeigen, dass über die meisten Erhebungsmethoden hinweg Aspekte wie Geschlecht, Alter, idiosynkratische Schocks, Bildungstand, soziale Normen, das Verlassen auf das Netzwerk Großfamilie und die Beziehungen zu lokalen Behörden signifikante Determinanten von Risikopräferenzen sind. Die Signifikanz der verschiedenen Stellvertretervariablen (proxies) für Sozialkapital deutet darauf hin, dass Risikopräferenzen in

soziale Institutionen eingebettet sind. Außerdem stellen wir fest, dass das größere Verlassen auf das Netzwerk mit der Verwandtschaft ersten Grades einen erhöhten Effekt auf die Risikoaversion hat, was darauf hindeutet, dass starke familiäre Verbundenheit Individuen davon abhalten kann, Risiken einzugehen. In Anbetracht des hohen Grades an Risikoaversion, raten wir zu risikominimierenden politischen Maßnahmen, wie etwa Landwirtschaftsversicherungen oder andere Sicherheitsnetze, welche die risikoscheuesten Individuen gezielt ansprechen könnten. Des Weiteren empfehlen wir Möglichkeiten für Kleinbauern zur Teilnahme an den praktischen Tätigkeiten der lokalen Feldversuche zu schaffen, um die Risikoaversion gegenüber neuen Produktionssystemen und –technologien abzubauen.

Obwohl in der Literatur oft betont wird, dass Schocks dazu führen, dass Haushalte in die Armutsfalle geraten und risikoscheue Personen in der Armut gefangen bleiben, wurde bis jetzt noch kein Versuch unternommen um festzustellen, ob Schocks die Risikoaversion beeinflussen. Außerdem gibt es keinen Konsens darüber, ob Risikopräferenzen über die Zeit unveränderlich bleiben. Deshalb untersucht das dritte Kapitel ob Risikopräferenzen von der mageren Zeit des Jahres zur Erntesaison hin unveränderlich bleiben und ob Schocks individuelle Risikopräferenzen verändern. Dazu wurden im Abstand von sieben Monaten, die Risikopräferenzen der selben Befragten durch drei weit verbreitete (Lotteriespiel, finanzielle Risikotoleranz-Frage, und Self-Assessment-Skala) und vier innovative Methoden (Szenarien zu Erträgen und Preisen bei Mais und Reis) erhoben. Um ein besseres Verständnis darüber zu erlangen, wie Schocks Risikopräferenzen beeinflussen können, untersuchten wir sowohl die zeitliche Komponente des Schocks, dass heisst in welchem zeitlichen Abstand zur Erhebung der Risikopräferenzen ereignete sich der Schock – als auch die spezifische Art/Ausprägung des Schocks, dass heisst handelte es sich bei dem Schock um Dürre, Viehsterben, einen anderen kovarianten Schock oder um einen idiosynkratischen Schock. Die Ergebnisse zeigen, dass bei allen außer einem Messverfahren– der finanziellen Risikotoleranz-Frage – Risikopräferenzen über die Saisons nicht stabil bleiben. In der Lotteriespiel- und der Self-Assessment-Skala Methode sind Korrelationen zwischen Risikopräferenzen über die Saisons hinweg eher schwach ausgeprägt, während Korrelationen bei den Szenarien zu Erträgen und Preisen bei Mais und Reis stärker ausfallen. Nach der Lotteriespiel- und der Self-Assessment-Skala Methode wurden die Befragten weniger riskoscheu, nach der Methode der Reis und Mais Szenarien jedoch riskoscheuer. Die Regressionsanalyse zeigt, dass Merkmale, welche sich zwischen den Saisons

eher nicht verändern, wie etwa Geschlecht, Bildung, und den Stellvertretervariablen für Sozialkapital, und Merkmale, welche sich über die Saisons hinweg verändern, wie idiosynkratische und kovariante Schocks, signifikante Determinanten von Veränderungen in Risikopräferenzen zwischen den Saisons sind, obwohl sich die bestimmenden Faktoren je nach Erhebungsmethode unterscheiden. Faktoren, die Veränderungen in den Risikopräferenzen über die Saisons hinweg verursachen und mittels der beiden Self-Assessment Methoden (finanzielle Risikotoleranz-Frage, und Self-Assessment-Skala) ermittelt wurden, haben tendenziell den gegenteiligen Effekt im Vergleich zu den Methoden, die Szenarien beinhalten. Dies unterstreicht einmal mehr die Wichtigkeit der Entscheidungsdomäne und der Erhebungsmethoden bei der Analyse von Risikopräferenzen. Untersucht man in getrennten Analysen den Einfluss von Schocks, differenziert nach Typ und Zeit, wird deutlich, dass es wichtig ist die verschiedenen Schocks zu trennen, um deren Einfluss auf die Stabilität von Risikopräferenzen zu bestimmen. Entgegen den Erwartungen haben jüngere Schocks keinen größeren Einfluss auf Risikopräferenzen. In den Regressionen, welche die Einflüsse von bestimmten Typen von Schocks untersuchten, hatten durch Viehsterben verursachte Verluste keine signifikante Wirkung auf Veränderungen in Risikopräferenzen über Saisons hinweg, obwohl Verluste durch andere kovariante und idiosynkratische Schocks einen solchen aufwiesen. In allen Analysen ist der relative Einfluss auf Veränderungen in Risikopräferenzen über die Saisons hinweg als Folge von Schocks recht klein. Aufeinanderfolgende Schocks können im Laufe der Zeit jedoch einen signifikanten Einfluss auf Risikoaversion haben. Basierend auf den Forschungsergebnissen, dass Schocks individuelle Risikopräferenzen verändern, schließt das Kapitel mit entsprechenden Maßnahmenempfehlungen, um zu verhindern, dass Haushalte in Armut geraten und in der Armut gefangen bleiben.

Die Stärkung der Rolle der Frau kann ebenfalls wichtige Auswirkungen auf Lebensunterhaltstrategien haben. Vorangegangene Forschungen zeigten, dass die Stärkung der Rolle der Frau einen positiven Einfluss auf die Bereiche Nahrungssicherheit, Ernährungszustand von Kindern, und Bildung hat. Darüberhinaus untersuchten mehrere Studien, welchen Einfluss die Teilnahme von Frauen an finanziellen Programmen auf deren Stärkung hat. In der Literatur fehlt es jedoch an Untersuchungen zu den Faktoren, die die Entscheidungsmacht von Frauen innerhalb des Haushaltes in Bezug auf eine Vielzahl von finanziellen Entscheidungen beeinflussen. Deshalb werden im vierten Kapitel die Einflussfaktoren der Entscheidungsmacht von Ehemann und

Ehefrau bei der Aufnahme und Rückzahlung von vier verschiedenen großer Kredite als auch beim Sparen und bei der Familienbudgetplanung untersucht. Anstatt alle Entscheidungen in einem Index zu bündeln, so wie es in den meisten Studien gemacht wird, fokussiert sich dieses Kapitel auf die getrennte Untersuchung jeder Entscheidung. Die Bestimmung der Determinanten der Entscheidungsmacht bei konkreten Entscheidungen kann helfen politische Maßnahmen auf die Stärkung der Entscheidungsmacht der Frau in bestimmten finanziellen Bereichen auszurichten. Ausgehend von Theorien und vorangegangener Forschung stellen wir die Hypothese auf, dass Faktoren auf individueller, Haushalts- und institutioneller Ebene Frauens Entscheidungsmacht in finanziellen Entscheidungen beeinflussen können. Die Ergebnisse zeigen, dass die Determinanten der Entscheidungsmacht abhängig von der Art der Entscheidung variieren und dass wichtige Erkenntnisse verloren gehen, wenn aggregierte Indices, basierend auf mehreren Entscheidungen, gebildet werden. Wir stellen fest, dass das Beherrschen der Vietnamesischen Sprache, ein höherer Bildungsabschluss, das Leben in einem relativ armen Haushalt und ein größeres Verlassen auf das Netzwerk Großfamilie, die Chancen der Frauen erhöht in den meisten Entscheidungen gestärkt aufzutreten, während eine langjährige Ehe, das Leben in einem Haushalt mit einem relativ hohen Kinderquotient, und das Leben in einem Haushalt in dem das Einkommen stärker von Frauen kontrolliert wird dagegen die Chancen der Frauen gestärkt zu sein, mindert. Obwohl das letztere Ergebnis ausgehend von der Theorie, dass je mehr von Frauen gesteuert wird, umso größer ist ihre Macht innerhalb des Haushaltes, nicht eingängig erscheint, deuten vorangegangene Studien und Folgeinterviews darauf hin, dass je erfolgreicher die Domäne der Frau wird, umso größer ist die Wahrscheinlichkeit, dass diese von den Männern übernommen wird. Ausgehend von den Ergebnissen geben wir folgende Empfehlungen zur Stärkung der Rolle der Frau in finanziellen Entscheidungen: Es sollte sichergestellt werden, dass Frauen Vietnamesisch sprechen; man sollte Bildung und heimische Beschäftigungsmöglichkeiten für Frauen fördern; eine Verlängerung des Schultages sollte angestrebt werden; man sollte gewährleisten, dass Kinder die Möglichkeit haben in der Schule Mittag zu essen. Empfehlungen speziell für den formellen Finanzsektor sind: Finanzdienstleistungen sollten sowohl auf Männer als auch auf Frauen ausgerichtet sein; Mobile Banking sollte angeboten und Bürokratie in der Durchführung von Finanztransaktionen sollte abgebaut werden. Da sich die Determinanten der Stärkung der Rolle der Frau auf individueller, Haushalts- und institutioneller Ebene gegenseitig verstärken können, ist ein Multi-Level-Ansatz zur Stärkung der Rolle der Frau erforderlich.

Diese Dissertation liefert zwei Hauptbeiträge: Der erste ist, dass wir sowohl geeignetere und aussagekräftigere Methoden zur Messung von Risikopräferenzen und der Entscheidungsmacht innerhalb eines Haushaltes entwickeln als auch Anregungen für zukünftige Forschung liefern. Dadurch, dass wir Risikopräferenzen mittels einer Reihe von Techniken – einem nicht-hypothetischen Lotteriespiel, zwei Self-Assessment-Techniken und sechs hypothetischen Szenarien – herausarbeiten, sind wir in der Lage gezielte Vorschläge zur Verbesserung der Messung von Risikopräferenzen, besonders für Kleinbauern in einem Entwicklungsland, zu erbringen. Wir sind der Meinung, dass die Self-Assessment-Skala und die hypothetischen Mais und Reis Szenarien die geeignetsten Methoden sind, jedoch sollten diese noch verbessert werden. So sollte man zum Beispiel aus der Self-Assessment-Skala die einfach zu identifizierende mittlere Kategorie herausnehmen und in den Mais und Reis Szenarien differenziertere Auswahlmöglichkeiten bieten. Im vierten Kapitel wurden die Nachteile des Status Quo, welcher auf der Analyse der Entscheidungsmacht innerhalb eines Haushaltes mittels eines Indexes, zusammengesetzt aus mehreren Entscheidungen, basiert, dargelegt. Zudem sind die Vorteile, die sich aus der Befragung nach spezifischen Arten von Krediten anstatt nach Krediten im Allgemeinen ergeben, offensichtlich: Wir fanden markante und wichtige Unterschiede zwischen der Entscheidungsmacht bei Kleinkrediten im Gegensatz zu Krediten größeren Umfangs. Darüberhinaus zeigten die drei Hauptkapitel, dass Sozialkapital, abhängig von der Stellvertretervariablen, unterschiedliche Wirkung auf Risikopräferenzen und Entscheidungsmacht haben kann. Deshalb schlagen wir anstelle nur einer Stellvertretervariablen die Verwendung mehrerer solcher Variablen vor. Um zukünftige Forschung zu unterstützen, sind die Fragebögen, welche zur Bestimmung von Risikopräferenzen, der Entscheidungsmacht und des Sozialkapitals verwendet wurden, im Annex aufgeführt.

Der zweite Beitrag dieser Arbeit ist, dass die Ergebnisse dazu verwendet werden können, um Sicherheitsnetze zielgenauer auszurichten, Investitionen zu fördern und die finanzielle Entscheidungsmacht von Frauen zu verbessern. Diese Empfehlungen können Haushalten helfen nicht in Armut zu geraten und in der Armut zu bleiben. Anhand der Forschungsergebnisse hat man herausgefunden, dass die meisten Befragten sehr risikoscheu sind und die gegenwärtige Existenzgrundlage - Maisproduktion an steilen Hängen und auf stark degradierten Böden – von den Bauern in Yen Chau als eine Aktivität mit niedrigem Risiko wahrgenommen wird. Die Befragten sollten angesichts dieser Erkenntnisse in der Übernahme neuer Produktionssysteme,

welche weniger Umweltbeeinträchtigung mit sich bringen aber von ihnen als risikoreicher eingestuft werden, unterstützt werden. Die Unterstützung bei der Übernahme von neuen Produktionsmaßnahmen könnte in Form von Krediten, subventionierten Produktionsmitteln, und lokalen Feldversuchen erfolgen. Angesichts der Forschungsergebnisse, dass Schocks dazu führen können, dass Individuen sogar risikoscheuer werden, können wirksame Transferprogramme für Nahrungsmittel und Geld, umfangreichere Krankenversicherungen, und Landwirtschaftsversicherungen dazu beitragen, die zunehmende Wirkung von Schocks auf Risikoaversion zu reduzieren, indem sie Haushalten bei der Linderung der Auswirkungen negativer Schocks helfen. Die obengenannten Vorschläge zur Steigerung des Einflusses von Frauen bei finanziellen Entscheidungen können zu greifbaren Ergebnissen, die wichtig für die Nahrungssicherheit sind, führen. Zusammenfassend soll gesagt werden, dass Unterstützung notwendig ist, um die Übernahme neuer Produktionssysteme zu fördern, um zu helfen mit Schocks besser fertig zu werden, und um den Einfluss von Frauen bei finanziellen Entscheidungen zu erhöhen, wodurch sich die Tür zu neuen Lebensunterhaltsstrategien eröffnet.

LIST OF ABBREVIATIONS

DIW – German Institute for Economic Research, Berlin

MPL – multiple price list

OLS – ordinary least squares

PPP – purchasing power parity

PPS – Probability Proportionate to Size

U.S. – United States

USD – United States dollar

VBARD – Vietnam Bank for Agriculture and Rural Development

VBSP – Vietnam Bank for Social Policies

VND – Vietnamese Dong (Vietnam's national currency)

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1 INTRODUCTION

This introduction presents general information on Vietnam and the study area before explaining the conceptual framework which puts forth the importance of understanding determinants of risk preferences and women's empowerment for poverty traps, income, and food security. Following the conceptual framework, we present the main research objectives, questions, and hypotheses. At the end of the introduction, an outline of the thesis is provided.

1.1 GENERAL INTRODUCTION

Vietnam is a country rich in biodiversity and culture, yet its people suffer from poverty and food insecurity. Nearly half of Vietnam's 86 million people depend on an inherently risky livelihood – agriculture (Food and Agriculture Organization, 2012; General Statistics Office, 2010). Despite recent economic growth and significant declines in poverty, poverty rates remain high. In 2008, 43% of Vietnamese were living on less than \$2 per day (The World Bank, 2012). Poverty is concentrated in rural areas, particularly in the Northern Uplands and among ethnic minorities (FAO, 2009). Although Vietnam's 53 ethnic groups comprise 13% of the total population, they account for nearly 30% of poor people (International Fund for Agricultural Development, n.d.). Given that poverty and food insecurity are intricately linked, food insecurity figures prominently in Vietnam's rural areas and remote communes as well as among ethnic minorities (Baulch and Masset, 2003). Food insecurity is both an adult and child phenomenon: 11% of Vietnam's population were undernourished in 2006-2008 (International Food Policy Research Institute, 2012); 20% of its children under five years of age were underweight in 2005-2010 (International Food Policy Research Institute, 2012); and 27% of mothers of young children suffer from chronic energy deficiency (Food and Agriculture Organization, 2012). Moreover, girls are three times more likely to be chronically stunted than boys, indicating gender inequality (Baulch and Masset, 2003).

This research takes place in Yen Chau district, Son La province, in northwestern Vietnam (please see Appendix 6.18 for a map of the study area). Yen Chau is mountainous and inhabited primarily by ethnic minorities. The largest ethnic minorities are Black Thai and H'mong,

accounting for 55% and 20% of the district's population, respectively. Kinh ("ethnic Vietnamese") constitute another 13%. Thai and H'mong ethnic minorities lag behind the Kinh majority in a number of important indicators. For example, the H'mong people have the highest fertility rate, infant mortality rate, and under-five mortality rate, as well as the lowest life expectancy, literacy rate, and age of first marriage of any other ethnic group in Vietnam (United Nations Population Fund, 2012). Thai people also have poorer living standards than the Kinh. Poverty and food insecurity are widespread in Yen Chau: the average daily per capita expenditures are just \$2.34 purchasing power parity (PPP)¹ and 70% of household heads in the previous year worried that food supplies would run out before the next harvest or before their household had enough money to purchase food.

Agriculture is the keystone for people's livelihoods in Yen Chau. Households grow rice on paddy fields in the lowlands mainly for home consumption, although nearly half do not produce enough rice to meet their consumption needs. Maize is grown in the uplands as a cash crop with the vast majority of households selling almost all harvested maize. Nearly all households are engaged in maize production on steep slopes resulting in high levels of soil erosion. Degraded soils combined with an increasing population density portend future problems compounding already existing ones (Lippe et al., 2011; Saint-Macary et al., 2010). People in Yen Chau confront significant risks, such as illness, drought, flooding, pests, plant diseases, and livestock deaths from harsh winters and disease outbreaks. Households have inadequate mechanisms to cope with shocks. Agricultural insurance is unavailable and government-provided health insurance covers only general administrative fees and low-cost treatments. Households must pay 70% of the costs for more serious treatments. Very few households deposit into savings accounts and just half save in other forms. Therefore, if a shock occurs, households have difficult choices between consumption smoothing (by selling assets or seeking other income) or asset smoothing (by reducing consumption). Given their low-level of income, households in Yen Chau are thus susceptible to falling into and remaining in poverty traps.

Worldwide, it is estimated that 320-443 million people are trapped in poverty (Chronic Poverty Research Centre, 2009). Its causes are multi-dimensional, dynamic, and can reinforce and

¹ The average daily per capita expenditures in 2010 were 19,740 Vietnamese dong (VND). These expenditures were updated for inflation and then converted to their purchasing power parity (PPP) equivalent: 10,178.57 VND/\$1 PPP (General Statistics Office, 2012; The World Bank, 2012).

interact with one another (Azariadis and Stachurski, 2005; Zimmerman and Carter, 2003). This perpetuates a cycle of low consumption, income, savings, and assets, resulting from insurance and credit market failures (Azariadis and Stachurski, 2005; Barnett et al., 2008; Carter and Barrett, 2006), remoteness (Bird et al., 2002), and other institutional failures (Azariadis and Stachurski, 2005). Moreover, poverty traps have been found to exist in remote and marginal areas, rather than more developed areas (Barrett et al., 2006). Given that Yen Chau is a remote area with marginal lands, has an increasing population density, and has poor availability and accessibility of formal credit, savings, and insurance, it is important to better understand dynamics within poverty traps so that recommendations can be made for keeping households out of poverty traps and helping households escape from them.

1.2 CONCEPTUAL FRAMEWORK

In this subsection, we first define risk and empowerment and then explain how they can be measured before discussing their importance in general and then specifically for poverty traps.

1.2.1 DEFINITIONS AND MEASUREMENTS OF RISK AND EMPOWERMENT

Risk is a situation where alternative outcomes exist with known probabilities and is distinct from uncertainty since the former entails unknown probabilities (Knight, 1921).² Some people prefer taking risks and are thus risk lovers, others avoid taking risks and are thus risk averse, and others have no preference for or against risk and are thus risk neutral. There are many methods to assess risk preferences including pairwise choice (e.g., Hey et al., 2009), willingness to pay or accept (e.g., Kachelmeier and Shehata, 1992), the Becker DeGroot Marschak mechanism (e.g., James, 2007), lottery choice task decisions (e.g., Holt and Laury, 2002), self-assessment questions (e.g., Cesarini et al., 2009), and hypothetical scenarios (e.g., Anderson and Mellor, 2009). In addition, risk preferences can be inferred from real life choices such as the ratio of risky assets to less risky assets (e.g., Gilliam et al., 2010) or insurance deductibles (e.g., Cohen and Einav, 2007). Although lottery choice task decisions are considered to be the gold standard, other methods continue to be applied.

² According to Knight (1921, p. 46), "while a single situation involving a known risk may be regarded as 'uncertain,' this uncertainty is easily converted into effective certainty; for in a considerable number of such cases the results become predictable in accordance with the laws of chance, and the error in such prediction approaches zero as the number of cases is increased."

A research gap persists in the comparison of different elicitation methods – particularly for data collected from resource-poor farmers in a developing country – since only a handful of studies have elicited risk preferences from more than one elicitation method (e.g., Anderson and Mellor, 2009; Dohmen et al., 2011). For this reason, we compare a variety of elicitation techniques: a lottery game with actual or non-hypothetical monetary payoffs; hypothetical gambles relating to inheritance, income, and prices and yields of maize and rice; and the financial risk tolerance question and self-assessment scale which allow respondents to self-assess their risk preferences. Moreover, there is no consensus in the literature on how risk preferences are influenced by socio-economic characteristics. Some studies have found that risk preferences differ significantly based on gender (e.g., Gilliam et al., 2010), education (e.g., Harrison et al., 2007), age (e.g., Tanaka et al., 2010), number of dependents (e.g., Hallahan et al., 2004), shocks (e.g., Guiso et al., 2011) and/or income (e.g., Cohen and Einav, 2007), while other studies have found no significant relationship (cf. Harrison et al. (2007) for gender; Anderson and Mellor (2009) for education; Holt and Laury (2002) for age; Picazo-Tadeo and Wall (2011) for number of dependents; Chiappori and Paiella (2011) for shocks; and Tanaka et al. (2010) for income). The relation between risk preferences and social capital is particularly neglected. Given the importance of social capital in the study area, we use several proxies to capture its various dimensions: norms of helping others, norms of sharing gains with others, the ability to rely upon various social networks in times of need, membership in organizations, connections to local authorities, and the village population. Moreover, we explore whether other socio-economic characteristics, including age, gender, education, and income, influence risk preferences.

In addition to the lack of agreement on how risk preferences are influenced by socio-economic characteristics, there is no consensus on whether risk preferences are stable over time and what causes for its instability are. There are only a handful of studies which have analyzed the consistency of risk preferences over time (Andersen et al., 2008; Brunnermeier and Nagel, 2008; Chiappori and Paiella, 2011; Cohen and Einav, 2007; Doss et al., 2008; Guiso et al., 2011; Harrison et al., 2005; Malmendier and Nagel, 2011; Sahn, 2008; Vlaev et al., 2009) with just a few eliciting risk preferences using more than one technique (Guiso et al., 2011; Malmendier and Nagel, 2011; Meier and Sprenger, 2010; Vlaev et al., 2009). Findings from previous studies on the stability of risk preferences over time greatly vary. In some, risk preferences are stable (e.g., Andersen et al., 2008; Chiappori and Paiella, 2011; Harrison et al., 2005) and in others they are

unstable (e.g., Doss et al, 2008; Guiso et al., 2011; Meier and Sprenger, 2010; Sahm, 2008). A few studies have analyzed whether shocks are significant in changing risk preferences. Most have found that national- or community-level shocks are significant (Doss et al., 2008; Guiso et al., 2011; Malmendier and Nagel, 2011; Sahm, 2008), while household- or individual-level shocks are not (Doss et al., 2008; Sahm, 2008). Adverse shocks can have detrimental outcomes for poor and non-poor households, such as through a reduction in savings and future investment capabilities. In this thesis we explore whether risk preferences are stable from the lean season to the harvest season as well as examine determinants of changes in risk preferences over time.

Despite the wide use of the term "empowerment" in development policy and in the literature, it is an amorphous concept since it is rarely precisely defined (Goetz and Gupta, 1996; G. Sen and Batliwala, 2000), a universal definition is lacking (Haque et al., 2011; Jejeebhoy and Sathar, 2011), and it represents a complex phenomenon (Kabeer, 2001) operating at multiple levels (Mabsout and Staveren, 2010). We adopt the most widely accepted definition (Haque et al., 2011) from Kabeer (2001, p. 81): empowerment is "an expansion in the range of potential choices available to women so that actual outcomes reflect the particular set of choices which the women in question value." Similar to determinants of risk aversion, determinants of women's empowerment are not well-understood, despite findings that it has tangible outcomes on a variety of development goals including food security, health, and education. Although several studies have explored the impact of exposure to credit or savings programs on empowerment (Ashraf et al., 2010; Hashemi et al., 1996; Holvoet, 2005; Swain and Wallentin, 2007), none have examined influencing factors of empowerment in a variety of intra-household financial decisions. Other studies, for example, have examined influencing factors of empowerment in decisions about credit in general, household expenditures, and/or mobility, often combining various decision domains together (Allendorf, 2007; Anderson and Eswaran, 2009; Garikipati, 2008; Kantor, 2003; Pitt et al., 2006; Rahman and Rao, 2004; Yusof and Duasa, 2010). We, instead, focus on women's role in financial decisions only because such decisions may impact strategic life choices (Kabeer, 1999) as well as reflect and create a particularly transformative power in women's improved status within the household (Goetz and Gupta, 1996; Kabeer, 2001). Moreover, identifying sources of empowerment in specific financial decisions can help direct policies to improve women's decision-making power in distinct financial domains. In this thesis,

we examine determinants of wives' and husbands' intra-household decision-making power for keeping track of family finances, saving, and taking out and repaying four types of loans.

1.2.2 THE GENERAL IMPORTANCE OF RISK AND EMPOWERMENT

Risk is central to many aspects of economic life including decisions about insurance, consumption, income, savings, and portfolio choice (Barry and Robison, 1975; Pratt, 1964; Sandmo, 1969, 1970, 1971). For example, risk aversion may affect tax evasion (Allingham and Sandmo, 1972), pension plans (Vlaev et al., 2009), and the portfolio share invested in stocks (Gilliam et al., 2010). In addition, high levels of risk aversion are cited as a major cause of poverty traps since risk averse individuals pursue low-risk, low-return livelihood strategies (Dercon, 1996; Lybbert and McPeak, 2012; Morduch, 1994; Rosenzweig and Binswanger, 1993). For example, Barnett et al. (2008, p. 1766) write, "Due to high uninsured risk exposure, households may adopt low-risk, low-return strategies for using productive assets, reducing the likelihood that they can accumulate the assets needed to escape poverty through autarchic savings and investment". However, both the poor and non-poor face complex risks, such as from credit availability, weather, the general economy, and contractual arrangements (Barry and Robison, 2001). Thus, decisions by the poor and non-poor are affected by risk preferences.

Similar to risk preferences, empowerment is also important for a variety of outcomes. Women's empowerment has been found to influence tangible outcomes including child nutrition, food security, education, and contraceptive use (Allendorf, 2007; Doss, 2006; Hashemi et al., 1996; Hoddinott and Haddad, 1995; Schuler et al., 1997; B. Sen and Hulme, 2004; Smith and Haddad, 2000; Thomas, 1990; Quisimbing and Maluccio, 2000). In addition, it has intrinsic value (Kabeer, 1999; G. Sen and Batliwala, 2000; The World Bank, 2011) and is regarded as critical for achieving poverty reduction and human rights (Malhotra and Schuler, 2005). Examples of international commitments to enhance women's empowerment include the Beijing Platform for Action at the United Nation's Fourth World Conference on Women in 1995 and the Millennium Development Goals. National commitments to improve women's empowerment include quotas, such as political quotas, which have been adopted in a number of developed and developing countries (Dahlerup and Freidenvall, 2005).

In what follows, we focus on the relevance of risk preferences and empowerment for poverty traps to provide an overarching conceptual framework in light of the average poor living

standard in Yen Chau. Nevertheless, as shown above, risk preferences and empowerment are also paramount outside of poverty traps.

1.2.3 THE IMPORTANCE OF RISK AND EMPOWERMENT FOR POVERTY TRAPS

Risk preferences and empowerment are intricately linked to poverty traps. The “classic” poverty trap involves low savings, low economic growth, and deepening poverty (United Nations Millennium Project, 2005). Poverty traps occur when households are trapped in chronic poverty from pursuing a perpetual cycle of low-risk, low-return livelihood strategies experienced by households below a particular income or asset threshold (Barrett et al., 2006; Carter and Barrett, 2006; Carter et al., 2007; Dercon, 1996; Lybbert and McPeak, 2012; Morduch, 1994; Rosenzweig and Binswanger, 1993; von Braun, 1995), which can be measured by the number of livestock owned by a household, for example. The threshold determines whether a household is in a dynamic system in which asset accumulation or asset decumulation prevails and has been identified in a number of countries (Adato et al., 2006; Barrett and Swallow, 2006; Barnett et al., 2008; Carter and Barrett, 2006; Carter et al., 2007; United Nations Millennium Project, 2005). Below the threshold, households are trapped in poverty and are unable to advance economically. Above the threshold, households are able to invest, accumulate, and advance economically (Carter et al., 2007).

Determinants of poverty traps include spatial remoteness, poor environmental conditions, local externalities, the general economic environment, financial market failures, low education, low income, intergenerational transfers, large household size, low asset endowment, poor employment access, and preferences such as for financial bequest (Benabou, 1994; Bird et al., 2001; Carter and Barrett, 2006; Carter and Lybbert, 2012; P. Dasgupta, 1997; S. Dasgupta et al., 2005; Durlauf, 1994; Hulme et al., 2001; Hulme and Shepherd, 2003; Ravallion, 2002; Woolard and Klasen, 2005). This thesis explores determinants of two factors within poverty traps – risk preferences and women's empowerment. Linkages of risk aversion and women's low empowerment within other aspects of poverty traps are explained in more detail below and summarized in Figure 1.1, which provides the conceptual framework for this thesis and indicates the chapters in which specific relationships are tested. This conceptual framework allows for a more in-depth analysis of causes of poverty traps by examining linkages among its various facets. Two overarching causes of poverty traps which are not explicitly included in Figure 1.1 are spatial remoteness and intergenerational transfers. Spatial remoteness contributes toward

many factors shown in Figure 1.1, such as poor credit market access, health, education, social capital access, and high child dependency ratios (Bird et al., 2001; Hulme et al., 2001). Intergenerational transfers are environmental, human, health, and financial capital transfers which can occur through various means such as socialization, transfers, and genetic inheritance (Durlauf, 1994; Emerson and Souza, 2003; Hulme and Shepherd, 2003). Because numerous studies have found that genetics and socialization influence a range of outcomes, such as political attitudes and ideologies (Alford et al., 2005) as well as social attitudes (Martin et al., 1986), we decided not to include intergenerational transmission in Figure 1.1. Moreover, there are even linkages between spatial remoteness and intergenerational transmission of poverty traps (Baulch and Masset, 2003).

Risk is central for decision-making and therefore affects several dimensions within poverty traps. Based on previous research and an extensive literature review, we hypothesize that risk aversion may increase from low education, particular forms of social capital, more household dependents, lower income, and adverse shocks. These hypothesized determinants of risk preferences are intricately linked within poverty traps. For example, low income and low education can lead to greater soil erosion since it has been found that low income and low education decrease the likelihood of adopting soil conservation techniques in Yen Chau (Saint-Macary et al., 2010). High risk aversion can also lead to environmental degradation through a dependence on maize production on highly degraded soils on steep slopes – a production system which smallholder farmers in Yen Chau perceive as a low risk income earning activity.³ Soil erosion can reduce income over time since the land yields less with the same inputs. In fact, soil erosion in Vietnam has been identified as an environmental cause of poverty traps (S. Dasgupta et al., 2005). In Chapter 2, we examine determinants of risk aversion, including income, education, and various types of social capital.

Adverse shocks can cause households to fall into poverty traps, while positive shocks can help households escape them. When a negative shock (hereafter, "shock") occurs and a minimum consumption and/or asset level is threatened, households must reduce physical capital, financial capital, savings, consumption, social capital, and/or human capital (Hoddinott, 2006; Hulme et al., 2001). Households already below the poverty trap threshold have been found to smooth assets by reducing consumption rather than to smooth consumption by reducing assets (Barrett et

³ This was identified by smallholders via a picture ranking of risks (shown in Appendix 6.16).

al., 2006; Carter et al., 2007, 2012; Kazianga and Udry, 2006; Lybbert and McPeak, 2012; Zimmerman and Carter, 2003). Reducing already low levels of consumption can further reduce the productive capacity of poor households through malnutrition's reducing effect on future income earning potential. For example, reductions in food consumption can have long-term and even permanent consequences on the physical and cognitive development of children (Alderman et al., 2003; Hoddinott, 2006; Hoddinott and Kinsey, 2001), further perpetuating poverty traps through reduced productivity and earnings (Behrman et al., 2004; Hoddinott, 2006).

Unfortunately, positive shocks, such as a significant inheritance or lottery winnings, are rare, while negative shocks are a recurring feature of poverty (Barnett et al., 2008; Wood, 2003). Household heads in Yen Chau confirmed this: when asked what the most common way allowing households to escape poverty, just 2.4% said receiving an inheritance or windfall gain (see Table 1.1) and when asked what the number one reason causing households to fall into poverty, nearly half stated drought or the illness or death of a working family member (see Table 1.2). Despite the sentiment among the majority of household heads that hard work is the number one way to escape poverty (see Table 1.1), previous studies have come to these inescapable conclusions: "the currently poor are likely to remain poor" (Naschold, 2012, p. 2033) and it is "extremely difficult for the poor to emerge from poverty by their own efforts" (Hulme and Shepherd, 2003, p. 407). Although the literature emphasizes connections between shocks and risk aversion with poverty traps, there has been no attempt to date to discern whether shocks influence risk aversion. If shocks cause individuals to become even more risk averse, this could increase the likelihood that households remain trapped in poverty because of pursuing even more extreme low-risk, low-return livelihood strategies. In Chapter 3, we explore whether shocks and other factors affect risk preferences to change over time.

Table 1.1: Most important ways for escaping poverty, in percent (N = 291)

	Most important	Second most important	Third most important
Hard work	57.7	19.9	9.6
Government support	17.5	6.5	7.9
Taking a risk that pays off	7.6	11.7	14.8
Support by local social network	6.2	5.8	10.3
Thriftiness	5.2	47.8	16.8
Receiving an inheritance or windfall gain	2.4	1.4	3.4
Support by remote social networks/remittances	2.4	0.7	2.4

Notes: These were identified by household heads. Other possible answers were windfall monetary gains such as an inheritance, non-government organization support, and other. Numbers do not sum to 100 because of excluding responses with a low percentage. Appendix 6.1 shows the exact wording of this question. Source: Own computations using data of the F2 project of SFB 564.⁴

Table 1.2: Most important causes of falling into poverty, in percent (N = 291)

	Most important	Second most important	Third most important
Bad habits (gambling, wasteful lifestyle)	29.9	16.2	12.7
Drought	28.5	15.1	16.5
Death/illness of a working household member	19.9	18.2	8.6
Taking a risk that fails	15.1	11.7	10.0
Alcoholism	2.1	12.0	5.8
Flooding or landslide	1	8.2	7.6

Notes: These were identified by household heads. Other possible answers were output price decrease, input price increases, expenses for ceremonies like funerals or weddings, declining soil fertility, and other. Numbers do not sum to 100 because of excluding responses with a low percentage. Appendix 6.1 shows the exact wording of this question.

Another perpetuating cause of poverty is low levels of women's empowerment. Linkages between women's empowerment and poverty traps have been less explicit than that between risk aversion or adverse shocks and poverty traps. An exception is B. Sen (2004), who writes of connections between women's empowerment and households getting out of poverty through better family planning, which leads to reduced family size, fewer resources spent on household consumption, and thus more capital accumulation. Indeed Hashemi et al. (1996) and Schuler et al. (1997) found that women's empowerment determines contraceptive use. Decreased contraceptive use allows high fertility rates which can exacerbate environmental degradation (S. Dasgupta et al., 2005; Sachs et al., 2004). Moreover, Vietnamese children from large households

⁴ Throughout this thesis, if not indicated otherwise, the source of all tables and figures showing descriptive or econometric statistics are derived from own computations using F2 project data of SFB 564. For brevity, the source is not mentioned in the following tables and figures throughout the thesis.

are less likely to ever attend primary school (Baulch and Masset, 2003). Thus, household size may also determine educational attainment. One reason why children may not attend school is that they may need to work. Working as a child has been found to reduce lifetime earnings (Emerson and Souza, 2011). Moreover, low education decreases future income earning potential, which can persist over time (Benabou, 1994). Women's empowerment has been found to increase expenditure shares on children's education in Bangladesh, Indonesia, and South Africa (Quisumbing and Maluccio, 2000). Thus, these studies highlight connections among women's empowerment, household size, education, and income.

In addition to the importance of women's empowerment for family planning and education, women's empowerment is imperative for food security. Previous studies have found that women's empowerment increases expenditure shares on food in Ghana (Doss, 2006), Côte d'Ivoire (Hoddinott and Haddad, 1995), and Ethiopia⁵ (Quisumbing and Maluccio, 2000) as well as increases child food security in Nepal (Allendorf, 2007), Bangladesh (B. Sen and Hulme, 2004), and Brazil (Thomas, 1990). Moreover, women's education is important for child nutrition: in a study of 63 developing countries by Smith and Haddad (2000), women's gross secondary school enrollment rates were responsible for about 43% of the total reduction in child malnutrition between 1970 and 1995. Food security is intricately linked to poverty traps: poor health is both a cause and effect of falling into poverty, a so-called nutritional poverty trap (P. Dasgupta, 1997). As shown in Figure 1.1, we hypothesize that education, social capital, household dependents, income, and risk aversion may influence women's empowerment for financial decisions. As explained above, these hypothesized influencing factors are intricately connected to other aspects within poverty traps. For example, certain social norms may decrease women's empowerment which may lead to poorer health and nutrition of children, which in turn may decrease future income earning potential.

Causes, consequences, linkages, and reinforcements in poverty traps are complex. This thesis focuses on identifying influencing factors of risk preferences and decision-making power and on

⁵ In contrast, Quisumbing and Maluccio (2000) found that the higher the assets the husband had at marriage, the greater the expenditure share on food in Bangladesh. The authors write that this is likely because of the important role of men's assets in food production. They also found that greater assets brought into marriage by the wife in relation to the husband decrease the share of income spent on food. The authors explain that this may be because women who are more empowered may prefer lower cost food.

1.3 SPECIFIC OBJECTIVES AND RESEARCH HYPOTHESES

Despite high risk aversion and low empowerment forming critical components in poverty traps as well as having tangible outcomes for income, investments, health, food security, and livelihood strategies for both the poor and non-poor, little is known about their influencing factors and their measurement. The main objective of this thesis is twofold: to identify influencing factors of risk preferences and women's decision-making power so that policy recommendations can help households and individuals avoid poverty traps or escape them as well as help both poor and non-poor households improve their livelihoods and make better investment and consumption decisions; and to compare and improve measurements of risk preferences and intra-household decision-making power, so that future research can use improved elicitation methods. Below, we list the three major research topics which correspond to the following three chapters, as well as their research questions and hypotheses.

Research topic 1: Risk preferences – their determinants and measurement

This topic is dealt with in Chapter 2 of the thesis and includes the following research questions and hypotheses:

1. How do widely applied methods of eliciting risk preferences compare to more locally-adapted methods?

We hypothesize that the decision domain will influence the degree of risk aversion elicited from respondents. The decision domain refers to the sphere the assessment method pertains to, such as whether the method refers to lottery winnings or windfall gains, food security, income, investments, prices, yields, inheritance, or a general willingness to take risks. The decision domain has been found to be an important factor to consider in the measurement of risk preferences (e.g., MacCrimmon and Wehrung, 1990; Soane and Chmiel, 2005). In this thesis, we examine whether the decision domain affects elicited risk preferences by comparing different assessment methods related to non-hypothetical windfall gains (via a lottery game), hypothetical windfall gains (via inheritance gambles), income-generating activities (via income gambles and maize gambles), household food security (via rice gambles), financial investments (via a financial risk tolerance question), and an overall willingness to take risks (via a self-assessment scale). We hypothesize that the two self-assessment methods will be

more highly correlated compared to the other methods and that the gambles involving maize and rice will also be highly correlated. On the other hand, the lottery game may not be as highly correlated with the other methods since it is the only non-hypothetical method applied.

2. What are determinants of risk preferences?

Using the above conceptual framework, we hypothesize that low levels of education and income, as well as high child dependency ratios, will increase risk aversion. Based on previous research, we hypothesize that female gender and older age may increase risk aversion.

3. How do various facets of social capital influence risk preferences?

We hypothesize that different forms of social capital will have varying impacts on risk preferences. For example, institutional factors – namely, social norms – may influence risk preferences given the reliance on social networks to obtain credit in the study area. Organizational membership may influence risk preferences less than the other forms of social capital given the bureaucratic nature of organizations in Vietnam. Moreover, network-reliance with different social networks may have varying impacts on risk preferences, with those among family being stronger than those among friends.

4. How applicable are widely applied methods to elicit risk preferences? Can the elicitation methods be improved to be more suitable, in general, and improved to be more suitable for smallholders in a developing country, in particular?

Because respondents, on average, have a low level of education, methods which are easier to comprehend may be better suited for eliciting risk preferences from smallholders in a developing country. Thus, we hypothesize that the lottery game may not be as appropriate to measure risk preferences compared to the other methods since it is more complex. Moreover, methods which relate more to livelihood strategies, namely, maize and rice production, may be better suited than methods based on windfall gains.

Research topic 2: The impact of shocks and other factors on changes in risk preferences from the lean season to the harvest season

This topic is dealt with in Chapter 3 of the thesis and includes the following research questions and hypotheses:

1. Do elicited risk preferences change across the lean season and hungry season?

We are unsure if and how risk preferences will change in the harvest season compared to the lean season. On the one hand, respondents could become less risk averse if elicited risk preferences reflect more current situations since risk preferences were reassessed during the harvest season when cash is more plentiful and the household is better able to buy food and other essentials. On the other hand, respondents could become more risk averse if risk preferences reflect the future more, which includes the possibility of another harsh winter.

2. Do shocks experienced just before risk preferences were elicited and covariate shocks have greater impacts on risk preferences than shocks experienced at a later date and idiosyncratic shocks, respectively?

Given the low level of income, assets, and savings in the study area, we hypothesize that shocks will increase risk aversion. In addition, we hypothesize that: shocks experienced closer to the survey date will have a greater impact on risk preferences compared to shocks experienced at a later date; and covariate shocks will have a greater impact on risk preferences than idiosyncratic shocks because support through social networks may break down if a shock affects most people in the area and covariate shocks could have a greater affect through peer reinforcement.

3. Do other characteristics which do not change between seasons, such as gender, education, and social capital, cause risk preferences to change from the lean season to the harvest season?

Based on the stark contrast in respondents' conditions in the lean and harvest seasons, we hypothesize that characteristics which do not change between seasons may also influence risk preference changes. For example, women may become more risk averse in the harvest season in light of the upcoming winter months and social norms may influence risk preference changes since gift giving through weddings is more common in the harvest season.

Research topic 3: Determinants of wives' and husbands' intra-household financial decision-making power

This topic is dealt with in Chapter 4 of the thesis and includes the following research questions and hypotheses:

1. How do wives' intra-household financial decision-making power compare to that of their husbands for saving, family budgeting, and borrowing and repaying four types of loans?

Given the gender context of the study area as well as wives' higher work load and lower education, we hypothesize that wives will have less intra-household financial decision-making power than husbands. Moreover, we hypothesize that wives' decision-making power will be lower for taking out and repaying loans of greater value compared to that for taking out and repaying smaller-sized loans, saving, and family budgeting.

2. What are influencing factors of wives' decision-making power?

Individual-, household-, and institutional-level factors may influence wives' intra-household financial decision-making power. Wives who cannot speak Vietnamese, who have a low level of education and income, who do not work off-farm, who are more risk averse, who have less social capital, who live in households with high child dependency ratios, and who live in households with more women household members, are hypothesized to have lower intra-household financial decision-making power.

3. How do measurements of decision-making power compare when based on an index composed of several decisions versus based on each decision separately?

Based on the majority of previous research which measures women's empowerment by relying on an index composed of several decisions rather than analyzing each decision separately, we hypothesize that indices will be able to adequately capture influencing factors of wives' decision-making power, but that they may obscure some important findings.

1.4 OUTLINE OF THESIS

The thesis proceeds as follows: Chapter 2 examines determinants of risk preferences, including several proxies of social capital and other individual- and household-level socio-economic characteristics, and compares the measurement of risk preferences using four widely applied hypothetical methods, four locally-adapted methods, and a non-hypothetical lottery game; Chapter 3 examines whether risk preferences are stable between the lean season and harvest season as well as causes for its instability, focusing on whether shocks and various facets of social capital cause individuals to become more risk averse; Chapter 4 analyzes influencing factors of wives' and husbands' intra-household financial decision-making power for taking out and repaying four types of loans, savings, and family budgeting; and Chapter 5 provides a

discussion of the results in light of the conceptual framework, discusses data limitations, and offers final conclusions for future research and policy.

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2 ASSESSING FARMERS' RISK PREFERENCES AND THEIR DETERMINANTS IN A MARGINAL UPLAND AREA OF VIETNAM: A COMPARISON OF MULTIPLE ELICITATION TECHNIQUES

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Abstract

We examine the consistency of risk preference measures based on eight hypothetical elicitation methods and a lottery game applied to smallholder farmers in a marginal upland environment in Vietnam. Using these measures, we identify influencing factors of risk aversion via regression analysis, whereby unlike previous studies, we include several proxies for social capital such as social networks and norms. Data were collected from household heads and spouses separately in a random sample of 300 households. While correlations between most of the various risk preference measures are statistically highly significant, most are weak. On average, respondents have a high degree of risk aversion and specific characteristics – gender, age, idiosyncratic shocks, education, social norms, network-reliance with extended family, and connections to local authorities – are significant determinants of risk preferences across most elicitation methods, while others – the household's dependency ratio, wealth, and covariate shocks – are significant in a few methods only. The explanatory power of the models is limited, indicating that other factors are likely to be of greater importance in determining risk preferences. The results can help target safety nets, encourage investments, and lead to the development of more applicable methods for assessing risk preferences of smallholders in developing countries.

2.1 INTRODUCTION

Risk is an integral part of decision-making, particularly for smallholder farmers in developing countries. Accordingly, it is important that risk preferences, their influencing factors, and the methods to empirically elicit them are better understood, allowing policy recommendations to better match smallholders' risk preferences. While classical theory suggests that all risky decisions take into account the same utility function, Rabin (2000) argues that decisions are made in different contexts and therefore may be subject to different parameters in the utility function, which is similar to Tversky and Kahneman's (1981) demonstration of framing effects. This suggests that the use of different elicitation techniques may lead to diverging measures of risk preferences.

Although there are many methods to elicit risk preferences, a research gap persists in the comparison of different elicitation methods – particularly for data collected from resource-poor farmers in developing countries. The methods encompass pairwise choice (e.g., Hey et al., 2009), willingness to pay or accept (e.g., Kachelmeier and Shehata, 1992), the Becker DeGroot Marschak mechanism (e.g., James, 2007), lottery choice task decisions (e.g., Holt and Laury, 2002), self-assessment questions (e.g., Cesarini et al., 2009), and hypothetical scenarios (e.g., Anderson and Mellor, 2009) as well as inferring risk preferences from real life choices such as the ratio of risky assets to less risky assets (e.g., Gilliam et al., 2010) or insurance deductibles (e.g., Cohen and Einav, 2007). Weighing three types of bidding tasks against pairwise choice lotteries, Hey et al. (2009) find that the latter led to significantly lower noise. A variation of pairwise choice lotteries, the multiple price list technique, has become the gold standard to assess risk preferences. This method was popularized by Holt and Laury (2002) and has subsequently been used in a number of studies (e.g., Anderson and Mellor, 2009; Harrison et al., 2007; Tanaka et al., 2010). Nevertheless, researchers continue to rely on other methods to elicit risk preferences, few of which are adapted to smallholders in developing countries (an exception is Hill (2009) which is explained in Section 2.3.2). Naturally, the question arises how risk preferences assessed by different techniques compare to each other in a within-sample experiment. This question, however, has been largely neglected in the literature to date since only a handful of studies have elicited risk preferences from more than one elicitation method (e.g., Anderson and Mellor, 2009; Dohmen et al., 2011).

Furthermore, there is no consensus on how risk preferences are influenced by socio-economic characteristics. While some studies find that risk preferences differ significantly based on gender (e.g., Gilliam et al., 2010), education (e.g., Harrison et al., 2007), age (e.g., Tanaka et al., 2010), number of dependents (e.g., Hallahan et al., 2004), shocks (e.g., Guiso et al., 2011) and/or income (e.g., Cohen and Einav, 2007), others find no significant relationship (cf. Harrison et al. (2007) for gender; Anderson and Mellor (2009) for education; Holt and Laury (2002) for age; Picazo-Tadeo and Wall (2011) for number of dependents; Chiappori and Paiella (2011) for shocks; and Tanaka et al. (2010) for income). The relation between risk preferences and social capital is particularly neglected. Previous studies have focused on how social networks function as an informal insurance mechanism against potential downfalls in consumption (Platteau and Abraham, 1987; Eswaran and Kotwal, 1990; Fafchamps and Lund, 2003), how social capital influences the formation of risk pooling groups (Murgai et al., 2002; Attanasio et al., 2012; Barr et al., 2012), or how social capital encourages firms to take risks (Steer and Sen, 2010). These studies suggest that households with more extensive networks and hence greater access to consumption credit, assistance in-kind, and capital markets are better able to cope with risks. Thus, social capital may be particularly important in environments where government or private sector substitutes for risk coping mechanisms are not available or accessible (Collier, 2002; Murgai et al., 2002).

Our study contributes to closing the above-mentioned knowledge gaps by: (1) comparing risk preferences elicited from a lottery choice task decision and eight hypothetical methods (the financial risk tolerance question, self-assessment scale, hypothetical scenarios involving income and inheritance gambles, and four locally-adapted scenarios involving hypothetical maize and rice gambles) in a within-sample experiment; and (2) identifying and comparing influencing factors of risk preferences, including several dimensions of social capital, across the elicitation techniques. To the best of our knowledge, this study is the first to compare risk preference measures from such a wide range of elicitation methods in a within-sample experiment in a developing country as well as to explore whether various facets of social capital influence an individual's risk preferences.

The remainder of this paper proceeds as follows: Section 2.2 briefly describes the study area; Section 2.3 explains the risk assessment methods; Section 2.4 presents the conceptual framework developed to investigate determinants of risk preferences; Section 2.5 describes the regression

models and the data used; Section 2.6 presents descriptive results and correlations of the risk preference assessment methods, regression results on influencing factors of risk preferences, and robustness checks; Section 2.7 discusses the results and limitations of the methods used; and Section 8 concludes and offers policy implications.

2.2 STUDY AREA

This study was conducted in Yen Chau district, a marginal upland area located in northwestern Vietnam. Yen Chau is inhabited primarily by ethnic minorities of which the largest are Black Thai and H'mong, accounting for 55% and 20% of the district's population, respectively. Kinh ("ethnic Vietnamese") constitute another 13%. Rice and maize are the two main crops: in 2010, 83% of households grew rice and 94% grew maize. Rice is grown in paddy fields in the lowlands mainly for home consumption, whereby nearly half of the households do not produce enough rice to meet their consumption needs. Maize, on the other hand, is grown in the uplands as a cash crop with the vast majority of households selling almost all harvested maize. The average daily per capita expenditures are equivalent to \$2.34 purchasing power parity (PPP).⁶ The most common shocks households experienced in the past year are drought, followed by animal death, yield losses from pests and diseases, and illness of a household member.

2.3 METHODS TO ELICIT RISK PREFERENCES

In this section we describe the risk preference elicitation methods. In all methods, larger numbers indicate a higher degree of risk aversion.

2.3.1 NON-HYPOTHETICAL ELICITATION METHOD

The only non-hypothetical elicitation method applied is the multiple price list technique (hereafter, MPL) based on Holt and Laury (2002). In the MPL, subjects were given a set of ten choices between two options – a relatively safer option (Option A) and a relatively riskier option (Option B). Each option had two possible payouts with different probabilities of each payout being realized (see Table 2.1). The payouts in the safer option had a lower variance than those in

⁶ The average daily per capita expenditures in 2010 were 19,740 Vietnamese dong (VND). These expenditures were updated for inflation and then converted to purchasing power parity (PPP): 10,178.57 VND/\$1 PPP (General Statistics Office, 2012; The World Bank, 2012).

the riskier option. In the first four choices, the expected value (not shown to subjects) of the safer option was greater than that of the riskier option, whereas in the last six choices the opposite was the case because the probability of the higher payout being realized increased by 10 percentage points in both options with each subsequent choice. Risk preferences are based on the point at which subjects switched from the safer Option A to the riskier Option B. According to expected payouts, approximately risk neutral people will switch to the riskier option in the fifth choice, while risk preferring and risk averse people will switch to the riskier option before and after the fifth choice, respectively.

The highest payout amount in our scenario is equivalent to about 3.3 times the average daily per capita expenditures in our sample, 23,862 VND or \$2.34 PPP. Therefore, the potential payouts can be considered substantial for respondents. To help subjects understand the ten choices, each choice was explained one at a time along with pie charts and explanations of probabilities via a ten-sided die (see Appendix 6.7 for the instructions and the choices in the lottery game). After all ten choices had been completed, subjects were shown their selections and given an opportunity to change any responses before one of the ten choices was randomly selected for an actual payout.

Table 2.1: Choices in the multiple price list

Choice (row)	Probability of high and low payouts		Payouts in the safer option (Option A) in '000 VND			Payouts in the riskier option (Option B) in '000 VND			E(A)-E(B)
	Low	High	Low	High	E(A)	Low	High	E(B)	
1	0.90	0.10	33.0	41.0	33.8	2.0	79.0	9.7	24.1
2	0.80	0.20	33.0	41.0	34.6	2.0	79.0	17.4	17.2
3	0.70	0.30	33.0	41.0	35.4	2.0	79.0	25.1	10.3
4	0.60	0.40	33.0	41.0	36.2	2.0	79.0	32.8	3.4
5	0.50	0.50	33.0	41.0	37.0	2.0	79.0	40.5	-3.5
6	0.40	0.60	33.0	41.0	37.8	2.0	79.0	48.2	-10.4
7	0.30	0.70	33.0	41.0	38.6	2.0	79.0	55.9	-17.3
8	0.20	0.80	33.0	41.0	39.4	2.0	79.0	63.6	-24.2
9	0.10	0.90	33.0	41.0	40.2	2.0	79.0	71.3	-31.1
10	0	1.0	33.0	41.0	41.0	2.0	79.0	79.0	-38.0

Notes: Each choice was explained one at a time along with pie charts and explanations of probabilities via a ten-sided die (see Appendix 6.7 for the instructions and the choices). Expected values were not shown to respondents. The PPP in 2011 is 10,179 VND/1 USD (The World Bank, 2012).

There are several approaches which can be used to analyze responses in the MPL. Similar to other studies using the MPL (e.g., Holt and Laury, 2002), we base risk preference labels on the total number of safer options chosen (see Table 2.2). Moreover, we calculate the constant relative risk aversion (CRRA) interval based on the following CRRA utility function:

$$U(Y) = Y^{(1 - r)/(1 - r)} \text{ for } r \neq 1 \quad (1)$$

where r is the CRRA and Y is the payout amount in the lottery.⁷ The CRRA is less than 0 for subjects who are risk lovers, equal to 0 for subjects who are risk neutral, and greater than 0 for subjects who are risk averse. The CRRA is preferable to other risk aversion parameters since it has a scale invariance property. Using this utility function, we can calculate the lower and upper bounds of a subject's CRRA. For subjects who did not switch back to the safer option after having already chosen the riskier option, the calculation of the CRRA interval is based on the total number of safer options chosen (as shown in Table 2.2).

Table 2.2: Risk preferences based on the multiple price list (N = 545)

Choice where a subject switched to the riskier option	Total number of safer options chosen	Risk preference label ^a	Constant relative risk aversion interval	Percent of subjects
1	0	Extremely risk loving	$r < -1.73$	1.8
2	1	Highly risk loving	$-1.73 > r < -0.96$	0.9
3	2	Very risk loving	$-0.96 > r < -0.49$	0.7
4	3	Risk loving	$-0.49 > r < -0.15$	2.6
5	4	Approximately risk neutral	$-0.15 > r < 0.15$	10.1
6	5	Slightly risk averse	$0.15 > r < 0.41$	11.7
7	6	Risk averse	$0.41 > r < 0.67$	20.0
8	7	Very risk averse	$0.67 > r < 0.97$	17.4
9	8	Highly risk averse	$0.97 > r < 1.36$	20.0
10	9	Extremely risk averse	$r > 1.36$	14.7

Notes: The total in the last column equals 99.9% because of rounding.

^a Labels are similar to those in previous studies; however, we exclude one respondent who never chose the safer option and label respondents who chose the safer option four times as being “approximately risk neutral” rather than “risk neutral”.

⁷ We adopt the terminology of CRRA based on other studies using the MPL technique. The correct terminology for the above described CRRA, however, is a partial risk aversion coefficient since the utility function is defined in terms of gains and losses rather than wealth (Hardaker et al., 2004).

For evaluating subjects who switched back to the safer option after having already chosen the riskier option, one can calculate the CRRA interval based on either the total number of safe options chosen (e.g., Holt and Laury, 2002) or on the first and last row in which the subject switched to the riskier option (e.g., Harrison et al., 2005). Risk preferences are determined by the midpoint of the CRRA interval, although subjects who chose the safer option nine (zero) times are assigned a CRRA equal to the lower (upper) bound of the CRRA interval since the upper (lower) bound equals infinity (negative infinity). For the hypothetical methods explained below which elicit a CRRA interval, we also determine risk preferences based on the midpoint of the CRRA interval; however, unlike the MPL, these methods have no explicit risk neutral or risk preferring options.

2.3.2 HYPOTHETICAL ELICITATION METHODS

The eight hypothetical methods to assess risk preferences are the financial risk tolerance question, a self-assessment scale, hypothetical scenarios involving income gambles (hereafter, the income series), hypothetical scenarios involving inheritance gambles (hereafter, the inheritances series), and four hypothetical questions involving price and yield gambles for rice and maize (hereafter, the rice and maize series).

Unlike the other methods, the financial risk tolerance question and self-assessment scale allow subjects to identify their own willingness to take risks. The financial risk tolerance question originates from the U.S. Federal Reserve Board's Survey of Consumer Finances and has been widely used in the U.S. to gauge risk preferences (e.g., Gilliam et al., 2010). Subjects were asked about the amount of financial risk they are willing to take: (1) substantial financial risks, expecting to earn substantial returns; (2) above average financial risks, expecting to earn above average returns; (3) average financial risks, expecting to earn average returns; or (4) not willing to take any financial risks (shown in Appendix 6.8). The self-assessment scale is based on the German Socio-Economic Panel Study conducted by the German Institute for Economic Research (DIW Berlin) and has also been widely used to analyze risk preferences. Dohmen et al. (2012) have confirmed the behavioral validity of this measurement. In the self-assessment, subjects were shown a scale with integers ranging from 0 (= fully avoiding risks) to 10 (= fully prepared to take risks) and asked to point to the integer best matching their willingness to take risks. Afterwards, responses were rescaled so that 0 represents the most risk preferring and 10 the most risk averse (shown in Appendix 6.9).

In the income gambles and inheritance gambles, subjects were asked how they would respond to hypothetical scenarios involving income and inheritance gambles (see Appendix 6.10 and 6.11 for the income and inheritance gambles, respectively). These two methods originate from the Health and Retirement Study conducted by the University of Michigan and have been examined by Anderson and Mellor (2009). In the income series, subjects were told to imagine that they were the sole income earner in the household and must change their income earning activity. They could choose either an activity that would generate certain income equal to their current income or an activity with a 50/50 chance of doubling or decreasing their current income by 75%, 50%, 33%, 20%, or 10%. The inheritance series has a similar approach. Subjects were asked to imagine that they had inherited a gas station which they could either sell outright for 336 million VND (equivalent to \$33,010 PPP) or wait one month to sell with a 50/50 chance of the inheritance doubling or decreasing in value by 75%, 50%, 33%, 20%, or 10%. To facilitate comprehension of the income and inheritance gambles, enumerators read each question aloud and showed and explained graphs representing the scenarios (see Appendices 6.10 and 6.11). Questions within the income and inheritance series were not presented in ascending or descending order of riskiness. Similar to Anderson and Mellor (2009), inconsistent responses were removed from the analysis; "inconsistent" means that a subject preferred the riskier (safer) choice in one question and the certain (riskier) choice in another question which entails a lower (higher) level of risk. For example, responses are inconsistent if the riskier outcome is preferred when the loss potential is 50% and the safer option is preferred when the loss potential is 33%, 20%, or 10%. Based on the riskiest scenario chosen, a CRRA interval can be calculated.

The last set of hypothetical methods to assess risk preferences are hypothetical gambles with varying yields and prices of maize and rice. The maize and rice gambles are adapted to local conditions and more familiar to respondents because they relate to the main cash crop and food crop, respectively. The gambles are based on Hill (2009); however, we use prices and yields which are within the minimum and maximum ranges in the study area. Respondents were asked which of four options of prices and yields for maize and rice they would prefer every year, assuming that yields and prices remain constant, respectively. Each gamble includes four options: The first option has a 100% chance of the median price or yield from Yen Chau in 2009 (prices were adjusted for inflation), while each subsequent option has a 50/50 chance of a price or yield which is 15% lower or higher than the median. Enumerators read the question aloud and

pie charts were used as visuals to further aid comprehension (see Appendix 6.12-6.15 for maize and rice gambles). Based on the option chosen, a CRRA interval can be calculated.

2.4 CONCEPTUAL FRAMEWORK TO IDENTIFY DETERMINANTS OF RISK

PREFERENCES

Although there is no consensus on how risk preferences are influenced by respondent characteristics, based on theoretical and empirical justifications from the studies discussed in the introduction, we have developed the following conceptual framework:

$$RP = f(\text{decision domain, gender, prior experiences, asset base}) \quad (2)$$

where RP is the elicited risk preference which is a categorical classification in the financial risk tolerance question and self-assessment scale or the midpoint of the CRRA interval derived from the other elicitation techniques. The factor "decision domain" is captured in our analysis by using and comparing elicitation methods related to non-hypothetical windfall gains (the MPL), hypothetical windfall gains (the inheritance series), income-generating activities (the income series and maize gambles), household food security (the rice gambles), financial investments (the financial risk tolerance question), and an overall willingness to take risks (the self-assessment scale). The decision domain has been found to be an important factor to consider in the measurement of risk preferences (e.g., MacCrimmon and Wehrung, 1990; Soane and Chmiel, 2005). Table 2.3 explains the measurement and presents descriptive statistics of the explanatory variables included in the regression analyses on the basis of the above functional equation. Descriptions of the variables and justification for their inclusion in the models are provided in the following paragraphs.

Table 2.3: Description and summary statistics of respondent characteristics (N = 545)

Variable	Description	Mean	Standard deviation
<i>Individual-level variables</i>			
Gender	Dummy = 1 if female, 0 otherwise	0.52	0.50
Age	Age in years	44.60	11.98
Education	Years of formal schooling completed	5.74	3.97
Helping others norm	Dummy = 1 if agrees that others in the village are expected to help a household who takes a risk and loses, 0 otherwise	0.46	0.50
Sharing with others norm	Dummy = 1 if agrees that a household who takes a risk and gains is expected to share its gain with others in the village, 0 otherwise	0.66	0.47
Organization membership	Number of organizations the respondent is a member of	1.35	0.76
<i>Household-level variables^a</i>			
Dependency ratio	Ratio of dependent (less than 15 years of age or greater than 64) to non-dependent household members	0.29	0.22
Idiosyncratic shock impacts	Monetary losses the household suffered due to idiosyncratic shocks in the preceding 12 months divided by annual per capita expenditures in 2010	0.40	1.29
Covariate shock impacts	Monetary losses the household suffered due to covariate shocks in the preceding 12 months divided by annual per capita expenditures in 2010	1.66	2.76
Network-reliance	The sum of “easy” responses from: “If you or another household member asked, would it be easy or not easy to borrow money for education (or for health expenses, a positive social event, a negative social event, or to borrow a water buffalo, or to ask for labor) from (see social networks below)”		
First-degree relatives		5.77	0.86
Extended family		4.48	1.96
Friends		4.81	1.83
Village head		3.92	2.69
Connections to authorities	The number of authorities at the commune, district, or provincial level that members of the household know personally (a two-way relationship in which people talk to each other and know at least basic information about one another) in the Communist Party, People’s Committee, Women’s Union, or Fatherland’s Front Union	3.27	4.71
Village population	Number of residents in the village where the respondent lives	546.17	271.60

Notes: ^a An additional household level variable included in the regression analyses is the wealth tercile of the household based on a wealth index which includes a range of indicators capturing multiple dimensions of poverty.

Prior experiences are proxied by impacts from idiosyncratic and covariate shocks. Although not explicitly tested before, the literature suggests that greater shock impacts – particularly covariate shocks – may increase risk aversion or risk averse behavior (Doss et al., 2008; Eswaran and Kotwal, 1990; Fafchamps and Lund, 2003). The factor "asset base" can be further differentiated into natural, physical, financial, human, and social capital (Scoones, 1998). A wealth index, which includes a range of indicators capturing multiple dimensions of poverty, proxies physical and financial capital. Households are classified into wealth terciles based on a linear composite index which measures the relative wealth status of a household within our sample relying on data from 2006 and 2007. The index is constructed by principal component analysis (Dunteman, 1994) and represents the households' scores on the first principal component extracted, which follows a standard normal distribution. The regression analyses include dummy variables representing if the respondent lives in a household classified as being in the poorest or wealthiest wealth tercile. Compared to respondents in the middle wealth tercile, we hypothesize that those in the poorest (wealthiest) tercile will be more (less) risk averse because of a lower (greater) capacity to cope with shocks (Zimmerman and Carter, 2003). Human capital is proxied by the years of formal schooling completed and the respondent's age as well as the household's dependency ratio. Respondents with more education may be less risk averse since they may be better able to assess risks and more knowledgeable about risky opportunities. The influence of age on risk aversion is unclear given varying findings in previous studies (Tanaka et al. (2010) find a positive relationship with risk aversion whereas Picazo-Tadeo and Wall (2011) find a quadratic one). Higher dependency ratios are hypothesized to have a positive impact on risk aversion.

Although social capital has many definitions, the most widely accepted one is by Putnam who defines social capital as "features of social organization such as networks, norms, and social trust that facilitate coordination and cooperation for mutual benefit" (Putnam, 1995, p. 67). Social networks are important in Yen Chau for households to obtain credit. Informal lenders dominate the credit market with most being neighbors, acquaintances, or relatives who live within the village or district. Relying upon family and acquaintances promotes information flows, trustworthy behavior, cooperation, and sanctions (Attanasio et al., 2012; Coleman, 1988; Karlan et al., 2009). Nearly all loans from informal sources do not require collateral and the majority of small- and medium-sized loans have no interest rate. Thus, most credit transactions rely upon

social collateral rather than physical collateral (Karlan et al., 2009) and can be considered a form of quasi-credit (Fafchamps, 1999; Platteau and Abraham, 1987). We analyze whether social capital influences risk preferences since social capital is likely to be effective in risk-sharing (Attanasio et al., 2009; Eswaran and Kotwal, 1990; Platteau and Abraham, 1987).

To capture distinct concepts of social capital, we use several proxies. Although this is recommended in the literature, most studies rely on one proxy only.⁸ The distinct concepts of social capital are the following: low and high closure which means having loose networks and sharing many common friends, respectively (Burt, 1995; Coleman, 1988; Granovetter, 1973); structural social capital which includes more observable social structures such as networks (Grootaert, 2002); cognitive social capital which includes less tangible elements such as norms and reciprocity (Grootaert, 2002); and linking social capital which involves relationships between people who interact across formal or institutionalized power in society (Szreter and Woolcock, 2004). The proxies we use to measure social capital are norms of helping others (cognitive social capital), norms of sharing gains with others (cognitive social capital), membership in organizations (structural social capital), the ease to rely upon various social networks (structural and cognitive social capital), connections to local authorities (linking social capital), and the village population and its square (to capture low vs. high closure). Below, we explain why these variables are included in the conceptual framework and hypothesize their impact on risk aversion.

Norms

Norms of helping others and norms of sharing gains with others capture reciprocity which is important in helping households cope with risks (Lyon, 2000; Murgai et al., 2002; Platteau and Abraham, 1987). Norms of reciprocity may be particularly important in Vietnam given the country's emphasis on equality through its political system and previous organization of farms in agricultural cooperatives. We hypothesize that respondents who agree with the helping others norm (i.e., that others in the village are expected to help households who take risks and lose) will be more willing to take risks since they may feel that others in the village would help them in case of a failed risky investment, while respondents who agree with the sharing gains with others norm (i.e., that a household who takes a risk and gains is expected to share its gain with others in

⁸ We recommend Grootaert (2002) for a review on various definitions and measurements of social capital. Please refer to Appendix 6.3-6.6 for the elicitation methods for proxies of social capital described in this section.

the village) will be less willing to take risks since they may feel obligated to share potential benefits with others and therefore may not benefit as much individually from taking risks.

Membership in organizations

This proxy underscores Putnam's concept that civic engagement gives rise to social capital and has been used in a number of studies as an indicator of social capital (e.g., Narayan and Pritchett, 1999). The most frequent organizations respondents belong to are the Farmer Union (29% of respondents), Women Union (27%), Elderly Union (11%), Veteran Union (9%), and Communist Party (5%). These highly bureaucratic organizations have strong ties to the government and help implement policies (Gray, 1999; Kerkvliet et al., 2003). Based on these links between the Communist Party and mass organizations, we are uncertain whether members of these organizations will be more willing to take risks. On the one hand, if members have a more internalized sense of equality, then they may be less willing to take risks. On the other hand, if they have better access to information and receive more support from officials for risky investments, they may be more inclined to take risks.

Network-reliance

The network-reliance variables capture the degree to which respondents can rely on first-degree relatives, extended family, friends, and the village head and are included based on the concept that "networks create trust when agents use connections as social collateral to facilitate informal borrowing" (Karlan et al., 2009, p. 1308). Our measurement of network-reliance is also consistent with Fafchamps' (1999) notion of risk-sharing via consumption credit and assistance in-kind as well as Simmel's concept of reciprocity transactions. Reciprocity transactions are "giving and returning the equivalence", such as favors between neighbors, without which social cohesion could not exist (Simmel, 1950, p. 387). Instead of a borrowing limit (Karlan et al., 2009) or the number of ties the household can rely on for help or who depends on the household for help (De Weerd and Dercon, 2006; Fafchamps and Lund, 2003), our measurement of network-reliance captures the ability to rely on various networks to borrow not only money, but also a water buffalo or labor given their importance for agricultural households. Moreover, we analyze the impact of network-reliance with distinct social networks; namely, first-degree relatives, extended family, friends, and the village head. We hypothesize that network-reliance with relatives will have the largest influence on risk preferences based on the importance of family in the traditional Vietnamese society (Hoang et al., 2006) as well as previous studies

which find family ties to be important in risk sharing (Attanasio, et al., 2012; Murgai et al., 2002; Rosenzweig, 1988). Table 2.3 shows that network-reliance is highest with first-degree relatives, followed by that among friends, extended family, and the village head.

Connections to local authorities

Connections to local authorities may decrease risk aversion if individuals receive support from officials for risky investments or it may increase risk aversion if individuals are influenced by authorities' emphasis on equality or feel that they may have to share gains from a risky investment with authorities.

Village population

There are opposing theories whether larger communities are beneficial (Granovetter, 1973; Burt, 1995) or not (Coleman, 1990; Karlan et al., 2009) for an individual's social capital or ability to share risks. In large communities, gathering information about households, monitoring and enforcing contracts, coordinating activities, and thus insuring risks may be more time-consuming and difficult (Rosenzweig, 1988; Murgai et al., 2002; De Weerd and Dercon, 2006). This implies that risk aversion may increase with village size. On the other hand, Granovetter's emphasis that weak ties are "indispensable to individuals' opportunities and to their integration into communities" (Granovetter, 1973, p. 1378) indicates that risk aversion may decrease with community size. Moreover, there may be a limit beyond which an exchange cannot take place (Bourdieu, 1986). Based on these theories, we examine whether village population and its squared term influence risk preferences.

To confirm that the above proxies of social capital measure distinct concepts, we analyze their correlation coefficients. All but three correlation coefficients are lower than 0.3.⁹ Moreover, the statistical significance and regression coefficients of the social capital proxies (cf. Table 2.7 in Section 2.6.2) confirm that the proxies indeed measure distinct concepts of social capital. Another concern is that social capital may be endogenous: one could imagine that someone who is less risk averse may be less willing, for example, to join an organization. Unfortunately, there is a lack of good instrumental variables to test for the endogeneity of social capital (Grootaert,

⁹ The highest correlation is between the helping others norm and sharing with others norm (Spearman correlation coefficient = 0.567, $P = 0.000$); the second highest is between network-reliance with friends and network-reliance with the village head (correlation coefficient = 0.481, $P = 0.000$); and the third highest is between network-reliance with first-degree relatives and network-reliance with extended family (correlation coefficient = 0.354, $P = 0.000$).

2002). However, Barr et al. (2012) find that risk aversion does not affect group formation for pooling risks, indicating that social capital may not be endogenous.

Other factors which may influence risk preferences include height, cognitive ability, personality, and parental education (Dohmen et al., 2010, 2011; Harrison et al., 2005; Mishra and Lalumière, 2011); however, because of data limitations we are not able to include these factors in our analysis. There may also be intergenerational transmission of risk preferences as a result of genetic inheritance (Cesaraini et al., 2009) and/or upbringing (Dohmen et al., 2012; Levin and Hart, 2003). This is briefly explored in Section 2.6.3.

2.5 REGRESSIONS MODELS AND DATA USED

Influencing factors of risk preferences elicited by the nine assessment methods are analyzed using ordinary least squares (OLS), two-limit tobit, and logistic regression models. The financial risk tolerance question and self-assessment scale are analyzed via OLS regression models because of the categorical nature of the dependent variable, while the other methods are analyzed via two-limit tobit models (Tobin, 1958) because of left- and right-censoring of the dependent variable which would yield biased estimates when using the OLS estimator. Left- (right-) censoring is caused by some respondents being even more risk preferring (averse) than the most risk preferring (averse) category could accommodate. Both lower and upper limits are observed in each model and therefore the dependent variable is censored at its minimum and maximum values. The tobit model accounts for the qualitative difference between limit and non-limit observations and uses the maximum likelihood method for parameter estimation (e.g., Wooldridge, 2006). Cluster effects need to be accounted for at the household-level because household-level variables are the same for both a household head and spouse. Not accounting for cluster effects would lead to underestimation of the population variance because the variation of the error term would be the same for two respondents residing in the same household. Therefore, all data are analyzed using models which adjust for clustering effects within households.

Data were collected in a random sample of 300 households, representative of Yen Chau district, Son La Province in northwestern Vietnam. A cluster sampling procedure was followed in which first, a village-level sampling frame was constructed. All villages in Yen Chau district were included except for those in four sub-districts bordering Laos because of difficulties in obtaining research permits there. Twenty villages were randomly selected using the Probability

Proportionate to Size (PPS) method (Carletto, 1999) based on the number of households in each village. Within each selected village, 15 households were then randomly selected using updated, village-level household lists as the sampling frames. This sampling procedure results in a self-weighting sample since the PPS method accounts for the difference in the number of households between villages (Carletto, 1999). In April and May of 2011, risk preferences were elicited from 549 household heads and spouses residing in 291 households. Some households had members with severe health problems and could not be interviewed. The number of respondents was reduced to 545 because of incomplete information in two cases and irrational responses in the MPL in two cases.

2.6 RESULTS

2.6.1 COMPARING RISK PREFERENCES ELICITED BY THE DIFFERENT METHODS

Although all assessment methods provide evidence that respondents are, on average, risk averse, there are marked differences in the degrees of risk aversion identified. In the MPL, the mean CRRA is 0.66 (s.d. = 0.61), indicating that respondents are risk averse to very risk averse based on the risk preference labels in Table 2.2.¹⁰ Based on the distribution of responses shown in Table 2.2, we can state that 6% are risk preferring, 10% are approximately risk neutral, and 84% are risk averse. The number of respondents whose risk preferences we can assess based on the income and inheritance series (528 and 532, respectively) is lower than that in the other elicitation methods because of respondents who responded “do not know” or inconsistently. The mean midpoint of the CRRA interval in the income series, 3.63 (s.d. = 2.40), is slightly greater than and statistically different from that in the inheritance series, 3.36 (s.d. = 2.36). The two-way tabulation of consistent responses in both series is shown in Table 2.4. Respondents with the same CRRA in both series, 43.8%, are in bold. About 7% of respondents in each method have a CRRA less than 0.31, indicating that these respondents are slightly risk averse, risk neutral, or risk preferring. On the other hand, about one-sixth are in the most risk averse category. Responses in both income and inheritance series are quite similar with the plurality having a

¹⁰ Some 5.7% of respondents reverted to the safer option after having previously chosen the riskier option; however, the mean midpoint of the CRRA interval based on the first and last switch points to the risky option is not statistically different from the mean midpoint based on the total number of safer options chosen. We therefore report the mean CRRA midpoint based on the total number of safer options chosen, as done by Holt and Laury (2002).

CRRA equal to 2.88. Discrepancies, however, are evident. For example, 25.6% of respondents in the *most* risk averse category in the income series are in the *least* risk averse category in the inheritance series.

The distribution of responses and mean CRRA based on the maize and rice series is shown in Table 2.5. The mean difference of the CRRA is statistically significant between all series except for between the maize price series and maize yield series. Respondents are most risk averse in the rice price series: 54% chose the most risk averse option in this series. Few respondents have a CRRA less than 0.58 in any of the maize and rice series. If we rank the average CRRA midpoints elicited from the various methods, respondents are, on average, most risk averse in the income series, which is followed by the inheritance series, rice price series, rice yield series, maize price and maize yield series, and MPL.

Responses from the self-assessment scale and financial risk tolerance question are shown in the left and right panels of Figure 2.1. The mean response in the self-assessment question is 5.58 (s.d. = 2.36) on a scale from 0 to 10. The plurality selected “5”, although this should not be interpreted as indicating risk neutrality given the qualitative nature of this question (Gloede et al., 2011). The mean response in the financial risk tolerance question is 2.87 (s.d. = 0.80) on a scale of 1 to 4, with the majority selecting the option indicating a willingness to take an average level of financial risk. Since the self-assessment scale and financial risk tolerance question do not elicit a CRRA and respondents may assume different reference points along the self-assessment scale, we cannot strictly compare these methods with the others. Nevertheless, the distributions in Figure 2.1 imply that the self-assessment scale and financial risk tolerance question elicit lower levels of risk aversion than the other methods since 28% are on the risk-preferring side of the self-assessment scale (i.e., they selected a number less than 5) and 26% are willing to take substantial or above average financial risk in the financial risk tolerance question. Nevertheless, given the different reference points along the self-assessment scale, this statement should be interpreted with caution.

Table 2.4: Comparison of consistent responses in the income and inheritance series (N = 520)

Midpoint of the Constant relative risk aversion interval in the income series		Midpoint of the Constant relative risk aversion interval in the inheritance series						Total
		< 0.31	0.65	1.50	2.88	5.65	> 7.53	
< 0.31	Frequency	14	5	6	2	3	5	35
	Percent in income series	40.0	14.3	17.1	5.7	8.6	14.3	
	Percent in inheritance series	35.9	10.0	6.5	1.1	3.5	6.7	6.7
0.65	Frequency	3	9	13	9	7	3	44
	Percent in income series	6.8	20.5	29.5	20.5	15.9	6.8	
	Percent in inheritance series	7.7	18.0	14.1	5.0	8.2	4.0	8.5
1.50	Frequency	0	14	27	24	5	5	75
	Percent in income series	0	18.7	36.0	32.0	6.7	6.7	
	Percent in inheritance series	0	28.0	29.3	13.4	5.9	6.7	14.4
2.88	Frequency	9	16	31	97	23	7	183
	Percent in income series	4.9	8.7	16.9	53.0	12.6	3.8	
	Percent in inheritance series	23.1	32.0	33.7	54.2	27.1	9.3	35.2
5.65	Frequency	3	2	12	33	33	7	90
	Percent in income series	3.3	2.2	13.3	36.7	36.7	7.8	
	Percent in inheritance series	7.7	4.0	13.0	18.4	38.8	9.3	17.3
> 7.53	Frequency	10	4	3	14	14	48	93
	Percent in income series	10.8	4.3	3.2	15.1	15.1	51.6	
	Percent in inheritance series	25.6	8.0	3.3	7.8	16.5	64.0	17.9
Total	Frequency	39	50	92	179	85	75	520
	Percent in income series	7.5	9.6	17.7	34.4	16.3	14.4	

Notes: Each cell shows the frequency of each combination of response and the percentage within that row and column except for the last row and column which indicate totals for the income series and inheritance series, respectively. Responses signifying that the same selection was made in both series are shown in bold.

Table 2.5: Respondent choices in the maize and rice gambles (N = 545)

	Option 1	Option 2	Option 3	Option 4	
CRRA ^a interval	$r > 3.36$	$1.20 > r < 3.36$	$0.58 > r < 1.20$	$r < 0.58$	
Scenario	100% chance of median ^b yield or price	50/50 chance of a 15% higher/ lower yield or price from median	50/50 chance of a 30% higher/ lower yield or price from median	50/50 chance of a 45% higher/ lower yield or price from median	Mean (standard deviation) of the CRRA ^c
Maize yield gamble	31.9%	44.2%	12.1%	11.7%	2.26 (0.97)
Maize price gamble	33.6%	42.4%	11.6%	12.5%	2.27 (0.99)
Rice ^d yield gamble	36.1%	43.3%	11.7%	8.8%	2.36 (0.95)
Rice price gamble	53.9%	31.6%	9.5%	5.0%	2.65 (0.91)

Notes:

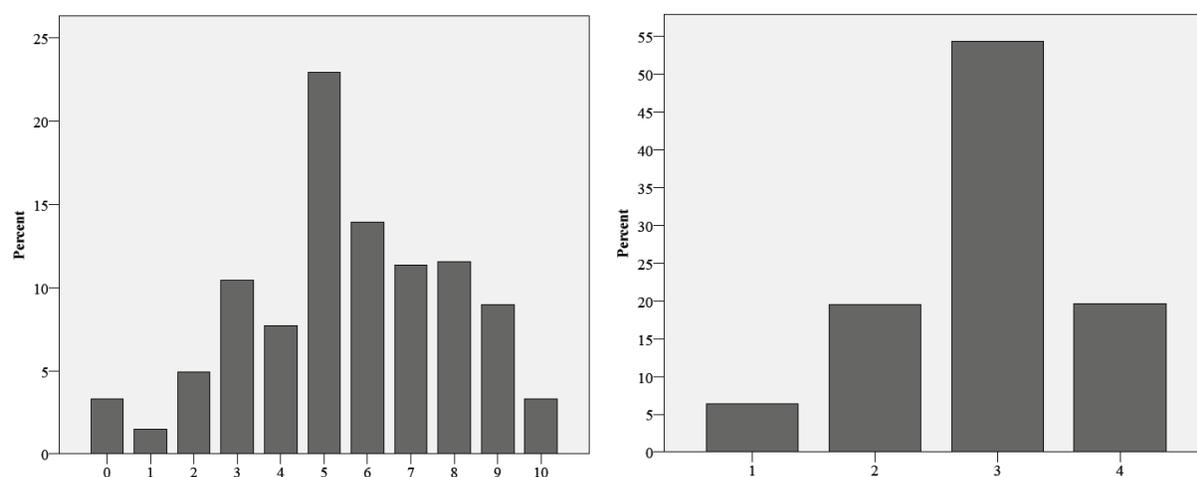
^a Constant relative risk aversion.

^b The median maize yield is 6.8 tons/hectare, the median maize price is 3,900 VND/kg, the median rice yield is 5 tons/hectare, and the median rice price is 6,550 VND/kg.

^c The mean difference between the maize yield series and maize price series is not statistically significant: all other mean differences are statistically significant ($P < 0.01$).

^d The rice series refer to unhusked rice in the summer season.

Figure 2.1: Distribution of responses to the self-assessment scale (left panel: N = 545) and financial risk tolerance question (right panel: N = 544)



Notes: In the left panel, 0 represent “fully prepared to take risks” and 10 represents “not willing to take any risks”. In the right panel, 1 represents a willingness to take “substantial financial risks, expecting to earn substantial returns”, 2 “above average financial risks, expecting to earn above average returns”, 3 “average financial risks, expecting to earn average returns”, and 4 “not willing to take any financial risks”.

Correlations between the various assessment methods are used to further examine how they compare to one another (shown in Table 2.6). Correlations above 0.25 are in bold, which highlights two groups of elicitation methods with higher correlations. The first group contains correlations between the financial risk tolerance question, self-assessment scale, income series, and inheritance series. The second group contains correlations between the rice and maize gambles. Correlations between the maize and rice gambles with the other methods, however, are weak and several are not statistically significant. Moreover, correlations are even negative between the MPL and the maize price, maize yield, and rice yield gambles.

Thus far, we have presented evidence that respondents are, on average, risk averse with many being very risk averse. We have also shown that elicited risk preferences differ depending on the method. For example, the mean CRRA ranges from 0.66 in the MPL to 3.63 in the income series. We will now examine whether socio-economic characteristics of respondents influence their risk preferences via regression analyses.

Table 2.6: Correlations between the risk assessment methods

	Multiple price list	Financial risk tolerance question	Self-assessment scale	Income series	Inheritance series	Maize yield gambles	Maize price gambles	Rice yield gambles	Rice price gambles
Multiple price list		.220 ^{***} (N = 544)	.193 ^{***} (N = 545)	.191 ^{***} (N = 528)	.199 ^{***} (N = 532)	-.099 ^{**} (N = 545)	-.075 [*] (N = 545)	-.016 (N = 545)	.112 ^{***} (N = 545)
Financial risk tolerance question	.220 ^{***} (N = 544)		.728^{**} (N = 544)*	.301^{**} (N = 527)*	.287^{***} (N = 531)	.035 (N = 545)	.059 (N = 545)	.097 ^{**} (N = 545)	.107 ^{**} (N = 545)
Self-assessment scale	.193 ^{***} (N = 545)	.728^{***} (N = 544)		.290^{***} (N = 528)	.265^{***} (N = 532)	.080 [*] (N = 545)	.098 ^{**} (N = 545)	.110 ^{**} (N = 545)	.181 ^{***} (N = 545)
Income series	.191 ^{***} (N = 528)	.301^{***} (N = 527)	.290^{***} (N = 528)		.400^{***} (N = 520)	.170 ^{***} (N = 545)	.194 ^{***} (N = 545)	.198 ^{***} (N = 545)	.144 ^{***} (N = 545)
Inheritance series	.199 ^{***} (N = 532)	.287^{***} (N = 531)	.262^{***} (N = 532)	.400^{***} (N = 520)		.079 [*] (N = 545)	.147 ^{***} (N = 545)	.102 ^{**} (N = 545)	.035 (N = 545)
Maize yield series	-.099 ^{**} (N = 545)	.035 (N = 544)	.080 [*] (N = 545)	.170 ^{***} (N = 528)	.079 [*] (N = 532)		.528^{***} (N = 545)	.672^{***} (N = 545)	.321^{***} (N = 545)
Maize price series	-.075 [*] (N = 545)	.059 (N = 544)	.098 ^{**} (N = 545)	.194 ^{***} (N = 528)	.147 ^{***} (N = 532)	.528^{***} (N = 545)		.478^{***} (N = 545)	.333^{***} (N = 545)
Rice yield series	-.016 (N = 545)	.097 ^{**} (N = 544)	.110 ^{**} (N = 545)	.198 ^{***} (N = 528)	.102 ^{**} (N = 532)	.672^{***} (N = 545)	.478^{***} (N = 545)		.383^{***} (N = 545)
Rice price series	.112 ^{***} (N = 545)	.107 ^{**} (N = 544)	.181 ^{***} (N = 545)	.144 ^{***} (N = 528)	.035 (N = 532)	.321^{***} (N = 545)	.333^{***} (N = 545)	.383^{***} (N = 545)	

Notes: The sample size, N, varies by correlation because one respondent answered “do not know” in the financial risk tolerance question and because we exclude inconsistent and “do not know” responses in the income series and inheritance series. Spearman rank correlation coefficients are reported due to the non-continuous nature of the variables. Correlations above 0.25 are in bold.

*** indicates statistical significance at the 1% level. ** Significant at the 5 percent level. * Significant at the 10 percent level.

2.6.2 FACTORS INFLUENCING RISK PREFERENCES

Separate regression models are estimated with the different risk preference measures as dependent variables to identify influencing factors of risk preferences. Examining determinants of risk preferences across various elicitation techniques allows us to check the robustness of explanatory factors and examine whether explanatory factors of risk preferences vary by decision domain. Regression results are shown in Table 2.7. All models are adjusted for clustering effects within households and thus the reported standard errors are linearized and robust. F-tests indicate that the null hypothesis that all regression coefficients are jointly zero can be strongly rejected in all models ($P < 0.001$) except for the maize yield and rice yield gambles; hence, the regression results of the latter two models are not shown. The variance inflation factor for each explanatory variable in the OLS regression models is smaller than 1.79 (with the exception of village population and its square) and the mean VIF is 4.16, indicating that multicollinearity does not pose a problem (Myers, 1990).

The regression results show that, first, the directional impact of almost all statistically significant explanatory variables on risk aversion is consistent across the models. The two exceptions are the sharing gains with others norm in the rice price gamble and idiosyncratic shock impacts in the maize price gamble. Second, the majority of the independent variables are statistically significant in determining risk preferences across most, if not all, models. For example, education has a statistically significant negative effect on risk aversion in all but one method – the maize price gamble. Third, the results offer intriguing insights into characteristics significant in increasing or decreasing risk aversion as well as their relative impact. For example, while the coefficients of gender indicate that females are substantially more risk averse than males, the effect of age is quite small with each additional decade increasing the CRRA between 0.06 and 0.50 points depending on the elicitation method. In separate regressions (results not shown) age-squared was also included, although we failed to find a nonlinear effect of age with the exception of the inheritance series ($P < 0.10$ for the added age-squared variable). Surprisingly, wealth is significant in two models only: Respondents in the poorest wealth tercile are significantly more risk averse than those in the middle wealth tercile in the self-assessment scale and inheritance series.

Table 2.7: Regression models with risk preferences as the dependent variable

	Multiple price list	Financial risk tolerance question	Self-assessment scale	Income series	Inheritance series	Maize price gamble	Rice price gamble
Type of regression	Tobit	OLS	OLS	Tobit	Tobit	Tobit	Tobit
Dependent variable	CRRA ^a	Categorical	Categorical	CRRA	CRRA	CRRA	CRRA
Risk preference scale	-1.73 to 1.36	1 to 4	0 to 10	0.31 to 7.53	0.31 to 7.53	0.58 to 3.36	0.58 to 3.36
Observations	545	544	545	528	532	545	545
At lower limit	1.8%			6.6%	7.3%	12.5%	5.0%
At upper limit	14.7%			17.6%	15%	33.6%	53.9%
Constant	1.368*** (0.324)	2.088*** (0.354)	3.828*** (1.048)	-0.071 (1.836)	-1.381 (1.370)	1.616* (0.940)	4.469*** (1.070)
Gender	0.114** (0.058)	0.406*** (0.060)	1.026*** (0.165)	1.141*** (0.258)	1.191*** (0.244)	0.437*** (0.153)	0.285 (0.182)
Age	0.006** (0.003)	0.007** (0.003)	0.024** (0.011)	0.050*** (0.014)	0.048*** (0.013)	0.012 (0.008)	-0.007 (0.008)
Education	-0.029*** (0.009)	-0.036*** (0.009)	-0.064** (0.027)	-0.058* (0.035)	-0.142*** (0.034)	-0.026 (0.023)	-0.093*** (0.026)
Helping others norm	-0.222*** (0.081)	-0.477*** (0.092)	-1.259*** (0.249)	-0.102 (0.256)	-0.670** (0.324)	0.190 (0.207)	0.257 (0.232)
Sharing gains with others norm	0.076 (0.076)	0.351*** (0.076)	0.666*** (0.234)	0.339 (0.341)	0.946*** (0.326)	0.145 (0.184)	-0.722*** (0.211)
Organization membership	-0.040 (0.042)	0.083* (0.042)	0.253* (0.131)	-0.020 (0.184)	0.061 (0.181)	-0.122 (0.111)	-0.102 (0.136)
Dependency ratio	-0.212 (0.142)	-0.051 (0.167)	0.122 (0.528)	2.219*** (0.718)	0.955 (0.627)	0.370 (0.387)	-0.486 (0.486)
Poorest tercile	-0.056 (0.087)	0.097 (0.089)	0.700** (0.281)	0.277 (0.421)	1.019*** (0.366)	0.369 (0.232)	-0.255 (0.278)
Wealthiest tercile	0.090 (0.083)	0.065 (0.083)	0.332 (0.272)	-0.099 (0.321)	0.376 (0.295)	0.077 (0.198)	0.336 (0.233)
Idiosyncratic shock impacts	0.034** (0.015)	-0.003 (0.016)	0.115** (0.055)	0.152* (0.088)	-0.046 (0.067)	-0.098* (0.054)	0.020 (0.065)
Covariate shock impacts	0.013 (0.010)	0.021* (0.011)	0.043 (0.032)	0.050 (0.060)	0.029 (0.040)	-0.020 (0.036)	-0.042 (0.032)

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	Multiple price list	Financial risk tolerance question	Self-assessment scale	Income series	Inheritance series	Maize price gamble	Rice price gamble
Network-reliance							
First-degree relatives	-0.013 (0.040)	0.132*** (0.045)	0.261** (0.123)	0.212 (0.226)	0.586*** (0.137)	0.004 (0.112)	-0.011 (0.127)
Extended family	-0.042** (0.018)	-0.056*** (0.020)	-0.082 (0.058)	-0.208** (0.084)	-0.161** (0.071)	-0.009 (0.044)	-0.024 (0.054)
Friends	0.009 (0.018)	-0.020 (0.022)	0.015 (0.068)	0.003 (0.086)	-0.172** (0.081)	-0.006 (0.048)	-0.027 (0.060)
Village head	0.010 (0.012)	-0.007 (0.012)	-0.142*** (0.039)	-0.027 (0.051)	-0.046 (0.045)	-0.021 (0.029)	0.047 (0.033)
Connections to authorities	-0.017*** (0.006)	-0.022*** (0.007)	-0.085*** (0.022)	-0.059 (0.037)	0.016 (0.034)	0.004 (0.017)	-0.027* (0.015)
Village population	-0.002*** (0.001)	0.000 (0.001)	-0.001 (0.002)	0.002 (0.003)	0.002 (0.002)	0.000 (0.001)	0.001 (0.002)
Village population squared	1.19e-06** (4.55e-07)	-3.51e-07 (4.70e-07)	3.14e-07 (1.52e-06)	-2.00e-06 (2.20e-06)	-1.32e-06 (1.85e-06)	-1.53e-07 (1.14e-06)	-5.01e-07 (1.38e-06)
F-statistic (18, 272)	3.88***	8.76***	9.40***	4.08*** ^b	6.99***	1.49*	2.39***
R-squared		0.222	0.203				
Pseudo R-squared ^c	0.063			0.032	0.047	0.018	0.031

Notes: Coefficients are in bold with their robust standard errors in parentheses. All regressions are clustered at the household level. The maize yield and rice yield gambles are not shown because in each model the null hypothesis that all slope parameters are jointly equal to zero cannot be rejected at the 10% level.

^a CRRA is the Constant relative risk aversion.

^b F(18, 271) for the income series.

^c Pseudo R-squared values reported are from the unclustered tobit regression models. Pseudo R-squared values cannot be reported for the clustered models because they rely on likelihood ratios which are inapplicable to survey data since maximum likelihood estimation assumes that observations are independently and identically distributed. Despite the close similarity in results from the unclustered and clustered models, these reported Pseudo R-squared values should be interpreted with caution.

*** Significant at the 1 percent level. ** Significant at the 5 percent level. * Significant at the 10 percent level.

The different dimensions of social capital have varying impacts on risk preferences. Respondents who agree with the helping others norm are significantly less risk averse in most elicitation methods. On the other hand, respondents who agree with the sharing gains with others norm are significantly more risk averse according to the financial risk tolerance question, self-assessment scale, and inheritance series, while they are less risk averse according to the rice price gambles. Memberships in organizations have a positive impact on risk aversion in the financial risk tolerance question and self-assessment scale, while more connections to local authorities have a negative impact on risk aversion in several elicitation methods. The network-reliance variables exhibit varying impacts on risk preferences. For example, increased network-reliance with first-degree relatives has a positive impact on risk aversion, while that with extended family, friends, and the village head has a negative impact. In the MPL, village population exhibits a quadratic relationship with risk aversion: increasing population reduces risk aversion at a decreasing rate until the population reaches 1,303 people (about 286 households), beyond which larger populations have an increasing effect on risk aversion.

To investigate which characteristics are most influential in determining whether an individual is *extremely* risk averse, we use logistic regression models in which the dependent variable equals one if the respondent is classified as extremely risk averse. Table 2.8 shows results in terms of odds ratios. The models have been adjusted for clustering effects within households and thus the reported standard errors are linearized and robust. F-tests indicate that most models have statistically highly significant explanatory power overall: again, the two exceptions are the maize yield and rice yield gambles (results are not shown because $P > 0.10$). Sensitivity and specificity tests report the share of cases correctly predicted by the models for the extremely risk averse and non-extremely risk averse sub-groups, respectively.

In general, the results from the logistic models confirm those from the OLS and two-limit tobit models, although there are some variables which are no longer significant or which become significant in the logistic models. For example, idiosyncratic shock impacts are no longer significant in the MPL and self-assessment scale. Contrary expectations, respondents in the wealthiest tercile in the MPL have a higher probability of being classified as extremely risk averse compared to respondents in the middle wealth tercile. The social capital variables again highlight the importance of social norms. Increased network-reliance with first-degree relatives has a positive impact on the probability of being extremely risk averse while that with extended

family has a negative impact. Network-reliance with the village head has an unexpected positive impact on being extremely risk averse in the rice price gamble. The specificity and sensitivity tests indicate that for most models, while the share of correctly predicted non-extremely risk averse individuals is quite high, the share of correctly predicted extremely risk averse individuals is quite low. This indicates that none of the models are capable of differentiating between the two groups at a satisfactory level of precision and that there must exist important, unidentified determinants of risk preferences apart from the factors included in this analysis.

Table 2.8: Logistic models with extreme risk aversion as the dependent variable

	Multiple price list	Financial risk tolerance question	Income series	Inheritance series	Maize price gamble	Rice price gamble
Definition of extreme risk aversion	Chose 8 or 9 safe options	Chose "Not willing to take any financial risks"	Always chose the safe option	Always chose the safe option	Chose the constant price	Chose the constant price
Observations	545	544	528	532	545	545
Number (%) classified as extremely risk averse	189 (34.7)	107 (19.7)	93 (17.6)	80 (15.0)	68 (33.6)	79 (53.9)
Constant	3.467 (3.927)	0.021** (0.032)	0.012*** (0.016)	0.008*** (0.011)	0.217 (0.218)	1.858 (1.875)
Gender	1.532** (0.296)	2.591*** (0.669)	2.194*** (0.583)	1.733* (0.520)	1.530** (0.293)	1.269 (0.222)
Age	1.017* (0.010)	1.038*** (0.014)	1.044*** (0.011)	1.042*** (0.011)	1.023*** (0.009)	0.999 (0.009)
Education	0.870*** (0.026)	0.837*** (0.034)	0.988 (0.036)	0.889*** (0.033)	0.967 (0.027)	0.919*** (0.024)
Help norm	0.433*** (0.116)	0.175*** (0.064)	1.207 (0.461)	0.725 (0.297)	0.977 (0.268)	1.206 (0.282)
Share norm	1.148 (0.298)	2.728*** (0.981)	1.868** (0.586)	2.997*** (1.247)	1.729** (0.414)	0.585** (0.124)
Organization membership	0.963 (0.143)	1.306 (0.265)	1.077 (0.202)	0.909 (0.219)	0.861 (0.124)	0.920 (0.123)
Dependency ratio	0.465 (0.250)	0.875 (0.625)	5.703*** (3.446)	2.182 (1.375)	1.605 (0.688)	0.724 (0.328)
Poorest tercile	0.794 (0.254)	1.421 (0.516)	1.263 (0.415)	2.074** (0.699)	1.354 (0.367)	0.739 (0.327)
Wealthiest tercile	1.741** (0.445)	1.402 (0.467)	0.729 (0.222)	1.441 (0.498)	1.049 (0.257)	1.346 (0.324)
Idiosyncratic shock impacts	1.003 (0.058)	0.803 (1.090)	1.120** (0.055)	0.922 (0.095)	0.752** (0.086)	0.979 (0.071)
Covariate shock impacts	1.030 (0.035)	1.090** (0.046)	1.071 (0.049)	1.041 (0.035)	0.998 (0.041)	0.944 (0.038)
Network-reliance						
First-degree relatives	1.009 (0.119)	1.500** (0.292)	1.030 (0.145)	1.399** (0.219)	0.967 (0.117)	1.033 (0.138)
Extended family	0.845 (0.052)	0.854** (0.067)	0.823*** (0.057)	0.856** (0.060)	1.022 (0.060)	0.971 (0.052)
Friends	0.960 (0.065)	0.870 (0.075)	1.009 (0.077)	0.928 (0.077)	0.972 (0.059)	0.918 (0.057)

(continued from previous page)

	Multiple price list	Financial risk tolerance question	Income series	Inheritance series	Maize price gamble	Rice price gamble
Village head	1.045 (0.048)	1.044 (0.066)	0.927 (0.050)	0.858** (0.057)	0.952 (0.041)	1.080* (0.044)
Connections to authorities	0.964 (0.029)	0.950 (0.033)	1.019 (0.025)	1.039 (0.027)	0.982 (0.021)	0.959** (0.020)
Village population	0.998 (0.002)	1.001 (0.002)	1.001 (0.002)	1.001 (0.002)	1.000 (0.002)	1.002 (0.002)
Village population squared	1.000 (1.55e-06)	1.000 (1.90e-06)	1.000 (1.85e-06)	1.000 (0.002)	1.000 (1.47e-06)	1.000 (1.45e-06)
F statistic (18, 272)	3.50***	4.05***	2.94*** ^a	3.64***	1.99**	1.75**
Sensitivity ^b	39.51%	25.56%	15.23%	13.39%	14.86%	71.47%
Specificity ^c	84.11%	95.51%	98.53%	99.24%	92.32%	45.16%
Pseudo R-squared ^d	0.116	0.200	0.128	0.151	0.054	0.049

Notes: Odds ratios are in bold with their robust standard errors are in parentheses. All regressions are clustered at the household level. The maize yield and rice yield gambles are not shown because in each model the null hypothesis that all slope parameters are jointly equal to zero cannot be rejected at the 10% level.

^a F(18, 271) for the income series.

^b Sensitivity refers to the predictions that the dependent variable is 1, conditional on observed values of 1

^c Specificity refers to the predictions that the dependent variable is 0, conditional on observed values of 0.

^d Pseudo R-squared values reported are from the unclustered logistic regression models. Pseudo R-squared values cannot be reported for the clustered models because they rely on likelihood ratios which are inapplicable to survey data since maximum likelihood estimation assumes that observations are independently and identically distributed. Despite the close similarity in results from the unclustered and clustered models, these reported Pseudo R-squared values should be interpreted with caution.

*** Significant at the 1 percent level. ** Significant at the 5 percent level. * Significant at the 10 percent level.

2.6.3 INTERGENERATIONAL TRANSMISSION OF RISK PREFERENCES

To examine whether there is intergenerational transmission of risk preferences, in separate regression analyses we explore whether risk preferences of the respondent's mother and father can explain the respondent's own risk preferences. Respondents were asked, "When you were young and still dependent on your parents, would you say that your mother was avoiding taking risks or fully prepared to take risks?" and then identified their mother's risk preferences based on the self-assessment scale. The same question was asked about the respondent's father. Because 55 respondents were unable to assess their parents' risk preferences, either because they did not feel they could make an accurate assessment or they did not grow up with their mother and/or father, we decided not to include parental risk aversion in the main analyses shown hitherto. This measure of parental risk aversion has the obvious disadvantage that the assessment is made by the children years later rather than by the parents themselves. Nevertheless, the measurement assesses perceptions of parental risk preferences which may influence respondents (Tversky and Kahneman, 1981).

We find weak evidence of intergenerational transmission of risk preferences. When the mother's and/or father's risk preferences are included in the regression analyses, the only assessment technique in which parental risk preferences are significant is the MPL (results are shown Table 2.9). The more risk averse the mother, the less risk averse the respondent, while the more risk averse the father, the more risk averse the respondent. These results deviate from previous studies which find that risk preferences of both the mother and father are positively related to children's risk preferences (Dohmen et al., 2012; Levin and Hart, 2003); however, these studies were conducted in developed countries and had better measurements of parental risk preferences since risk preferences were assessed from parents themselves. Further research is required to be able to make more conclusive statements about the impact of childhood experiences on risk preferences in a developing country.

Table 2.9: Intergenerational transmission of risk preferences

Type of regression	Tobit
Dependent variable	Constant relative risk aversion
Risk preference scale	-1.73 to 1.36
Observations	490
Lower limit	1.8%
Upper limit	13.3%
Constant	1.326 (0.408)
Gender	0.105* (0.061)
Age	0.006** (0.003)
Education	-0.026*** (0.010)
Help norm	-0.233*** (0.082)
Share norm	0.101 (0.078)
Organization membership	-0.051 (0.045)
Dependency ratio	-0.166 (0.158)
Poorest tercile	-0.072 (0.086)
Wealthiest tercile	0.089 (0.086)
Idiosyncratic shock impacts	0.019 (0.015)
Covariate shock impacts	0.010 (0.010)
Network-reliance	
First-degree relatives	-0.009 (0.050)
Extended family	-0.045** (0.018)
Friends	0.005 (0.019)
Village head	0.013 (0.013)
Connections to authorities	-0.016** (0.006)
Village population	-0.001** (0.001)
Village population squared	9.21e-07** (4.64e-07)
Mother's risk preference ^a	-0.081+ (0.049)
Father's risk preference	0.078* (0.042)
F-statistic (20, 254)	3.22***
Pseudo R-squared ^b	0.067

Notes: Standard errors are in parentheses. Standard errors are robust and linearized in the first model which accounts for cluster effects at the household-level.

^a Mother's and father's risk preferences were assessed by the respondents themselves via the self-assessment scale (see Section 2.6.3 for more information).

^b Pseudo R-squared is from the unclustered model. The Pseudo R-squared value cannot be reported for the clustered model because it relies on the likelihood ratio which is inapplicable to survey data since maximum likelihood estimation assumes that observations are independently and identically distributed. Despite the results from the unclustered and clustered models being very similar, the reported Pseudo R-squared value should be interpreted with caution.

*** Significant at the 1 percent level. ** Significant at the 5 percent level. * Significant at the 10 percent level. + Significant at the 15% level.

2.6.4 ROBUSTNESS TESTS

The following robustness tests were undertaken to assess whether the main implications and interpretations of the regression analyses remain the same under varying model specifications: (1) replacing wealth index terciles with expenditure terciles based on either 2007 or 2010 expenditure data; (2) changing the dependent variables from the midpoint of the CRRA to categorical values; (3) changing the specification of the tobit models to OLS; (4) changing the specification of the logistic models to linear probability models (i.e., OLS); (5) changing the specification of the logistic models to probit; (6) expanding the definition of extreme risk aversion in the logistic models; (7) excluding respondents who had never completed the first year of primary school; (8) specifying membership in organizations as an index variable based on how active the respondent is in the organization, similar to Narayan and Pritchett (1999); (9) removing all social capital variables; (10) removing respondents in the self-assessment scale and the financial risk tolerance question who selected the middle or average category, respectively; and (11) including dummy variables representing the respondent's ethnicity. In these robustness checks, some variables lose their significance and others become significant. However, in all but three cases,¹¹ the main implications and interpretations of statistically significant factors remain unchanged.

2.7 DISCUSSION OF RESULTS

2.7.1 COMPARISON TO OTHER STUDIES

The finding that the majority of respondents are risk averse supports other studies (e.g., Anderson and Mellor, 2009; Holt and Laury, 2002) and confirms that risk aversion, rather than risk neutrality, should be considered when analyzing smallholder decisions. The mean CRRA from the MPL in our study, 0.66, compares closely to other studies, such as 0.63 in northern

¹¹ The first case is in robustness test (6): greater network-reliance with the village head becomes statistically significant ($P < 0.10$) in the MPL logistic regression model when the definition of extreme risk aversion is expanded to include respondents who chose 7 safe options. The second case is in robustness tests (4) and (5): knowing more local authorities becomes statistically significant ($P < 0.10$) in predicting extreme risk aversion in the inheritance series when the model specification is changed from logistic to OLS or to probit. The third case is in robustness test (7): greater idiosyncratic shock impacts have a statistically significant ($P < 0.10$) negative impact on the odds of being extremely risk averse in the MPL when respondents who had never completed the first year of primary school are excluded from the analysis.

Vietnam (Tanaka et al., 2010) and 0.67 in Denmark (Harrison et al., 2007). Responses to the self-assessment scale (mean = 5.58) and the financial risk tolerance question (mean = 2.87) are also similar to those in other studies although respondents in our case tend to assess themselves as being more risk averse: the mean is slightly below 5 in Cesarini et al. (2009) in the self-assessment scale in a sample from Sweden and the mean is 2.39 in the financial risk tolerance question in Gilliam et al. (2010) in a sample from the United States. Results from the income and inheritance series follow a similar pattern: while 17.7% and 14.3% are in the most risk averse category in the income series and inheritance series in this study, respectively, in Anderson and Mellor (2009) only 4.1% and 5.2% are in these categories.

Although the R-squared values are low, they compare well to those in other studies. For example, the R-squared of the self-assessment scale in our study is 0.22, while that in a study by Dohmen et al. (2012) is 0.23. OLS models based on risk preferences elicited from the MPL in Tanaka et al. (2010) have R-squared values of about 0.08: If we use an OLS model instead of a two-limit tobit model to examine determinants of risk preferences based on the MPL, the R-squared value is 0.13.

The distribution and correlations of risk preferences based on the different elicitation methods provides evidence that measured risk aversion varies when assessed through non-hypothetical and hypothetical methods as well as through different decision domains. Correlations between the only non-hypothetical method (the MPL) and the hypothetical methods are lower than those among the hypothetical methods. Furthermore, based on the distribution of responses, respondents appear less risk averse in the self-assessment scale and financial risk tolerance question compared to the MPL. Other studies also find that risk aversion is lower when elicited through hypothetical techniques (e.g., Harrison, 2006; Holt and Laury, 2002). The degree of risk aversion elicited from the income, inheritance, maize, and rice series is much higher than in the MPL. This may be because these methods lack risk neutral or risk preferring options and involve much more substantial (though hypothetical) gains and losses compared to the windfall gain in the MPL. In general, the results show that the degree of risk aversion greatly differs by elicitation technique. Therefore, comparing risk preferences elicited through non-hypothetical and hypothetical methods or through different decision domains should be done with caution. Others also find that risk preferences are not stable across contexts (e.g., Barseghyan et al., 2011) and that framing effects may influence observed behavior (Tversky and Kahneman, 1981).

Correlations between risk preferences in our study are, for the most part, higher than those in other studies. For example, the correlation between the MPL and the self-assessment scale is 0.114 ($P < 0.01$) in Gloede et al. (2011) for subjects in Vietnam, while that in our study is 0.228 ($P < 0.01$). Anderson and Mellor (2009) find no significant correlation between the MPL and income series and a correlation of 0.22 ($P < 0.05$) between the MPL and inheritance series, while we find correlations of 0.165 ($P < 0.01$) and 0.147 ($P < 0.01$), respectively. Moreover, the correlation between the income series and inheritance series in Anderson and Mellor (2009) is 0.175 ($P < 0.10$), while that in our study is 0.425 ($P < 0.01$). Correlations may be, for the most part, higher and more statistically significant in this study because interview techniques relied on verbal, pictorial, and written methods which may have resulted in more accurate responses (Duklan and Martin, 2002). Correlations, however, are quite weak, particularly between the maize or rice series with the other methods. This may result from the elicitation methods measuring risk aversion for different decision domains as well as the previously mentioned lack of risk neutral and risk preferring options in the hypothetical scenarios eliciting a CRRA.

Inconsistencies were present between the income and inheritance series. One explanation could be prospect theory (Kahneman and Tversky, 1979). In the inheritance series, we did not tell respondents to assume that they would not receive an inheritance other than the hypothetical one in the scenario. Therefore, respondents who expect to receive a substantial inheritance may have internalized this expectation as a reference point in the inheritance series, which may have affected their responses. This, however, has little relevance in the study area: when respondents were asked at the beginning of the interview if their household expects to receive a substantial inheritance, major funds, or assets, only 7% stated yes. This indicates that for the vast majority of respondents, the reference point for the inheritance series is the same – i.e., a reference point of no inheritance.

The literature offers conflicting evidence about if and how respondent characteristics affect risk aversion. For example, we find that risk aversion decreases with education, confirming results in other studies (e.g., Gilliam et al., 2010) while deviating from others (e.g., Tanaka et al., 2010). Previous studies find a positive relationship between risk aversion and wealth (e.g., Cohen and Einav, 2007), while others find a negative one (e.g., Holt and Laury, 2002). We find evidence that respondents in both the poorest and wealthiest terciles are more risk averse than those in the middle wealth tercile. While respondents in the poorest tercile may be more risk

averse because they have fewer assets to rely upon, respondents in the wealthiest tercile may be more risk averse because of a relatively weak preference for status, which may reflect the Communist Party's emphasis on equality and the prior organization of farm households into cooperatives (Carlsson et al., 2007). Moreover, the wealthier may be satisfied with their living standard and may not want to take risks which may threaten their lifestyle, while those in the middle tercile may still want to achieve a higher living standard.

The literature suggests that shocks, especially covariate shocks, may impact risk preferences (Doss et al., 2008; Eswaran and Kotwal, 1990; Fafchamps and Lund, 2003). Impacts from shocks may depend on decisions taken by the household before the shock occurred based on risk preferences. For example, risk preferences may influence cropping patterns and selling decisions. Therefore, shock impacts may be partly endogenous. We find that covariate shocks have a significantly positive effect on risk aversion in the financial risk tolerance question models only, while idiosyncratic shocks have a significant positive effect on risk aversion in several models. Illness of a household member is the most common idiosyncratic shock. In the maize prices gamble, however, greater impacts from idiosyncratic shocks have an unexpected negative impact on risk aversion. Although government-provided health insurance covers general administrative fees and low-cost treatments, households must pay 70% of the costs for more serious treatments. Therefore, households must pay the lion's share for severe illnesses. All shock coefficients, however, have only a small effect on risk aversion given their low Beta-coefficients.

2.7.2 IMPACTS OF SOCIAL CAPITAL ON RISK PREFERENCES

Since social capital's influence on individual risk preferences has not been explicitly analyzed before, we cannot make comparisons with other studies. Instead, we discuss the results in light of previous literature on social capital. We find that cognitive social capital, namely norms, are important determinants of risk preferences: In most models, respondents agreeing with the helping others norm are significantly less risk averse, while those agreeing with the sharing gains with others norm are significantly more risk averse. The helping others norm may be particularly important for coordinating action between households when public or private sector substitutes are lacking (Collier, 2002). An explanation for the strong and significant positive impact on risk aversion from agreeing with the sharing gains with others norm may result from generalized reciprocity, which may prevent "one from accumulating much more than the average" (Cashdan, 1985, p. 456). Moreover, expectations of sharing with others may lower the risk premium since

individuals may be less willing to take risks if they believe that they would have to share their success with others.

Surprisingly, organizational membership – one of the most widely used proxies of social capital – is statistically significant in two models only and has a positive impact on risk aversion. Its positive effect may result from an emphasis on equality since mass organizations are largely functional groups attached to the Communist Party (Gray, 1999; Kerkvliet et al., 2003). This attachment may also explain why organizational membership is insignificant in most models: Social capital benefits from these organizations may be less than those from locally-formed organizations. Furthermore, Grootaert and van Bastalaer (2002) observe that organizational membership is not a relevant social capital indicator in countries where informal networks are more important.

Network-reliance is an important determinant of risk preferences; however, its directional impact on risk aversion depends on the particular social network. For example, network-reliance with extended relatives has a negative impact on risk aversion, while that with first-degree relatives has a positive one. In almost all models, network-reliance with friends or with the village head is insignificant, highlighting the importance of family in the traditional Vietnamese society. Although it may seem counterintuitive, the positive impact of network-reliance with first-degree relatives supports findings in other studies. For example, Sharma and Zeller (1997) find that credit groups containing a higher proportion of relatives have higher default, which may be because of cultural factors which “make it difficult to impose sanctions on relatives” (Sharma and Zeller, 1997, p. 1738). Moreover, social capital literature suggests that “fierce loyalties and familial attachments” may discourage people from “advancing economically” (Woolcock, 1998, p. 171). In addition, incomes among first-degree relatives are likely to be more highly correlated and if a risky investment supported by an intra-household investment fails, the household would be affected by the loss more severely than if the money had been borrowed from extended family members. Another factor is that people may be more committed to repay and to reciprocate loans to first-degree relatives, which may result in individuals choosing less risky investment strategies.

Village population and its square demonstrate that low closure is effective in reducing individual's risk aversion assessed from the MPL technique, but only up to a certain point – a village with about 1,300 residents. Socially distant individuals can exert less social pressure and

reciprocal obligations are less certain. In addition, it is more difficult in large communities to gather information about households, monitor and enforce contracts, and coordinate activities (De Weerd and Dercon, 2006; Murgai et al., 2002; Rosenzweig, 1988).

In summary, the analysis of how social capital impacts risk preferences demonstrates the importance of analyzing different forms of social capital separately as well as including less tangible forms of social capital, namely norms.

2.7.3 LIMITATIONS OF THE ELICITATION METHODS USED

There are a number of limitations of the elicitation methods used to assess risk preferences. First, the self-assessment scale may be biased due to framing effects since 23% selected the easily-identifiable middle category. We recommend that the self-assessment scale be re-scaled, such as from 0 to 9, to avoid an easily identifiable middle category. Second, in the income, inheritance, maize, and rice series, the certainty effect that people underweight probable outcomes compared with certain outcomes may have led respondents to choose the certain outcome over riskier ones (Kahneman and Tversky, 1979). Therefore, these measures may have overestimated the degree of risk aversion. Moreover, these methods lacked risk neutral or risk preferring options which may explain why they found much higher degrees of risk aversion than the MPL which included such options. Third, there is low applicability of the income and inheritance series and the MPL to real life decisions of smallholders in developing countries who have few opportunities to change their income earning activity or to receive windfall gains. Fourth, there are many drawbacks to the financial risk tolerance question, such as the dual thrust of response categories since they assume not only a willingness to take risks, but also an expectation of returns. We propose excluding expectations of returns from the response categories. Moreover, the conversion of responses from the financial risk tolerance question into numerical categories of risk aversion is problematic (Hanna and Lindamood, 2004). Fifth, the direction of causality of some respondent characteristics is unknown. Tanaka et al. (2010, p. 557) write, “Do preferences cause economic circumstances (e.g., through business formation), or do circumstances create preferences”?

Although the explanatory power of the models is similar to that in other studies, it is still low – particularly in the maize and rice gambles. One reason for the low explanatory power in these series may be that the four available price and yield options were not able to adequately capture varying degrees of risk aversion. Moreover, between 32% and 54% selected the first option (a

100% chance of the median price or yield), signifying that the second option (a 50/50 chance of a 15% lower/higher price or yield from the median) may have been deemed too risky. Thus, we propose offering respondents more refined yield and price options, such as a 5% higher/lower price or yield from the median.

Despite these limitations, we are confident that respondents understood the questions well because of the various interview techniques employed such as visual, oral, and written explanations. Empirical support of respondents' comprehension of the questions is seen, for example, in the low number of inconsistent responses within the MPL, income series, and inheritance series, as well as in the high percentage of respondents with the same risk classification in the income and inheritance series. Nevertheless, the low level of predictive power of the models clearly signals that other factors, such as personality traits and childhood experiences, are likely to be important in determining risk preferences.

2.8 CONCLUSIONS

Comparing risk preferences based on the nine elicitation methods yields several interesting findings. First, the results provide evidence that specific factors are significant determinants of risk preferences across most elicitation methods: gender, age, education, norms about helping others, norms about sharing gains with others, impacts from idiosyncratic shocks, network-reliance with extended family, and connections to local authorities. The significance of several social capital proxies suggests that people's risk preferences are embedded in social institutions. Second, respondents, on average, have a high degree of risk aversion, although this is not surprising considering the risks they face, such as illness, natural disasters, and livestock disease outbreaks, as well as the lack of adequate formal insurance mechanisms and little government assistance to buffer shocks. The greater impact of idiosyncratic shocks on risk preferences rather than covariate shocks, however, was unexpected. Third, even though correlations between most risk preference measures are statistically highly significant, they are rather weak in magnitude. This suggests that risk preference measures related to various decision domains should be compared with caution. Fourth, the low explanatory power of respondent characteristics in explaining risk preferences indicates that the examined factors can only partly account for risk preferences and that other characteristics may explain more variance. The low explanatory power

may also indicate that the methods used to elicit risk preferences may not be suitable in developing countries.

Comparing the elicitation methods allows insights into which method may be better adapted to assess risk preferences of smallholder farmers in a developing country. Although the MPL is the gold standard to assess risk preferences, there are several disadvantages of this method: it is expensive, requires numeracy, is time-intensive to train interviewers and to explain to respondents, and windfall gains are atypical for smallholders. Nevertheless, the MPL has clear advantages. Unlike hypothetical survey methods, it is incentive compatible and lacks framing effects which may shape behavior. The self-assessment scale may be the best alternative to the MPL since it has behavioral validity with responses to the MPL, is easier to administer and comprehend, and can be adapted to different scenarios (e.g., Dohmen et al., 2012). Although, the income series has several disadvantages – it has framing effects, is more difficult to comprehend, and requires more time to explain than the self-assessment scale – it involves potential losses. The question should be re-phrased to better reflect smallholders' lives, such as posing a question about a decision to reallocate land to a new cash crop with possible gains and losses.

Several opportunities present themselves for future research. First, the very low explanatory power of the models of risk preferences based on the maize and rice gambles is disappointing and underscores the importance of continued research on how to elicit risk preferences based on real life decisions. Second, more research is needed on the stability of risk preferences over time to analyze if and how risk preferences are affected by positive or negative shocks. Third, examining the explanatory power of risk preference measures in observed economic behavior would be relevant to test the validity of the methods. Fourth, identifying more explanatory factors of risk preferences, such as upbringing and past experiences is needed.

This research has several implications for policymakers. The result that most respondents are risk averse – with a large proportion being very risk averse – indicates that smallholders may be unwilling to change their production system by investing in new inputs or a new production system, for example, even if credit opportunities exist (e.g., Giné and Yang, 2009). The avoidance of investments deemed too “risky”, which could otherwise increase households' productive capacity, may keep the poor trapped in poverty (Rosenzweig and Binswanger, 1993; Morduch, 1994; Dercon, 1996). Education measures may enable smallholders to more realistically assess risks and make better-informed investment decisions. Policymakers should be

aware that encouraging risk-reducing or risk-increasing technologies may have different welfare impacts on smallholders based on their risk preferences and socio-economic characteristics (Picazo-Tadeo and Wall, 2011). Because of the high degree of risk aversion, policymakers and extension agents should recommend that smallholders invest step-wise in new opportunities or technologies. Open-ended interviews with village heads confirm that smallholders are reluctant to invest in new technologies without first witnessing their success. Ideally, farmers could actively participate in the hands-on operations of trial plots to help overcome any risk aversion. For example, Conley and Udry (2010) find that farmers imitate agricultural decisions of neighbors who had experienced successful agricultural production. The need for social protection policies and better health insurance coverage is apparent based on the finding that idiosyncratic shocks increase risk aversion. Moreover, risk-reducing policies such as agricultural insurance and other safety nets could be targeted to the most risk averse individuals – women, people whose households recently suffered from large idiosyncratic shocks, the older, and the less educated.

2.9 BIBLIOGRAPHY

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3 THE IMPACT OF IDIOSYNCRATIC AND COVARIATE SHOCKS ON CHANGES IN RISK PREFERENCES BETWEEN THE LEAN AND HARVEST SEASONS FOR SMALLHOLDER FARMERS IN VIETNAM

THEA NIELSEN, MANFRED ZELLER

Abstract

Previous studies emphasize that shocks cause households to fall into poverty traps and to remain there because of risk aversion. Despite this well-known connection between shocks and risk aversion with poverty traps, there has been no attempt to discern whether shocks influence risk preferences to change in a developing country. We examine whether shocks, social capital, and other characteristics influence changes in risk preferences from the lean season to the harvest season from household heads and spouses in a random sample of 300 households engaged in smallholder agriculture in northwestern Vietnam. The elicitation techniques encompass a non-hypothetical lottery game and six hypothetical methods. Except for one assessment method, risk preferences are not stable across seasons. Shocks and other characteristics significantly change risk preferences between seasons. Based on the findings, we provide policy recommendations to help households better cope with shocks and encourage them to pursue new livelihood strategies.

3.1 INTRODUCTION

Adverse shocks can push households under a poverty threshold, causing them to fall into poverty traps. This can result in detrimental short-term and even permanent outcomes for health, education, and income (Carter et al., 2007; Hoddinott, 2006). Households may be unable to escape poverty traps because they may be too risk averse and thus pursue low-risk, low-return livelihood strategies (Dercon, 1996; Lybbert and McPeak, 2012; Morduch, 1994; Rosenzweig and Binswanger, 1993). Although the literature emphasizes this connection between shocks and risk aversion with poverty traps, there has been no attempt to date to discern whether shocks influence risk aversion. If shocks cause individuals to become even more risk averse, this could increase the likelihood that households remain trapped in poverty because of pursuing more extreme low-risk, low-return livelihood strategies. This study examines whether risk preferences are stable from the lean season to the harvest season and whether shocks cause risk preferences to change among smallholder farmers living in an upland environment characterized by poverty and food insecurity in northwestern Vietnam.

Risk is a situation where alternative outcomes exist with known probabilities and is distinct from uncertainty since the former entails unknown probabilities (Knight, 1921).¹² Some people prefer taking risks and are thus risk lovers, others avoid taking risks and are thus risk averse, and others have no preference for or against risk and are thus risk neutral. There are many methods available to assess risk preferences including pairwise choice (e.g., Hey et al., 2009), willingness to pay or accept (e.g., Kachelmeier and Shehata, 1992), the Becker DeGroot Marschak mechanism (e.g., James, 2007), lottery choice task decisions (e.g., Holt and Laury, 2002), self-assessment questions (e.g., Cesarini et al., 2009), and hypothetical scenarios (e.g., Anderson and Mellor, 2009). In addition, risk preferences can be inferred from real life choices, such as the ratio of risky assets to less risky assets (e.g., Gilliam et al., 2010) or insurance deductibles (e.g., Cohen and Einav, 2007). Here, we elicit risk preferences using a lottery game with actual payouts – the so-called gold standard –, two widely applied self-assessment methods (the financial risk tolerance question and self-assessment scale), and four locally-adapted methods

¹² According to Knight (1921, p. 46), "while a single situation involving a known risk may be regarded as uncertain, this uncertainty is easily converted into effective certainty; for in a considerable number of such cases the results become predictable in accordance with the laws of chance, and the error in such prediction approaches zero as the number of cases is increased".

involving hypothetical price and yield gambles of the main cash crop (maize) and main food crop (rice).

There are only a handful of studies which have elicited risk preferences over time using more than one method (Guiso et al., 2011; Malmendier and Nagel, 2011; Vlaev et al., 2009). The majority of studies eliciting risk preferences over time rely on one technique only (e.g., Andersen et al., 2008; Brunnermeier and Nagel, 2008; Chiappori and Paiella, 2011; Doss et al., 2008; Harrison et al., 2005; Sahm, 2008). Furthermore, to the best of our knowledge, the only other study to examine changes in risk preferences over time in a developing country is Doss et al. (2008), although they measure risk perceptions based on a subjective and ordinal measure of self-identified risks rather than risk preferences based on a measure which can be compared to other studies. Findings from previous studies on the stability of risk preferences over time greatly vary. In some, risk preferences are stable (e.g., Andersen et al., 2008; Chiappori and Paiella, 2011; Cohen and Einav, 2007; Harrison et al., 2005), while in others they are unstable (e.g., Doss et al., 2008; Guiso et al., 2011; Meier and Sprenger, 2010; Sahm, 2008). One cause for this disparity is that these studies elicited risk preferences using quite disparate methods, such as lottery games or gambles (Andersen et al., 2008; Baucells and Villasís, 2010; Harrison et al., 2005; Vlaev et al., 2009), hypothetical income gambles (Baucells and Villasís, 2010; Sahm, 2008; Vlaev et al., 2009), self-assessment questions (Baucells and Villasís, 2010; Guiso et al., 2011; Malmendier and Nagel, 2011; Vlaev et al., 2009), rankings of self-identified risks (Doss et al., 2008), and real-life decisions about insurance contracts (Cohen and Einav, 2007) or the share of risky assets (Brunnermeier and Nagel, 2008; Chiappori and Paiella, 2011; Malmendier and Nagel, 2011). Studies which elicited risk preferences based on real-life decisions found that risk preferences are stable, which may be explained by "sticky" decisions: it requires a high time input to reallocate assets into or out of stocks or to choose new insurance deductibles. On the other hand, studies which elicited risk preferences using self-assessment questions found that risk preferences are unstable (Guiso et al., 2011; Meier and Sprenger, 2010; Vlaev et al., 2009) and studies which elicited risk preferences using gambles found a variety of outcomes: unstable risk preferences (Guiso et al., 2011), stable risk preferences (Andersen et al., 2008; Harrison et al., 2005), and only "modest changes" in risk preferences (Sahm, 2008). Besides differences in the elicitation methods among these studies, the time between surveys varied from three months (Vlaev et al., 2009) to six years (Sahm, 2008). Based on our literature review, we infer that the

different methods themselves rather than the various time lags between surveys are more influential in determining whether risk preferences are found to be stable.

Studies examining risk preferences over time have analyzed impacts of both time-variant and time-invariant variables on risk preference changes (Andersen et al., 2008; Brunnermeier and Nagel, 2008; Chiappori and Paiella, 2011; Guiso et al., 2011; Malmendier and Nagel, 2011; Sahm, 2008) or failed to examine any influencing factors (Baucells and Villasís, 2010; Meier and Sprenger, 2010; Vlaev et al., 2009; Zeisberger, et al., 2012). Our review of these studies which examined determinants of risk preference changes over time does not allow us to provide any definite conclusions about if, how, or why risk preferences may change over time. For example, while Sahm (2008) found that time-invariant characteristics such as gender, race, and education were significant in determining changes in risk preferences over time, other studies found no such relation (Andersen et al., 2008; Doss et al., 2004; Malmendier and Nagel, 2011). Several studies have found that time-variant characteristics – namely, changes in wealth, assets, or income – did not affect risk preference stability over time (Brunnermeier and Nagel, 2008; Chiappori and Paiella, 2011; Doss et al., 2008; Guiso et al., 2011; Malmendier and Nagel, 2011; Sahm, 2008), while Malmendier and Nagel (2011) found that low stock market returns decreased the willingness to take financial risk over time.

A few studies have analyzed whether shocks are significant in changing risk preferences. Most studies have found that national- or community-level shocks are significant (Doss et al., 2008; Guiso et al., 2011; Malmendier and Nagel, 2011; Sahm, 2008), while household- or individual-level shocks are not (Doss et al., 2008; Guiso et al., 2011; Malmendier and Nagel, 2011; Sahm, 2008). For example: Sahm (2008) found that major life events, such as a job loss or diagnosis of a serious health condition, did not change risk preferences over time for older respondents in the U.S., yet that general changes in the macroeconomic environment did; Doss et al. (2008) found that household-level shocks and changes in livestock assets did not change rankings of self-identified risks over time for respondents in East Africa, yet that community-level shocks did; and Malmendier and Nagel (2011) found that income did not influence changes in financial risk tolerance in the U.S., but that general stock market returns did. Therefore, the literature indicates that covariate shocks rather than idiosyncratic shocks may be more influential in changing risk preferences over time. Since idiosyncratic shocks, such as a job loss or major illness, can affect one's lifetime income quite severely, it is somewhat surprising to us that idiosyncratic shocks

were not found to affect risk preferences. On the other hand, perhaps risk preference changes are an outcome of a collective communication process that may be triggered by a covariate shock which affected peers as well, and an outcome of communication which may cause individuals to adopt the group's pessimism and become more risk averse. Covariate shocks, such as ever-increasing stock prices, may also work the other way, making people more risk-loving over time through communication and a community or even country-wide optimism about the future. Idiosyncratic shocks are less talked about in groups and thereby are less influenced by social processes and common opinion. In addition, households may be able to borrow from others in the area to cope with idiosyncratic shocks, but may be less able to do so if a covariate shock occurs (e.g., Platteau and Abraham, 1987). Therefore, risk preference changes may be more affected by covariate rather than idiosyncratic shocks.

To the best of our knowledge, no previous study has examined whether social capital affects risk preference changes over time. Previous studies have focused on how social networks function as an informal insurance mechanism against potential downfalls in consumption (Eswaran and Kotwal, 1990; Fafchamps and Lund, 2003; Platteau and Abraham, 1987) or in assets (Carter et al., 2007), how social capital influences formation of risk pooling groups (Attanasio et al., 2012; Barr et al., 2012; Murgai et al., 2002), and how social capital encourages firms to take risks (Steer and Sen, 2010). These studies suggest that individuals with more extensive networks and hence greater access to consumption credit, assistance in-kind, and capital markets are better able to cope with risks. Therefore, such individuals may have more stable risk preferences since they may be better able to smooth consumption over time. Social capital may be particularly important when government or private sector substitutes for risk coping mechanisms are not available or accessible (Collier, 2002; Murgai et al., 2002). We hypothesize that for most proxies of social capital, individuals with greater access to social capital may be better able to cope with negative shocks and therefore have more stable risk preferences or may have less stable risk preferences because of more social obligations at different times of the year.

In contrary to previous studies which used only one or a few elicitation methods, we systematically apply three widely-applied methods to elicit risk preferences as well as four locally-adapted methods to test whether findings differ by method. These methods are a lottery game – the so-called gold standard – developed by Holt and Laury (2002), a self-assessment

scale developed by the German Institute for Economic Research (DIW Berlin), the financial risk tolerance question which originates from the U.S. Federal Reserve Board's Survey of Consumer Finances, and four locally-adapted methods involving gambles of prices and yields for maize and rice based on Hill (2009). This study provides several contributions to the literature by: 1) examining the stability of risk preferences from the lean season to the harvest season based on seven elicitation methods for smallholder farmers in a developing country; and 2) identifying determinants, including social capital and idiosyncratic and covariate shocks, of changes in risk preferences across seasons. To the best of our knowledge, there is no previous study which analyzes the stability of risk preferences elicited from such a wide range of techniques for respondents living in a developing country or which examines whether various facets of social capital influence changes in risk preferences over time. Moreover, this is the first study to examine if shocks can change risk preferences of respondents living in a developing country. We analyze how changes in risk preferences are affected by: the time component of a shock by examining shock impacts experienced at different intervals in time prior to the interview date; and by the characteristic of the shock by examining drought, livestock death, other covariate shock, and idiosyncratic shock impacts. Influencing factors of changes in risk preferences across seasons are examined for each of the seven assessment methods separately, thereby allowing for more robust evidence of our findings across elicitation methods. Examining changes in risk preferences elicited from such a variety of methods also allows us to test whether different elicitation methods matter for both outcomes and determinants of risk preferences stability.

In summary, previous studies are inconsistent in demonstrating whether risk preferences are stable over time and in identifying influencing factors for their instability. Therefore, this study may help disentangle the effect of the elicitation method on the stability of risk preferences over time and provide more robust evidence of findings across the elicitation methods. Moreover, this study seeks to contribute to closing the knowledge gap on how time-variant and time-invariant factors influence changes in risk preferences. The remainder of this paper proceeds as follows: Section 3.2 presents the study area with regards to the importance of shocks and social capital, Section 3.3 describes the risk preference elicitation techniques, Section 3.4 presents the conceptual framework, Section 3.5 describes the regression models and data used, Section 3.6 examines and discusses the results, and Section 3.7 provides conclusions as well as research and policy recommendations.

3.2 DESCRIPTION OF THE STUDY AREA

This study was conducted in Yen Chau district, a marginal upland area in northwestern Vietnam. Yen Chau is inhabited primarily by ethnic minorities of which the largest are Black Thai and H'mong, accounting for 55% and 20% of the district's population, respectively. Kinh ("ethnic Vietnamese") constitute another 13%. Rice is grown in paddy fields in the lowlands mainly for home consumption, although nearly half do not produce enough rice to meet their consumption needs. Maize, on the other hand, is grown in the uplands as a cash crop with the vast majority of households selling almost all harvested maize. Nearly all households are engaged in maize production on steep slopes which results in high levels of soil erosion. Although outsiders may perceive this production system to be a risky livelihood strategy since it degrades soil and relies heavily on high-yielding maize varieties and hence fertilizer, respondents perceive it as a very low-risk income earning activity: When asked to rank nine agricultural activities in terms of their riskiness for household income, less than 10% selected maize as being the most or second most risky agricultural activity and less than 5% selected maize as being the third or fourth most risky agricultural activity. Therefore, respondents consider maize production to be one of the *least* risky agricultural activities to earn income. Social capital is important in Yen Chau to secure credit which is mainly used to finance food purchases, agricultural inputs, social events, education, and health care. Most loans are collateral-free and are lent by neighbors, acquaintances, or relatives who live within the village or district. Thus, most credit transactions rely on social collateral rather than physical collateral (Karlan et al., 2009).

The average daily per capita expenditures are equivalent to \$2.35 in purchasing power parity (PPP).¹³ Food security is a concern: Nearly three-quarters of household heads reported worrying about exhausting food supplies before there was either enough earned income or before the next harvest season. One cause of food insecurity is shocks; the most frequent shocks are drought, livestock death, yield loss from pests or diseases, and illness of a household member. For example, nearly all households reported losses from a drought in the unusually cold winter of 2010/2011 which resulted in widespread livestock deaths. To cope with this extreme winter,

¹³ The average daily per capita expenditures in 2010 were 19,740 Vietnamese dong (VND). These expenditures were updated for inflation and converted to their purchasing power parity (PPP) equivalent: 10,178.57 VND/\$1 PPP (General Statistics Office, 2012; The World Bank, 2012).

households resorted to consumption smoothing (by using savings and selling livestock) and asset smoothing (by reducing food and non-food consumption): Four-fifths of households affected by the drought reported reducing consumption and over half reported reducing food consumption to cope with the drought. In addition, households sold livestock, changed agricultural practices, sought off-farm employment, and/or took out loans. Previous studies have identified shocks as a major cause for households to fall into poverty (e.g., Carter et al., 2007). Household heads in Yen Chau confirmed this: 29% stated that the most important cause for households to fall into poverty is drought and 20% stated that it is the illness or death of a working household member. Mechanisms to cope with negative shocks also impact non-poor households who may not be vulnerable to falling into poverty, such as by depleting assets.

In summary, the study area is characterized by poverty, food insecurity, a heavy reliance on social capital, and covariate and idiosyncratic shocks.

3.3 METHODS TO ELICIT RISK PREFERENCES

Seven methods were applied to elicit risk preferences: a non-hypothetical lottery game, two self-assessment techniques (the financial risk tolerance question and self-assessment scale), and four locally-adapted hypothetical gambles involving varying prices and yields of the main cash crop (maize) and main food crop (rice) in Yen Chau. The non-hypothetical method, a lottery game, involved actual payouts whereas the hypothetical methods asked respondents to assess their own risk preferences or involved gambles which were hypothetical only. In all methods applied, larger numbers indicate a higher degree of risk aversion. Other methods to elicit risk preferences include willingness to pay or accept, the Becker DeGroot Marschak mechanism, hypothetical income and inheritance gambles, and inferring risk preferences from real life choices such as the ratio of risky assets to less risky assets. Willingness to pay/accept gambles and the Becker DeGroot Marshak mechanism were not applied because they would be too difficult for respondents to comprehend and require high time-inputs to train enumerators and explain to respondents. Income and inheritance gambles were not applied given concern of their inapplicability in the area, which was found in Chapter 2. In addition, data availability prevented eliciting risk preferences from real-life decisions. Finally, respondent fatigue was a concern.

3.3.1 NON-HYPOTHETICAL ELICITATION METHOD

The only non-hypothetical elicitation method applied is a lottery game called the multiple price list technique (hereafter, MPL) based on Holt and Laury (2002). In the MPL, subjects were given a set of ten choices between two options – a relatively safer option (Option A) and a relatively riskier option (Option B). Each option had two possible payouts with different probabilities of each payout being realized (see Table 3.1). The payouts in the safer option had a lower variance than those in the riskier option. In the first four choices, the expected value (which was not shown to subjects) of the safer option was greater than that of the riskier option, whereas in the last six choices the opposite was the case because the probability of the high payout being realized increased by 10 percentage points in both options with each subsequent choice. Risk preferences are based on the point at which subjects switched from the safer option to the riskier one. According to expected payouts, approximately risk neutral people will switch to the riskier option in the fifth choice, while risk preferring and risk averse people will switch to the riskier option before and after the fifth choice, respectively.

Table 3.1: Choices in the multiple price list

Choice (row)	Probability of high and low payouts		Payouts in the safer option (Option A) in ‘000 VND			Payouts in the riskier option (Option B) in ‘000 VND			E(A)-E(B)
	Low	High	Low	High	E(A)	Low	High	E(B)	
1	0.90	0.10	33.0	41.0	33.8	2.0	79.0	9.7	24.1
2	0.80	0.20	33.0	41.0	34.6	2.0	79.0	17.4	17.2
3	0.70	0.30	33.0	41.0	35.4	2.0	79.0	25.1	10.3
4	0.60	0.40	33.0	41.0	36.2	2.0	79.0	32.8	3.4
5	0.50	0.50	33.0	41.0	37.0	2.0	79.0	40.5	-3.5
6	0.40	0.60	33.0	41.0	37.8	2.0	79.0	48.2	-10.4
7	0.30	0.70	33.0	41.0	38.6	2.0	79.0	55.9	-17.3
8	0.20	0.80	33.0	41.0	39.4	2.0	79.0	63.6	-24.2
9	0.10	0.90	33.0	41.0	40.2	2.0	79.0	71.3	-31.1
10	0	1.0	33.0	41.0	41.0	2.0	79.0	79.0	-38.0

Notes: Payouts were adjusted for inflation. In the second survey round (in the harvest season), Option A had payouts of 35,000 VND and 44,000 VND and Option B had payouts of 2,000 VND and 85,000 VND. The purchasing power parity in 2011 is 10,179 VND/\$1 (The World Bank, 2012).

The highest payout amount, 79,000 VND, is equivalent to about 3.3 times the average daily per capita expenditures in our sample, 23,905 VND or \$2.35 at purchasing power parity (PPP). Therefore, the highest potential payout can be considered substantial for respondents. To help subjects understand the ten choices, each choice was explained one at a time along with pie

charts and explanations of probabilities via a ten-sided die (Appendix 6.7 contains the instructions and choices). After all ten choices had been completed, subjects were shown their selections and given an opportunity to change any responses before one of the ten choices was randomly selected for an actual payout.

There are several approaches to analyze selections in the MPL. Similar to other studies using this technique (e.g., Holt and Laury, 2002), we base risk preference labels on the total number of safer options chosen (see Table 3.2). Moreover, we calculate the constant relative risk aversion (CRRA) interval based on the CRRA utility function:

$$U(Y) = Y^{(1 - r)/(1 - r)} \text{ for } r \neq 1 \quad (1)$$

where r is the CRRA and Y is the payout amount in the lottery.¹⁴ The CRRA is less than 0 for subjects who are risk lovers, equal to 0 for subjects who are risk neutral, and greater than 0 for subjects who are risk averse. The CRRA is preferable to other risk aversion parameters since it has a scale invariance property. Thus, the CRRA can be compared across studies. Using this utility function, we can calculate the lower and upper bounds of a subject's CRRA. Risk preferences are determined by the midpoint of the CRRA interval though subjects who chose the safer option nine (zero) times are assigned a CRRA equal to the lower (upper) bound of the CRRA interval since the upper (lower) bound equals infinity (negative infinity). Eight respondents were excluded that had selected the safer option in the last choice since the probability of winning the high payout is 100% in the this choice and therefore it is not rational to select the safer option which has a lower guaranteed payout.

¹⁴ We adopt the terminology of CRRA based on other studies using the MPL technique. The correct terminology for the above described CRRA, however, is a partial risk aversion coefficient since the utility function is defined in terms of gains and losses rather than wealth (Hardaker et al., 2004).

Table 3.2: Risk preferences based on the multiple price list (N = 530)

Total number of safer options chosen	Risk preference label ^a	Constant relative risk aversion interval	Percent of subjects in the lean season	Percent of subjects in the harvest season
0	Extremely risk loving	$r < -1.73$	1.7	4.0
1	Highly risk loving	$-1.73 > r < -0.96$	0.9	2.3
2	Very risk loving	$-0.96 > r < -0.49$	0.8	0.9
3	Risk loving	$-0.49 > r < -0.15$	2.6	3.0
4	Approx. risk neutral	$-0.15 > r < 0.15$	10.2	15.1
5	Slightly risk averse	$0.15 > r < 0.41$	11.7	20.9
6	Risk averse	$0.41 > r < 0.67$	19.8	22.1
7	Very risk averse	$0.67 > r < 0.97$	17.7	17.9
8	Highly risk averse	$0.97 > r < 1.36$	20.2	9.8
9	Extremely risk averse	$r > 1.36$	14.3	4.0

Notes:

^a Labels are similar to those in previous studies; however, we separate respondents who never chose the safer option from those who chose the safer option once and we label respondents who chose the safer option four times as being “approximately risk neutral” rather than “risk neutral”. Moreover, we exclude eight subjects who chose the safer option in the last choice.

3.3.2 HYPOTHETICAL ELICITATION METHODS

The six hypothetical methods to assess risk preferences are two widely applied self-assessment techniques (the financial risk tolerance question and self-assessment scale) and four locally-adapted hypothetical questions involving price and yield gambles for maize and rice.

Unlike the other methods, the financial risk tolerance question and self-assessment scale allow subjects to explicitly identify their own willingness to take risks. The financial risk tolerance question originates from the U.S. Federal Reserve Board’s Survey of Consumer Finances and has been widely applied in the U.S. to gauge risk preferences (e.g., Gilliam et al., 2010). Respondents were asked the amount of financial risk they are willing to take: (1) substantial financial risks, expecting to earn substantial returns; (2) above average financial risks, expecting to earn above average returns; (3) average financial risks, expecting to earn average returns; or (4) not willing to take any financial risks (shown in Appendix 6.8). The self-assessment scale is based on the German Socio-Economic Panel Study conducted by the German Institute for Economic Research (DIW Berlin) and has also been widely applied to elicit risk preferences. In addition, Dohmen et al. (2012) have confirmed the behavioral validity of this measurement. In the self-assessment scale, subjects were shown a scale with integers ranging from 0 (= fully avoiding risks) to 10 (= fully prepared to take risks) and asked to point to the integer best

matching their willingness to take risks (shown in Appendix 6.9). Afterwards, responses were rescaled so that 0 represents the most risk preferring and 10 the most risk averse. Unlike the other assessment methods in which a CRRA interval is elicited, risk preferences are categorical classification in these two techniques.

The last set of hypothetical methods to assess risk preferences consists of gambles with varying yields and prices of maize and rice. The maize and rice gambles relate to local conditions and are thus more familiar to respondents because they relate to the main cash crop and food crop, respectively. The gambles are based on Hill (2009); however, we use yields and prices which lie within the minimum and maximum ranges in the study area. Respondents were asked which of four options of varying yields and prices for maize and rice they would prefer every year, assuming that prices and yields remain constant, respectively. Each gamble includes four options: The first option has a 100% chance of the median price or yield from Yen Chau, while each subsequent option has a 50/50 chance of a price or yield which is 15% lower or higher than the median (Appendix 6.12-6.15 contain the rice and maize gambles). Based on the scenario chosen, a CRRA interval can be calculated. We determine risk preferences based on the midpoint of the CRRA interval; however, unlike the MPL, the maize and rice gambles include no explicit risk neutral or risk preferring options. In the first (second) survey round, median yields and prices were based on data from 2009 (2010). Prices were adjusted for inflation.¹⁵ Enumerators read the question aloud and pie charts were used as visuals to further aid comprehension.

Assessing risk preferences from such a wide range of techniques – a lottery game with actual payouts, two hypothetical self-assessment-type questions (a financial risk tolerance question and a self-assessment scale), and four hypothetical yield and price gambles of maize and rice – allows us to examine whether determinants of risk preference instability across seasons vary by elicitation technique and provide more robust findings across the elicitation methods.

¹⁵ Updating these gambles in the second survey round based on data in 2010 had very slight changes in the CRRA intervals because of needing to round numbers to make sense for the local currency. Because changes in the CRRA intervals were so small, we applied the same CRRA intervals for the second survey round as in the first survey round. The same holds true for the MPL technique in which gambles in the second survey round were also adjusted to account for inflation.

3.4 CONCEPTUAL FRAMEWORK TO IDENTIFY CHANGES IN RISK PREFERENCES ACROSS SEASONS

There is no consensus on whether risk preferences change over time and if so, what causes these changes. Although previous studies have analyzed whether time-invariant characteristics, such as gender, influence the stability of risk preferences, they fail to provide a conceptual framework. Based on theoretical justifications and the inclusion of particular parameters in previous studies, we hypothesize that changes in risk preferences across seasons are a function of the season in which risk preferences were elicited (the lean season or the harvest season), the decision domain, time-invariant characteristics, and time-variant characteristics.

Risk preferences were first assessed in the lean season in April and May of 2011 after an unusually cold and dry winter and then reassessed seven to eight months later in the maize harvest season. The season in which risk preferences were elicited could affect risk preferences given the different conditions of households in each season as well as varying emotions at these different times of the year. Previous studies have found that emotions, past experiences, and even moods can induce changes in risk preferences (e.g., Guiso et al., 2011; Kuhnen and Knutson, 2011; Leith and Baumeister, 1996; Lerner and Keltner, 2011; Slovic et al., 2004). In the lean season, households wait to harvest rice and are either depleting stored rice, purchasing rice, or borrowing rice from others. Some households mix cassava, an inferior food item in Yen Chau, with rice to avoid having to purchase rice. Maize is harvested in November and December and is a major source of cash income. Weddings and other ceremonies are more common in the months after the harvest season than at any other time of the year. Although weddings are a jovial event involving heavy drinking, households are obligated to give monetary gifts. Given these different situations: on the one hand, respondents could become less risk averse in the harvest season if elicited risk preferences reflect more current situations since cash is more plentiful and households are better able to purchase food and other essentials in the harvest season; on the other hand, respondents could become more risk averse if risk preferences reflect the future more since respondents could be anxious about the possibility of another harsh winter. Nevertheless, risk preferences may not change at all. In classical theory, individuals have one value function throughout their lifetime wealth and thus risky decisions should take into account the same value function and would be subject to the same risk preferences (Cohen and Einav, 2007).

The decision domain refers to the sphere in which the assessment method pertains to and is captured by the various elicitation methods relating to non-hypothetical windfall gains (the MPL), income-generating activities (the maize gambles), household food security (the rice gambles), financial investments (the financial risk tolerance question), an overall willingness to take risks (the self-assessment scale), self-identification of risk preferences (the financial risk tolerance question and self-assessment scale), and gambles (the MPL, maize gambles, and rice gambles). The decision domain has been found to be an important factor to consider in measuring risk preferences (e.g., MacCrimmon and Wehrung, 1990; Soane and Chmiel, 2005) and thus may be a determinant of the stability of risk preferences across seasons. For example, households may become less risk averse in the harvest season according to the MPL because cash is more plentiful then and therefore potential winnings from the lottery game may not be as important relative to the household's cash supply compared to when risk preferences were first elicited during the lean season when cash was scarcer. Moreover, learning effects may be greater in the lottery game compared to the other methods since the lottery game is more complicated for respondents to comprehend compared to the other methods. Learning effects may influence respondents to become less risk averse in the second survey round since respondents may be better able to estimate expected values in the second survey round and thus may not be as risk averse compared to the first survey round, as was shown in Chapter 2. In the rice and maize gambles, respondents may be more risk averse in the harvest season through their anticipation of another harsh winter with limited access to food. Changes in risk preferences based on the two self-assessment-type questions (the financial risk tolerance question and self-assessment scale) may differ from the other methods. These two methods could represent past experiences (i.e., how respondents feel that they coped with past difficulties), the present situation (i.e., how respondents feel on the day of the interview), or future experiences (i.e., how respondents expect they will cope with future difficulties). Again, if risk preferences reflect more an anticipation of future experiences, respondents may become more risk averse in the harvest season in anticipation of another harsh winter, yet if they reflect the current situation more, then respondents may be less risk averse in the harvest season.

Descriptions and summary statistics of the time-invariant characteristics hypothesized to influence changes in risk preferences across seasons are shown in Table 3.3. Although some variables labeled as time-invariant can clearly change over time, such as age and education, some

did not change over the seven months between the lean and harvest seasons (such as gender and age) and others are unlikely to change. For example, social capital is quite persistent and likely to remain stable over seven months (Azariadis and Stachurski, 2005; Hulme and Shepherd, 2003). Therefore, we label these variables as time-invariant.

The time-invariant individual-level variables include gender, age, and education. Women may become more risk averse in the harvest season because men gamble and drink more in the harvest season. In addition, women may be more concerned with how to extend the family budget as far into the winter as possible: Cash is important in the coming months since nearly half of households do not grow enough rice to meet consumption needs and rice is harvested in October and November, usually before the maize is harvested. The older and less educated may become more risk averse because they may have fewer available mechanisms to cope with the upcoming winter compared to younger and more educated respondents. While some previous studies have found that education has a decreasing effect on risk aversion over time and that age and female gender have an increasing effect (Guiso et al., 2011; Sahm, 2008), others have found that these characteristics exert no influence (Doss et al., 2008; Malmendier and Nagel, 2011).

The other time-invariant variables are proxies of social capital. The most widely accepted definition of social capital is by Putnam (1995, p. 67) who defines social capital as "features of social organization such as networks, norms, and social trust that facilitate coordination and cooperation for mutual benefit". As described in Section 3.2, social networks are important avenues in Yen Chau to obtain credit. Informal lenders dominate the credit market with most being neighbors, acquaintances, or relatives who live within the village or district. Relying upon family and acquaintances promotes information flows, trustworthy behavior, cooperation, and sanctions (Attanasio et al., 2012; Coleman, 1988; Karlan et al., 2009). Based on findings in previous studies that social capital is effective in risk-sharing (Attanasio et al., 2012; Eswaran and Kotwal, 1990; Platteau and Abraham, 1987), we hypothesize that, in general, respondents with greater access to social networks will have more stable risk preferences since they may be better able to smooth consumption and to cope with risks from season to season.

Table 3.3: Descriptive statistics and summary of time-invariant characteristics (N = 538)

Variable	Description	Mean	Standard deviation
<i>Individual-level variables</i>			
Gender	Dummy = 1 if the respondent is female, 0 otherwise	0.52	0.50
Age	Age of respondent in years.	44.43	11.74
Education	Years of formal schooling completed.	5.78	3.98
Helping others norm	Dummy = 1 if the respondent agrees that others in the village are expected to help a household who takes a risk and loses, 0 otherwise.	0.66	0.47
Sharing with others norm	Dummy = 1 if the respondent agrees that a household who takes a risk and gains is expected to share its gain with others in the village, 0 otherwise.	0.46	0.50
Organizational membership	Number of organizations the respondent is a member of	1.36	0.76
<i>Household-level variables^a</i>			
Dependency ratio	Ratio of household dependents (< 15 or > 64 years of age) to non-dependents.	0.29	0.22
Network-reliance with...	The sum of “easy” responses from: “If you or another household member asked, would it be easy or not easy to borrow money for education (or for health expenses, a positive social event, a negative social event, or to borrow a water buffalo, or to ask for labor) from (see social networks below)”		
First-degree relatives		5.77	0.88
Extended family		4.47	1.97
Friends		4.80	1.84
Village head		3.95	2.70
Connections to authorities	The number of authorities at the commune, district, or provincial level that members of the household know personally	3.24	4.70
Village population ^b	Number of people living in the village	547.64	272.86

Notes:

^a An additional household-level variable hypothesized to influence changes in risk preferences across seasons is the wealth tercile of the household based on a wealth index which includes a range of indicators capturing multiple dimensions of poverty (see Footnote 18 for more details).

^b The square of village population is another hypothesized influencing factor of changes in risk preferences across seasons.

To capture distinct concepts of social capital, we use several proxies. Although doing so is recommended in the literature, most studies rely on one proxy only. The distinct concepts of social capital are the following: low and high closure which means having loose networks and sharing many common friends, respectively (Burt, 1995; Coleman, 1988; Granovetter, 1973); structural social capital which includes more observable social structures such as networks (Grootaert, 2002); cognitive social capital which includes less tangible elements such as norms and reciprocity (Grootaert, 2002); and linking social capital which involves relationships between people who interact across formal or institutionalized power in society (Szreter and Woolcock, 2004). The social capital proxies in this study are norms of helping others (cognitive social capital), norms of sharing gains with others (cognitive social capital), membership in organizations (structural social capital), the ease of relying upon various social networks (structural and cognitive social capital), connections to local authorities (linking social capital), and the village population and its square (to capture low vs. high closure). Data for these variables were collected in the lean season. All but three correlation coefficients of these various social capital proxies are lower than 0.3 and the regression analyses in Section 3.6.2 confirm that these proxies indeed measure distinct concepts of social capital.¹⁶ Below, we specify our hypotheses for how these various facets of social capital may influence risk preference changes across seasons.

Norms capture reciprocity which is critical for coping with risks (Lyon, 2000; Murgai et al., 2002; Platteau and Abraham, 1987) and may be particularly important in Vietnam given the country's emphasis on equality through its political system and previous organization of farms in cooperatives. Norms may influence risk preference stability because of increased social pressure to share gains with others during the harvest season. Information is incredibly fluid and transparent within and between villages in Yen Chau. Therefore, when cash is plentiful in the harvest season, a household may not want to make a risky investment knowing that others may view this household as having excess cash to spare. Therefore, respondents who agree with the

¹⁶ The highest correlation is between the helping others norm and sharing gains with others norm (Spearman correlation coefficient = 0.564, $P = 0.000$); the second highest is between network-reliance with friends and network-reliance with the village head (Spearman correlation coefficient = 0.487, $P = 0.000$); and the third highest is between network-reliance with first-degree relatives and network-reliance with extended family (Spearman correlation coefficient = 0.358, $P = 0.000$).

sharing gains with others norm may become more risk averse in the harvest season since they may feel more obligated to share their cash income with others at this time of the year. In addition, we hypothesize that the sharing gains with others norm will be more important in determining changes in risk preferences across seasons than the norm about helping others who take a risk and fail because it is more common for households to share gains (i.e., income from the maize harvest) with others in the harvest season through cash gifts at celebrations and events at that time of the year. Therefore, the importance of the sharing gains with others norms is likely to be greater than that of the helping others norm.

The other individual-level measure of social capital is membership in organizations, which underscores Putnam's concept that civic engagement gives rise to social capital (Putnam, 1995). Many studies have used membership in organizations as an indicator of social capital (e.g., Narayan and Pritchett, 1999). The most frequent organizations people in Yen Chau belong to are the Farmer Union and Women Union, which are highly bureaucratic and have strong ties to the government (Gray, 1999; Kerkvliet et al., 2003). If people with greater access to social networks through organizations are expected to share their gains from the maize harvest with more people, such as through ceremonial gifts, they may become more risk averse in the harvest season. On the other hand, people with greater access to these social networks may become less risk averse in the harvest season because of attending more celebratory events and acquiring a more risky vibe at these jovial social events. Yet, attending ceremonies in the harvest season may be predictable and therefore organizational membership may not affect risk preference changes across seasons. Moreover, people with greater access to social capital through organizations may have more stable risk preferences if they are better able to smooth consumption.

Network-reliance and connections to local authorities are proxies for social capital at the household-level because they were asked to the household head only and are assumed to be relevant for all household members. Network-reliance variables capture the degree to which households can rely on first-degree relatives, extended family, friends, and the village head and are included based on the concept that "networks create trust when agents use connections as social collateral to facilitate informal borrowing" (Karlan et al., 2009, p. 1308).¹⁷ Based on the

¹⁷ Our measurement of network-reliance is consistent with Fafchamps' (1999) notion of risk-sharing via consumption credit and assistance in-kind as well as Simmel's (1950) concept of reciprocity transactions. Reciprocity transactions are "giving and returning the equivalence", such as favors between neighbors, without

importance of family in traditional Vietnamese society (Hoang et al., 2006) and previous studies which found family ties to be important in risk sharing (Attanasio, et al., 2012; Murgai et al., 2002; Rosenzweig, 1988), we hypothesize that network-reliance with family members may be more important in determining changes in risk preferences across seasons than network reliance with others. The final social capital proxy is the village population and its square, which measure the concepts of high closure and low closure. Again, we are unsure of the directional impact on risk preferences of greater network reliance as well as the village population and its square given the above reasoning – the influence of past or current situations versus future outlooks, the influence of attending more social events such as weddings, and the hypothesis that households with greater access to social networks may have more stable risk preferences.

Other time-invariant household-level variables are the poorest and wealthiest tercile of the wealth index and the household's dependency ratio. The wealth index includes a range of indicators, capturing multiple dimensions of poverty.¹⁸ We hypothesize that individuals living in households in the poorest tercile and with higher dependency ratios will have less stable risk preferences because of a lower capacity to cope with shocks (Zimmerman and Carter, 2003) and because of facing greater credit constraints (Simtowe et al., 2008). We are uncertain, however, of the direction of the impact: respondents living in poorer households and households with greater dependency ratios may become less risk averse in the harvest season if risk preferences are more of a reflection of the current situation. On the other hand, respondents living in such households may become more risk averse in the harvest season in light of the approaching winter.

Besides the above characteristics that are unlikely to change over seven months yet which may influence risk preference changes from the lean season to the harvest season, impacts from

which social cohesion could not exist (Simmel, 1950, p. 387). Instead of a borrowing limit (Karlan et al., 2009) or the number of ties the household can rely on for help or who depends on the household for help (De Weerd and Dercon, 2006; Fafchamps and Lund, 2003), our measurement of network-reliance captures the ability to rely on various networks to borrow not only money, but also a water buffalo or labor given their importance for agricultural households. Moreover, we analyze the impact of network-reliance with distinct social networks; namely, first-degree relatives, extended family, friends, and the village head.

¹⁸ Households were classified into wealth terciles based on a linear composite index which measures the relative wealth status of a household within our sample relying on data from 2006 and 2007. The index is constructed by principal component analysis (Dunteman, 1994) and represents households' scores on the first principal component extracted, which follows a standard normal distribution.

shocks may determine risk preference changes since past experiences, fear, and anxiety have been found to influence risk preferences (e.g., Guiso et al., 2011; Kuhnen and Knutson, 2011; Lerner and Keltner, 2011; Slovic et al., 2004). To better qualify the impact of shocks, monetary losses from shocks were divided by the household's annual average per capita expenditures from data collected in 2010. This allows a better representation of shock impacts for each household. The shock variables are first differences and therefore equal the difference between the monetary shock impacts experienced between the harvest season and lean season minus the monetary shock impacts experienced seven to eight months before the lean season. For example, if a household's per capita annual expenditures equal 30 million VND and the household incurred a loss valued at 10 million VND from the death of a water buffalo between the lean season and the harvest season and no livestock deaths were reported seven months prior to the lean season, then the first-differenced shock impact variable for livestock deaths would equal one-third (10 million VND/30 million VND). To analyze whether impacts from more recent shocks have a greater effect on risk preference changes, we examine idiosyncratic and covariate shock impacts experienced at different intervals in time prior to the interview (within two months, three to four months, five to six months, and seven to eight months before the interview). Moreover, we examine whether the type of shock is important for risk preference changes by analyzing impacts from drought, livestock deaths, other covariate shocks, and idiosyncratic shocks. Besides negative shocks, we include positive shock impacts; namely, social event expenditures and gifts.

As discussed in the introduction, although the impact of shocks on smallholders' risk preferences has not been examined before, the literature suggests that greater shock impacts – particularly covariate shocks – may increase their risk aversion (Doss et al., 2008; Eswaran and Kotwal, 1990; Fafchamps and Lund, 2003) and that shocks experienced closer to the interview may have a greater influence on risk preferences compared to shocks experienced at a later date (Malmendier and Nagel, 2011). Thus, we hypothesize that covariate shocks as well as shocks experienced closer to the survey date will have a greater affect on risk preferences.

3.5 DATA AND REGRESSION MODELS USED

Data were collected in a random sample of 300 households, representative of Yen Chau district, Son La Province in northwestern Vietnam. A cluster sampling procedure was followed in which first a village-level sampling frame was constructed. All villages in Yen Chau district were

included except for those in four sub-districts bordering Laos because of difficulties in obtaining research permits there. Of these villages, 20 were randomly selected using the Probability Proportionate to Size (PPS) method (Carletto, 1999) based on the number of households in each village. Within each selected village, 15 households were then randomly selected using updated, village-level household lists as the sampling frames. This sampling procedure results in a self-weighting sample since the PPS method accounts for the difference in the number of households between villages (Carletto, 1999).

Risk preferences were elicited from 549 respondents residing in 291 households in the lean season in April and May of 2011. Seven to eight months later during the maize harvest season in November and December of 2011, risk preferences were elicited again for 540 respondents residing in 288 households. Nine respondents could not be re-interviewed during the harvest season because they were either deceased, sick, or absent for an extended period of time. Two respondents with missing information for some explanatory variables (the social capital proxies) were excluded from the analysis. The number of respondents for each assessment method varies from 530 to 538 because some respondents answered inconsistently or selected “do not know” in some elicitation methods and not in others. Moreover, when comparing risk preferences elicited in the lean and harvest seasons, following Guiso et al. (2011) we exclude censored responses. Responses are censored if a respondent chose either the most or least risk averse category in both survey rounds. For example, if a respondent selected the most risk averse option in the maize yield gamble and became more risk averse in the harvest season, this person had no choice to select a more risk averse option in the second survey round.

The stability of risk preferences from the lean season to the harvest season is analyzed through basic statistical methods (such as examining distributions, the significance of mean changes, and correlations of risk preferences across seasons) as well as through first-difference regressions. First-difference regressions rather than fixed effects regressions were chosen because we are interested in determinants of changes in risk preferences across seasons rather than determinants of risk preferences in general. For example, rather than analyzing average effects of gender, age, shocks, etc., on risk preferences, we examine whether risk preferences change across seasons and if so, what influenced these changes. Using first-difference regressions allows us to examine in-depth the effects of various time-variant and time-invariant characteristics on changes in risk preferences elicited at two very different times of the year. First-difference regressions remove

any observed or unobserved time-invariant heterogeneity in preferences and individual characteristics as well as control for aggregate shocks. This technique has been applied in other studies examining determinants of changes over time in risk preferences (Andersen et al., 2008; Baucells and Villasis, 2010; Chiappori and Paiella, 2011; Guiso et al., 2011) and discount rates (Meier and Sprenger, 2010). In first-difference regressions, the dependent variable equals the change in risk preferences from the lean season to the harvest season and is calculated by subtracting the elicited risk preference in the lean season in April and May of 2011 from that in the harvest season in November and December of 2011. Therefore, a positive (negative) dependent variable indicates that respondents become more (less) risk averse from the lean season to the harvest season and a dependent variable equal to zero indicates that there was no change in risk preferences.

Similar to the dependent variable (risk preference changes over time), the shock impact variables are also first-differences. Interpretations of the first-differenced shock variables vary. Thus, we provide explanations of how these variables can be interpreted. A positive Beta-coefficient of a first-differenced shock variable could indicate that greater shock impacts experienced between seasons (compared to those experienced seven to eight months before the lean season, when risk preferences were first elicited) have an increasing effect on risk aversion in the harvest season; however, a positive Beta-coefficient could also indicate that greater shock impacts experienced before the lean season have a decreasing effect on risk aversion in the harvest season. A negative Beta-coefficient of a first-differenced shock variable could indicate that greater shock impacts experienced between seasons (compared to those seven to eight months before the lean season) have a decreasing effect on risk aversion in the harvest season; however, a negative Beta-coefficient could also indicate that greater shocks experienced seven to eight months before the lean season have an increasing effect on risk aversion in the harvest season. Effects of shocks may take months to impact the household, in which case shocks experienced farther away from the interview may affect risk preferences. Because of these varying interpretations of the first-differenced shock variables, we provide robustness checks via pooled OLS regressions.

All models adjust for cluster effects within households and the reported standard errors are robust. Cluster effects need to be accounted for at the household-level because household-level variables are the same for both a household head and spouse. Not accounting for cluster effects

would lead to underestimation of the population variance because the variation of the error term would be the same for two respondents residing in the same household. In the following section, the results are presented and discussed.

3.6 RESULTS AND DISCUSSION

This section first examines elicited risk preferences in each season and then analyzes if and how risk preferences changed from the lean season to the harvest season. Then we identify and discuss influencing factors of risk preference changes across seasons.

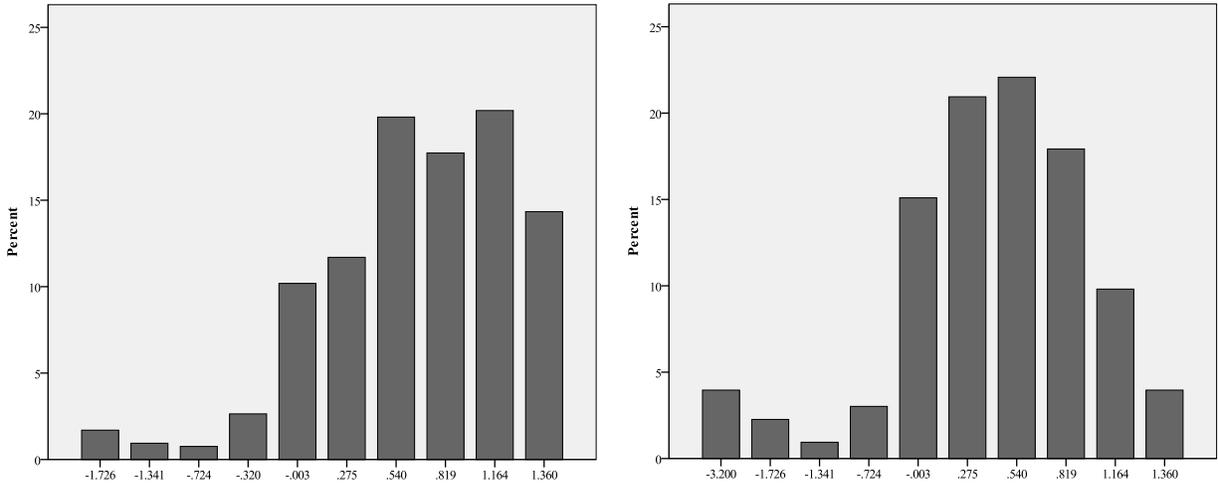
3.6.1 COMPARING THE DEGREE OF RISK AVERSION ELICITED IN BOTH SEASONS

In both seasons, most elicitation methods indicate that respondents are quite risk averse, although the degree of risk aversion varies by method. The highest degree of risk aversion is found in risk preferences elicited from the maize and rice gambles, while the lowest is found in risk preferences elicited from the financial risk tolerance question. The left and right panels of

Figure 3.1 display the distribution of responses to the MPL in the lean and harvest seasons, respectively. CRRA values greater than, equal to, and less than zero indicate risk aversion, approximate risk neutrality, and a preference for risk, respectively. The figure shows that most respondents are risk averse: less than 10% can be classified as preferring risk in both seasons and 10% and 15% can be classified as being approximately risk neutral in the lean and harvest seasons, respectively. Table 3.4 shows risk preferences based on the financial risk tolerance question. The majority of respondents in both seasons selected the option indicating that they are willing to take on an average level of financial risk. The share of respondents selecting that they are not willing to take any financial risk dropped from about one-fifth in the lean season to one-tenth in the harvest season. Very few respondents in either season indicated that they are willing to take substantial financial risk. Figure 3.2 displays the distribution of responses based on the self-assessment scale. The plurality selected the easily-identifiable middle category, 5, while very few selected either extreme. In both seasons, more respondents selected a number on the end of the scale closer to the risk averse side, 10, compared to those who selected a number on the end of the scale closer to the risk preferring side, 0. Table 3.5 provides risk preferences based on the maize and rice gambles. In the lean season, the plurality selected the second most risk averse option (Option 2) in the maize yield, maize price, and rice yield gambles, while the majority

selected the most risk averse option (Option 1) in the rice price gamble. In the harvest season, the majority selected the most risk averse option in each of the gambles.

Figure 3.1: Risk preferences according to the multiple price list in the lean season (left panel) and harvest season (right panel) (N = 530)

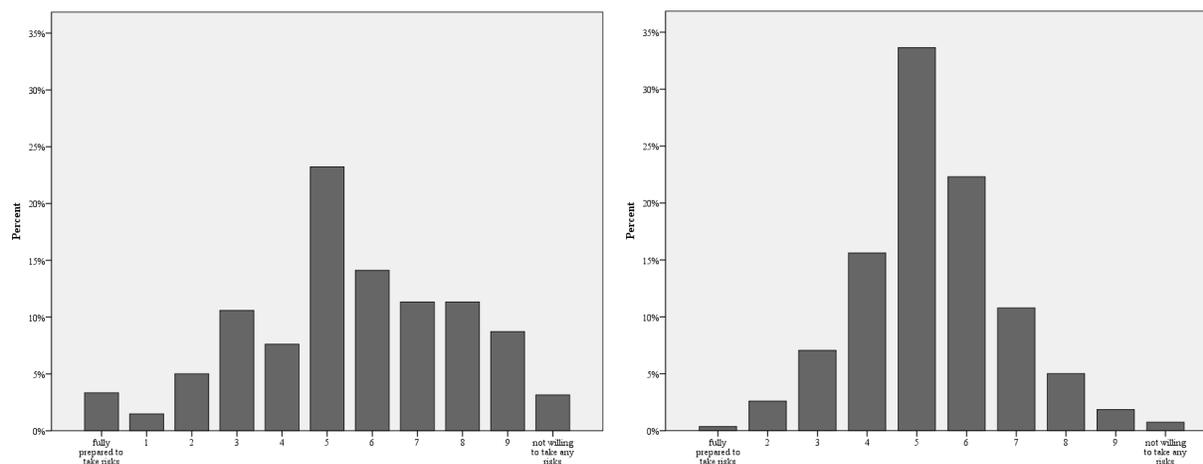


Notes: The midpoint of the CRRA interval for approximately risk neutral respondents in the above figures is 0.003 because of needing to round numbers to make sense for the local currency.

Table 3.4: Risk preferences according to the financial risk tolerance question, in percent (N = 537)

	Substantial financial risk	Above average financial risk	Average financial risk	Not willing to take any financial risk
Lean season	6.3	19.7	54.9	19
Harvest season	2.8	18.2	73.4	5.6

Figure 3.2: Risk preferences according to the self-assessment scale in the lean season (left panel) and harvest season (right panel) (N = 538)



Notes: A few respondents chose a number between two integers. These were rounded to the nearest whole number for visual purposes in the above figures. Moreover, no respondent selected "1" in the harvest season.

Table 3.5: Risk preferences according to the maize and rice gambles, in percent (N = 535)

	Option 1	Option 2	Option 3	Option 4
Constant relative risk aversion	$r > 3.36$	$1.20 > r < 3.36$	$0.58 > r < 1.20$	$r < 0.58$
Scenario	100% chance of median yield or price ^a	50/50 chance of a 15% higher/lower yield or price from median	50/50 chance of a 30% higher/lower yield or price from median	50/50 chance of a 45% higher/lower yield or price from median
<i>Lean season</i>				
Maize yield gamble	32.0	44.5	11.6	12.0
Maize price gamble	33.5	42.8	12.0	11.8
Rice ^b yield gamble	35.7	43.9	11.4	9.0
Rice price gamble	54.0	31.4	9.5	5.0
<i>Harvest season</i>				
Maize yield gamble	62.1	31.6	5.2	1.1
Maize price gamble	68.0	29.3	2.1	0.6
Rice yield gamble	61.3	34.0	3.7	0.9
Rice price gamble	72.0	24.9	2.2	0.9

Notes:

^a Medians in the lean (harvest) season are from 2009 (2010): In the first (second) survey round, the median maize yield was 6.8 (6.0) tons/hectare, the median maize price was 3,900 (5,000) VND/kg, the median rice yield is 5.0 (4.8) tons/hectare, and the median rice price is 6,550 (9,000) VND/kg. Prices were adjusted for inflation.

^b Rice refers to unhusked rice in the summer season.

We now quantify the significance of changes in risk preferences across the seasons. Censored responses are now excluded from all subsequent analyses. Table 3.6 includes the number and percentage of censored responses in each of the assessment methods as well as the distribution of respondents who became less risk averse, had no change in risk preferences, or became more risk averse from the lean season to the harvest season. These distributions show that the plurality became less risk averse based on the MPL and self-assessment scale, did not change risk preferences based on the financial risk tolerance question, and became more risk averse based on the maize and rice gambles. These results are confirmed when examining the mean difference in risk preferences elicited in the two seasons. The Pearson Chi-square statistic of Type I error shows that the null hypothesis of no association between risk preferences elicited in both seasons cannot be rejected at the 1% level for the MPL and self-assessment scale, but it can be rejected for the financial risk tolerance question and for the maize and rice gambles. Correlations of risk preferences across seasons are statistically significant for each of the elicitation methods at the 1% level except for the financial risk tolerance question ($P < 0.10$). Correlations based on the MPL and self-assessment scale are rather weak, while those in the maize and rice gambles are stronger. Correlations may be lower when risk preferences are based on the MPL and self-assessment scale since there are a higher number of options within these methods. Other studies have found that correlations of risk preferences over time are quite weak: Sahn (2008) found a correlation of 0.18 when using income gambles, Guiso et al. (2011) found a correlation of 0.12 when using a financial risk tolerance-like question, and Vlaev et al. (2009) found a correlation of 0.28 when using a self-assessment scale which ranged from 1 to 5 and an insignificant correlation of 0.20 when using lotteries; however, Meier and Sprenger (2010) found a correlation of 0.56 when using the same self-assessment scale applied in this study.

To summarize, respondents became significantly less risk averse according to the MPL and self-assessment scale, more risk averse according to the maize and rice gambles, and had no change in risk aversion according to the financial risk tolerance question. Thus, for all but one elicitation method, risk preferences are not static from the lean season to the harvest season. Risk preferences of smallholders in Vietnam may be more unstable over seven to eight months than risk preferences of people from developed countries because of higher vulnerability to poverty and greater uncertainty across seasons for smallholders. What caused respondents' risk

preferences to change from the lean season to the harvest season? This question is explored in the following section.

Table 3.6: Changes in risk preferences over time for non-censored respondents

	Multiple price list	Financial risk tolerance question	Self-assessment scale	Maize yield	Maize price	Rice yield	Rice price
Number (%) of censored respondents	8 (1.5%)	10 (1.9%)	1 (.2%)	114 (21.3%)	136 (25.4%)	122 (22.8%)	211 (39.4%)
Sample size (non-censored respondents only)	522	527	537	421	399	413	324
Decrease in risk aversion	57.7%	29.6%	47.5%	17.8%	13.0%	20.6%	25.9%
No change in risk aversion	15.5%	47.2%	16.4%	19.2%	18.5%	18.2%	14.8%
Increase in risk aversion	26.8%	23.1%	36.1%	62.9%	68.4%	61.3%	59.3%
Mean change in risk aversion ^a (standard deviation)	-.373*** (1.006)	-.05 (.922)	-.250** (2.581)	.759*** (1.288)	.941*** (1.176)	.673*** (1.242)	.603*** (1.377)
Type I error probability ^b	84.21	17.18**	122.86	75.59***	72.36***	95.37***	124.06** *
Correlation over time ^c	.149***	.074*	.137***	-.270***	-.233***	-.276***	-.521***

Notes:

^a Paired sample t-test of the mean difference being significantly different from 0 is indicated for each respondent. A negative (positive) mean difference indicates that respondents became less (more) risk averse in the harvest season compared to the lean season.

^b Pearson Chi-squared statistic of the null hypothesis of no association in risk preferences elicited in the lean and harvest seasons.

^c Spearman rank correlation coefficients are reported due to the non-continuous nature of the variables.

*** indicates statistical significance at the 1% level, ** at the 5 percent level, and * at the 10 percent level.

3.6.2 DETERMINANTS OF RISK PREFERENCE CHANGES ACROSS SEASONS

This subsection explores influencing factors of changes in risk preferences across seasons using first-difference regressions. The effects of the time component of the shock and the characteristic of the shock are explored in separate regression analyses, shown in Table 3.7 and Table 3.8, respectively. F-tests indicate that the null hypothesis that all regression coefficients are jointly zero can be strongly rejected in most models. Exceptions are the maize price gambles which are not presented, as well as the rice yield and rice price gambles in Table 3.8 ($P = 0.145$ and $P = 0.160$, respectively). The R-squared ranges from a low of 0.06 in the rice yield gamble (in Table 3.8) to 0.14 in the financial risk tolerance question (in Table 3.7).

We first examine how time-invariant characteristics affect changes in risk preferences from the lean season to the harvest season based on results in both Table 3.7 and Table 3.8. When comparing the influence of time-invariant characteristics on risk preference changes across seasons, there are only two main differences between the tables: In Table 3.8, the helping others norm becomes statistically insignificant in the maize yield gamble and the difference in gifts received from positive social events becomes statistically significant in the rice yield gamble. Only a few time-invariant variables are significant in changing risk preferences across several models: female gender, norms of helping others, norms of sharing gains with others, the household's relative wealth status, and connections to authorities. A few variables are significant in one or two models only: age, organizational membership, the household's dependency ratio, and all but one network-reliance variable. Moreover, three variables are not significant in any model: the village population and its square, as well as network-reliance with friends. The relative impact of most explanatory variables on changes in risk preferences across seasons is quite small. Moreover, no definite conclusions can be made on how social capital influences changes in risk preferences across seasons given the varying directional impacts of its different proxies. For example, respondents who are members of more organizations became less risk averse in the harvest season, while those who know more local authorities became more risk averse. An explanation for this is that people may be more obligated to share their income in the harvest season with local authorities, while people who are members of more organizations may become less risk averse from absorbing a jovial, risk-taking atmosphere at ceremonies involving heavy drinking in the harvest season.

A major finding is that explanatory variables in the two methods in which respondents self-identify their risk preferences (the financial risk tolerance question and self-assessment scale) often have the opposite effect on changes in risk preference compared to the other assessment techniques. For example, females became more risk averse in the harvest season than they were in the lean season according to the MPL and rice price gamble, but became less risk averse according to the financial risk tolerance question. Education, norms, and connections to local authorities follow similar trends. In fact, network-reliance with extended family is the only significant variable which has the same directional impact on risk preferences when comparing the two self-identification methods to the other elicitation methods. Thus, the results demonstrate that influencing factors of changes in risk preferences across seasons vary greatly when risk preferences are based on methods relying upon respondents to self-identify their risk preferences compared to methods which rely upon gambles. An explanation for this is that respondents' answers in the self-identification methods may reflect their desired risk preferences rather than actual risk preferences. Another explanation is that these questions may reflect past experiences related to how respondents handled already-experienced risks, rather than reflect how they currently or would handle risks. After all, the maize and rice gambles asked respondents to choose yields and prices for the future, whereas the financial risk tolerance and self-assessment scale asked respondent to assess the degree of risk they are currently willing to take.

In Table 3.7 and Table 3.8, differences in expenditures for positive social events (mainly weddings) have no effect on changes in risk preferences in any of the elicitation methods and gifts received from positive social events have a decreasing effect on risk aversion in one method only, the rice yield gamble (in Table 3.8). In robustness checks, we applied pooled OLS regressions to analyze average effects of positive social event expenditures and gifts on risk preferences (results not shown). We find that positive social event expenditures have a decreasing effect on risk aversion in the self-assessment methods (the financial risk tolerance question and self-assessment scale) and that gifts received from positive social events also have a decreasing effect on risk aversion in the risk yield series. Their relative impact on risk preferences is nevertheless small.

We now turn to the analysis of if and how shocks change risk preferences. We first examine results in Table 3.7, in which the shock impact variables are specified by time. The results show that the impact of idiosyncratic shocks on risk preferences based on the two self-assessment

methods also differ from the other elicitation methods. Greater differences in idiosyncratic shock impacts have a decreasing effect on risk aversion according to these two methods (see Table 3.7), whereas they have an increasing effect based on the two rice gambles, which is what we would theoretically expect based on findings in previous studies that negative or fear-inducing events increase risk aversion (e.g., Guiso et al., 2011). Moreover, none of the covariate shock variables are significant in changing risk preferences across seasons based on the two self-identification methods, whereas they are for most of the other methods. A peculiar result is that the difference in impacts from covariate shocks experienced three to four months prior to the interview have a decreasing effect on risk aversion based on the MPL, maize yield gamble, and rice price gamble, whereas the difference in covariate shock impacts experienced seven to eight months prior to the interview have an expected increasing effect on risk aversion based on the MPL. Further investigation finds that shocks that occurred three to four months before the interview were mainly livestock deaths, whereas shocks that occurred seven to eight months before the interview were mainly drought. Impacts on the household from livestock deaths may take a longer time to set-in than those of drought. Therefore, a negative Beta-coefficient could indicate that livestock deaths which occurred before the lean season still have an increasing effect on risk aversion in the harvest season. However, in Table 3.8 in which shocks are broken down by type, impacts from livestock death are not significant in determining risk preference changes in any of the elicitation methods and drought impacts are significant in the financial risk tolerance question only. The lack of significance of impacts from livestock deaths on changes in risk preferences supports Doss et al. (2008) who found that changes in livestock assets do not change rankings of self-identified risks over time. One explanation for the unexpected finding that impacts from drought did not affect risk preference changes in most methods is that losses from droughts may be difficult for respondents to estimate since the drought affected the rice crops harvested after data on shock impacts prior to the lean season were collected in April and May.

An important result in Table 3.7 is that shocks experienced closer to the interview do not have a greater influence on risk preference changes compared to shocks experienced farther away from the interview. This runs contrary to Malmendier and Nagel (2010) who found that more recent investment returns have stronger effects on risk preferences in the U.S.; however, financial investments in the U.S. are more liquid than lumpy assets such as livestock in Yen Chau, which may have implications for how long it takes shocks to impact risk preferences. Our hypothesis

that shocks may take a long time to affect risk preferences is also confirmed by the negative sign of most covariate shock variables significant in Table 3.7, which indicate that shocks experienced before the lean season may still have an increasing effect on risk aversion in the harvest season.

It is important to consider that the effect of all shock impact variables on risk preferences changes are very small. For example, the Beta-coefficient of the difference in idiosyncratic shocks experienced two months prior to the interview (in Table 3.7) indicates that if the household experienced an idiosyncratic shock two months prior to the harvest season equal to their per capita annual expenditures and the household experienced no idiosyncratic shocks in the two months prior to the lean season, an individual living in this household would assess themselves 0.453 integers lower on the self-assessment scale (which is from zero to ten and has a mean difference of -0.250 between seasons) and their CRRA would be just 0.285 higher in the harvest season based on the rice yield series (which has a mean difference of 0.673 between seasons) in the harvest season, given that all other independent variables are held constant. Thus, these impacts on risk preference changes are small relative to the estimated loss incurred. Nevertheless, if the household experiences several severe shocks, this may have a large affect on risk preference changes. For example, if a household experienced three idiosyncratic shocks with impacts equal to their per capita annual expenditures seven to eight months prior, three to four months prior, and two months prior to the harvest season and had experienced no such shocks in the eight months prior to the lean season, their CRRA would be 0.98 greater ($0.285 + 0.253 + 0.442$) in the harvest season according to the rice yield series (which has a mean difference of 0.673 between seasons), given that all other independent variables are held constant. Since shocks are a frequent phenomenon in Yen Chau, this may lead to significant increases in risk aversion over time.

In robustness checks, we applied pooled OLS regressions to analyze the average effect of idiosyncratic and covariate shocks specified by time on risk preferences (results not shown). We find support for the above findings that more recent shocks do not have a greater effect on risk preferences and that the relative impacts of shocks on risk preferences are small. In addition, we find the peculiar result that idiosyncratic shocks have a decreasing effect on risk aversion according to the self-assessment scale; however, we find the expected result that idiosyncratic shocks have an increasing effect on risk aversion according to the maize and rice gambles. We also find that greater covariate shock impacts occurring three to four months prior to the

interview have a decreasing effect on risk aversion according to the MPL, maize yield gamble, and rice yield gamble, but that covariate shocks occurring seven to eight months prior to the interview have an increasing effect on risk aversion according to the MPL.

The influence of different types of shocks on risk preference changes across seasons shown in Table 3.8 are more in line with theoretical expectations: greater differences in shock impacts have an increasing effect on risk aversion in the harvest season. Nevertheless, shock impacts are again very small. For example, if a household did not experience an idiosyncratic shock in the eight months prior to the interview in the lean season and a household member became ill or died between the lean and harvest seasons resulting in a loss equivalent to the their per capita annual expenditures, the midpoint of the CRRA interval for an individual living in this household would increase by a mere 0.054 according to the MPL (from a mean change of -0.373) and 0.065 according to the rice yield gamble (from a mean change of 0.673), assuming that all other independent variables are held constant. In robustness checks via pooled OLS regressions to examine the average effect of shocks specified by type on risk preferences (results not shown), impacts from drought, other covariate shocks, and idiosyncratic shocks have an increasing effect on risk aversion based on the financial risk tolerance question. Moreover, greater impacts from other covariate shocks have an increasing effect on risk aversion based on the MPL. On the other hand, impacts from livestock deaths and idiosyncratic shocks have a decreasing effect on risk aversion based on the rice price gamble.

In general, the results show that negative shocks affect risk aversion and positive shocks do not. Nevertheless, the impacts of shocks on risk aversion across the various techniques are not consistent since they vary in degree and directional impact depending on the shock and the elicitation method.

Table 3.7: Determinants of changes in risk preferences across seasons with shocks by time

	Multiple price list	Financial risk tolerance question	Self-assessment scale	Maize yield gamble	Rice yield gamble	Rice price gamble
Observations	522	527	537	421	413	324
Constant	-1.998*** (0.640)	0.663 (0.446)	1.124 (1.199)	1.157 (0.761)	0.555 (0.779)	-0.584 (1.096)
Gender	0.247*** (0.082)	-0.226*** (0.076)	-0.132 (0.191)	0.078 (0.116)	0.017 (0.119)	0.393** (0.151)
Age	0.003 (0.004)	-0.004 (0.004)	-0.016 (0.012)	0.004 (0.007)	0.006 (0.006)	0.018** (0.008)
Education	0.002 (0.012)	0.020* (0.011)	0.011 (0.035)	-0.032* (0.018)	-0.003 (0.018)	0.037 (0.023)
Helping others norm	0.161 (0.117)	0.497*** (0.105)	1.406*** (0.275)	-0.277* (0.167)	-0.228 (0.161)	-0.344* (0.189)
Sharing gains norm	-0.050 (0.104)	-0.400*** (0.092)	-0.741*** (0.260)	0.198 (0.151)	0.306** (0.151)	0.571*** (.176)
Dependency ratio	0.108 (0.210)	0.189 (0.206)	-0.129 (0.632)	-0.554 (0.374)	-0.288 (0.313)	0.584 (0.433)
Poorest tercile	0.333*** (0.121)	-0.179* (0.104)	-0.988*** (0.339)	0.246 (0.186)	0.281 (0.176)	0.185 (0.242)
Wealthiest tercile	0.014 (0.122)	-0.192* (0.104)	-0.656** (0.313)	0.072 (0.159)	-0.076 (0.149)	-0.264 (0.199)
Network-reliance with...						
First-degree relatives	0.065 (0.088)	-0.110* (0.057)	-0.110 (0.139)	-0.085 (0.097)	-0.026 (0.113)	-0.011 (0.127)
Extended family	0.025 (0.025)	0.068*** (0.023)	0.021 (0.063)	0.068* (0.036)	0.054 (0.034)	0.046 (0.045)
Friends	0.045 (0.029)	-0.012 (0.030)	-0.127 (0.081)	0.023 (0.045)	0.011 (0.045)	-0.002 (0.052)
Village head	-3.3e-05 (0.018)	0.012 (0.016)	0.173*** (0.051)	0.035 (0.024)	0.031 (0.024)	-4.4e-04 (0.026)
Connections to authorities	0.007 (0.058)	0.020** (0.009)	0.078*** (0.029)	-0.034** (0.013)	-0.012 (0.013)	0.013 (0.015)
Organizational membership	0.068 (0.058)	-0.135** (0.052)	-0.275* (0.153)	-0.043 (0.091)	-0.074 (0.092)	0.024 (0.115)
Village population	0.001 (0.001)	-4.2e-04 (0.001)	1.1e-04 (0.002)	-0.001 (0.001)	-7.5e-04 (0.001)	-0.001 (0.001)
Village population squared	-1.4e-07 (6.2e-07)	3.0e-07 (6.0e-07)	-3.1e-07 (1.7e-06)	6.5e-07 (9.1e-07)	5.9e-07 (8.8e-07)	7.0e-07 (1.1e-06)

(continued from previous page)

	Multiple price list	Financial risk tolerance question	Self-assessment scale	Maize yield gamble	Rice yield gamble	Rice price gamble
Difference in idiosyncratic shock impacts that occurred...before the survey						
2 months prior	0.079 (0.070)	-0.103* (0.058)	-0.453*** (0.170)	0.265 (0.082)	0.285*** (0.077)	0.018 (0.173)
3 to 4 months prior	0.047 (0.055)	0.026 (0.057)	0.238 (0.180)	0.121 (0.113)	0.253* (0.146)	0.277* (0.164)
5 to 6 months prior	0.081 (0.070)	-0.022 (0.036)	-0.274*** (0.104)	-0.081 (0.126)	0.024 (0.117)	0.002 (0.194)
7 to 8 months prior	0.067 (0.103)	0.050 (0.069)	-0.244 (0.169)	0.045 (0.200)	0.442*** (0.130)	0.450*** (0.166)
Difference in covariate shock impacts that occurred...before the survey						
2 months prior	0.072 (0.103)	0.206 (0.127)	0.236 (0.364)	-0.028 (0.222)	-0.066 (0.188)	0.010 (0.171)
3 to 4 months prior	-0.071*** (0.019)	0.032 (0.022)	0.001 (0.050)	-0.109** (0.046)	-0.051 (0.053)	-0.095* (0.050)
5 to 6 months prior	-0.014 (0.017)	0.021 (0.013)	0.044 (0.051)	0.024 (0.033)	0.035 (0.031)	0.044 (0.038)
7 to 8 months prior	0.078** (0.039)	0.032 (0.029)	-0.052 (0.102)	0.043 (0.051)	0.047 (0.049)	0.035 (0.047)
Difference in positive social event impacts	-0.046 (0.055)	-0.031 (0.039)	-0.136 (0.190)	-0.031 (0.054)	0.013 (0.055)	0.016 (0.143)
Difference in gift impacts from positive events	0.087 (0.094)	-0.025 (0.056)	0.108 (0.201)	-0.041 (0.073)	-0.068 (0.081)	0.121 (0.267)
F statistic	F(26, 260) = 2.06***	F(26, 257) = 3.70***	F(26, 261) = 3.47***	F(26, 235) = 2.18***	F(26, 226) = 1.85***	F(26, 203) = 1.45*
R ²	0.090	0.138	0.135	0.094	0.082	0.100

Notes: First-difference regressions were applied. Coefficients are shown in bold with their robust standard errors in parentheses. All regressions are clustered at the household level. The maize price gamble is not shown because it is not overall statistically significant.

*** indicates statistical significance at the 1% level, ** at the 5 percent level, and * at the 10 percent level.

Table 3.8: Determinants of changes in risk preferences over with shocks by type

	Multiple price list	Financial risk tolerance question	Self-assessment scale	Maize yield gamble	Rice yield gamble	Rice price gamble
Observations	522	527	537	421	413	324
Constant	-1.940*** (0.667)	0.698 (0.435)	1.128 (1.198)	1.288 (0.793)	0.661 (0.814)	-0.636 (1.089)
Gender	0.247*** (0.082)	-0.223*** (0.076)	-0.127 (0.191)	0.076 (0.116)	0.014 (0.119)	0.389** (0.151)
Age	0.001 (0.004)	-0.005 (0.004)	-0.013 (0.012)	0.001 (0.007)	0.004 (0.006)	0.019** (0.008)
Education	0.005 (0.012)	0.021** (0.011)	0.008 (0.034)	-0.031* (0.018)	0.001 (0.018)	0.040* (0.022)
Helping others norm	0.190 (0.120)	0.492*** (0.108)	1.360*** (0.279)	-0.255 (0.170)	-0.186 (0.164)	-0.332* (0.192)
Sharing gains norm	-0.079 (0.105)	-0.392*** (0.094)	-0.713*** (0.260)	0.175 (0.153)	0.272* (0.155)	0.587*** (0.183)
Dependency ratio	0.158 (0.209)	0.173 (0.203)	-0.376 (0.626)	-0.459 (0.382)	-0.158 (0.312)	0.744* (0.424)
Poorest tercile	0.323*** (0.117)	-0.174* (0.203)	-0.897*** (0.338)	0.239 (0.188)	0.259 (0.180)	0.133 (0.243)
Wealthiest tercile	0.027 (0.126)	-0.162 (0.104)	-0.562* (0.314)	0.125 (0.166)	-0.016 (0.155)	-0.231 (0.197)
Network-reliance with...						
First-degree relatives	0.060 (0.090)	-0.122** (0.055)	-0.128 (0.136)	-0.095 (0.100)	-0.032 (0.119)	-0.024 (0.119)
Extended family	0.022 (0.025)	0.074*** (0.024)	0.026 (0.066)	0.069* (0.037)	0.052 (0.036)	0.053 (0.045)
Friends	0.048 (0.030)	-0.012 (0.030)	-0.125 (0.081)	0.036 (0.045)	0.020 (0.045)	0.001 (0.051)
Village head	-0.005 (0.018)	0.013 (0.016)	0.173*** (0.051)	0.020 (0.025)	0.020 (0.023)	-0.011 (0.023)
Connections to authorities	0.008 (0.010)	0.019** (0.009)	0.072** (0.030)	-0.037** (0.014)	-0.020 (0.014)	0.005 (0.013)
Organizational membership	0.060 (0.059)	-0.140*** (0.052)	-0.281* (0.151)	-0.042 (0.094)	-0.062 (0.095)	0.038 (0.117)
Village population	-0.001 (0.001)	-4.1e-04 (7.7e-04)	-1.3e-04 (0.002)	-0.001 (0.001)	-0.001 (0.001)	-0.001 (0.001)
Village population squared	-2.5e-07 (6.3e-07)	3.3e-07 (5.9e-07)	3.9e-08 (1.7e-06)	7.5e-07 (9.2e-07)	7.6e-07 (9.0e-07)	7.0e-07 (1.1e-06)

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	Multiple price list	Financial risk tolerance question	Self-assessment scale	Maize yield gamble	Rice yield gamble	Rice price gamble
Drought	0.002 (0.020)	0.037** (0.015)	0.036 (0.058)	0.003 (0.042)	0.024 (0.039)	0.037 (0.045)
Livestock death	-0.031 (0.033)	0.020 (0.023)	2.4e-04 (0.063)	-0.046 (0.063)	-0.048 (0.061)	-0.055 (0.064)
Other covariate shocks	0.054 (0.052)	0.082** (0.038)	-0.070 (0.166)	0.139* (0.083)	0.193** (0.085)	0.152 (0.139)
Idiosyncratic shocks	0.054** (0.023)	-0.001 (0.017)	0.054 (0.058)	-0.027 (0.045)	0.065* (0.037)	0.004 (0.069)
Expenditures for positive events	-0.043 (0.055)	-0.042 (0.041)	-0.159 (0.192)	-0.020 (0.055)	0.022 (0.058)	-0.017 (0.154)
Value of gifts received from positive events	0.074 (0.092)	-0.017 (0.055)	0.099 (0.200)	-0.073 (0.067)	-0.146* (0.075)	0.095 (0.275)
F statistic	F(22, 264) = 1.68**	F(22, 261) = 3.93***	F(22, 265) = 3.22***	F(22, 239) = 1.80**	F(22, 230) = 1.34 ^a	F(22, 207) = 1.32 ^b
R^2	0.070	0.131	0.118	0.078	0.056	0.078

Notes: First-difference regressions were applied. Coefficients are shown in bold with their robust standard errors in parentheses. All regressions are clustered at the household level. The maize price gamble is not shown because it is not overall statistically significant.

^a The rice yield gamble is only marginally statistically significant overall ($P = 0.145$).

^b The rice price gamble is only marginally statistically significant overall ($P = 0.160$).

*** indicates statistical significance at the 1% level, ** at the 5 percent level, and * at the 10 percent level.

3.6.3 LIMITATIONS AND RECOMMENDATIONS FOR FUTURE RESEARCH ON RISK PREFERENCES

There are some limitations to the elicitation methods applied in this study. We address these limitations below and offer recommendations for future research on risk preferences.

The MPL is considered to be the gold standard to elicit risk preferences, is incentive compatible, and lacks framing effects. However, there are many disadvantages to this method. First, the MPL measures windfall gains which are not applicable to most smallholder farmers. Second, it is expensive since training costs are higher and payouts are non-hypothetical. Third, it is time-intensive to manage logistically. Fourth, it involves high time inputs to explain to respondents. Fifth, it requires numeracy. Sixth, it is more difficult for respondents to comprehend than the other methods since it involves varying probabilities. In addition, luck and superstitions may have influenced choices (Knight, 1921). For these reasons, we do not recommend the MPL for eliciting risk preferences, particularly in a developing country. The method may be suitable in a developed country among educated respondents, yet the payouts should be high enough so that they are significant for respondents which may constrain budgets.

The two self-identification methods, the financial risk tolerance question and self-assessment scale, also have disadvantages. The financial risk tolerance question is problematic for several reasons, such as the dual thrust of response categories since they assume not only a willingness to take risks, but also an expectation of returns. For future research, we propose excluding expectations of returns from the response categories or to test the bias resulting from the inclusion of expectations of returns in field experiments. The conversion of responses into numerical categories (Hanna and Lindamood, 2004) and the unfamiliar nature of financial investments for many are additional complications. The self-assessment scale may be a good alternative to the MPL and financial risk tolerance question since it has behavioral validity with responses to the MPL, is easier to administer and comprehend, is less expensive, and can be adapted to different scenarios (e.g., Dohmen et al., 2012) to assess preferences for different types of risks such as for income, food security, and investment decisions. Nevertheless, risk preferences assessed from the self-assessment scale may be biased due to framing effects since the plurality selected the easily-identifiable middle category, 5, on the scale from 0 to 10. Previous studies have demonstrated that people prefer to select the middle option. For example, it has been found that people who view choices A, B, and C will often find B more attractive than C, but if they view the choices B, C, and D, they will say that C is more attractive than B

(Benartzi and Thaler, 2002). For future research, we recommend that the self-assessment scale be re-scaled, such as from 0 to 9, to avoid an easily identifiable middle category. A major drawback of these two self-assessment methods is that unlike the other methods, they do not elicit a CRRA which can be compared across contexts. Moreover, across the various elicitation methods, determinants of changes in risk preferences across seasons based on these two methods tended to have the opposite effect compared to the other elicitation methods and the effects were often contrary to expectations and theoretical foundations. Some explanations for this anomaly are: responses may have reflected how respondents would like their risk preferences to be or how they would like others to view their risk preferences to be rather than how they actually are; and responses may be a reflection of confidence in how past situations were handled rather than a reflection of how current or future situations would be handled. Therefore, we recommend explicitly including a time dimension in these methods, such as specifying whether the respondent should assess their current willingness to take risks, their (recent) past willingness to take risks, or their (near) future willingness to take risks. Given the above reasons as well as the inability to compare these methods across different contexts, the current state of these methods are less preferable compared to methods eliciting a CRRA.

We also tested four locally-adapted gambles involving prices and yields of the main cash crop (maize) and food crop (rice). A disadvantage of the maize and rice gambles is that the certainty effect that people underweight probable outcomes compared with certain outcomes may have led respondents to choose the certain outcome over the riskier ones (Kahneman and Tversky, 1979). Therefore, these measures may overestimate the degree of risk aversion since the certain outcome (Option 1) entailed the greatest degree of risk aversion. Moreover, there were no risk neutral or risk preferring options in these methods and the gambles may have been incapable of capturing varying degrees of risk aversion. In particular, the second most risk averse option (Option 2) in the gambles, which entailed a 50/50 chance of a 15% greater or lower price or yield than the median, may have been interpreted as too risky compared to the most risk averse option (Option 1) which was a 100% chance of the median price or yield. This may explain why these methods elicited much higher degrees of risk aversion than the MPL. We suggest altering the gambles to create more refined CRRA intervals by including more choices which are closer in value, such as differences of 5% or 10% rather than 15%. In our opinion, the maize and rice gambles have the greatest potential for assessing risk preferences of smallholders since they

elicit a CRRA which is comparable across studies and contexts, were relatively easy for respondents to comprehend, and involve decisions which are more applicable and familiar to respondents. The method could also be adapted to other regions of the world based on local cash and food crops.

There are also some data limitations. Few households experienced shocks within some of the two-month intervals. Therefore, the precision of estimates in Table 3.7 are not as strong as those in Table 3.8 for which there were a larger number of households experiencing shocks within the four shock types. In addition, interpretations of varying degrees of risk aversion in the two self-assessment type questions (the financial risk tolerance question and self-assessment scale) may have changed over time. For example, a six on the scale may mean something different to the same respondent in November than it did in April. In addition, some respondents may not have been able to accurately estimate losses from shocks and some of these losses may not have occurred yet, but may have been anticipated by respondents. For example, if a household member fell ill, the estimated loss of the illness up until the interview date does not include estimated losses into the future as well.

Despite these limitations, we are confident that respondents understood the questions well because of the various interview techniques employed, such as combinations of visual, oral, and written explanations (Duklan and Martin, 2002). Nevertheless, the low level of predictive power of the models clearly signals that other factors are likely to be important in determining changes in risk preferences from the lean season to the harvest season, such as individual's economic, weather, and political, social, and financial outlooks. Other explanations for unstable risk preferences include measurement error, learning effects, and fundamentally unstable preferences (Binswanger, 1980; Meier and Sprenger, 2010).

3.7 CONCLUSIONS

Previous literature has established that shocks cause households to fall into poverty traps and that risk aversion can cause households to remain trapped in poverty (Carter et al., 2007; Dercon, 1996; Hoddinott, 2006; Lybbert and McPeak, 2012; Morduch, 1994; Rosenzweig and Binswanger, 1993). This study has analyzed whether risk preferences assessed from seven elicitation techniques are stable for smallholder farmers in northwestern Vietnam from the lean season to the harvest season and then examined influencing factors of changes in risk preferences

across seasons using first-difference regression analyses. The results indicated that for all but one assessment method – the financial risk tolerance question – risk preferences were not stable across seasons. Respondents became less risk averse according to the lottery game and self-assessment scale, while they became more risk averse according to the maize and rice gambles.

The first-difference regression analyses provided empirical evidence that specific shocks and proxies of social capital are significant in causing risk preferences to change from the lean season to the harvest season. We found that cognitive social capital (proxied by norms) and linking social capital (proxied by connections to local authorities) are more influential in determining changes in risk preferences in the harvest season compared to low vs. high closure (proxied by the village population and its square) and structural social capital (proxied by membership in organizations and network-reliance). Moreover, several time-invariant characteristics influenced changes in risk preferences across seasons, such as gender and education. Examining the influence of shocks by time and type in separate analyses highlighted the importance of separating various shocks to examine their impact on risk preference stability. Contrary to expectations, more recent shocks did not have a greater effect on risk preference changes. Robustness checks using pooled OLS regression analyses supported this finding. In regressions which analyzed impacts of specific types of shocks, losses from livestock deaths had no significant effect on changes in risk preferences across seasons, although losses from other covariate shocks and idiosyncratic shocks did. Although the relative impact on changes in risk preferences across seasons as a result of shocks is quite small, households experiencing several shocks may have significant increases in risk aversion over time.

Comparing the elicitation methods allows insights into which methods may be better adapted to assess risk preferences of smallholder farmers in a developing country. We discussed the limitations of each of the seven elicitation methods applied in this study and offered recommendations for their improvement in Section 3.6.3. In summary, we assess the maize and rice gambles as having the greatest potential for examining risk preferences of smallholders since they elicit a CRRA which is comparable across studies and contexts, were found to be relatively easy for respondents to comprehend, involve decisions which are more applicable and familiar to respondents, and can be adapted to other regions based on local cash and food crops. We are wary of accepting lottery gambles as the gold standard and suggest that given the importance of measuring risk aversion, more research on eliciting risk preferences from different measures

needs to be conducted similar to past research on finding appropriate methods to elicit household income through Living Standards Measurement Studies in which there were many tests of different versions of the questionnaire. The quest for better methods should be continued.

We offer some policy recommendations based on our findings that smallholders are very risk averse in both seasons and that some types of shocks cause smallholders to become even more risk averse over time. Recommendations which could mitigate the increasing impact of shocks on risk aversion include effective cash or food transfer programs, lower deductibles for medical expenses, and agricultural insurance. Given the high degree of risk aversion and the perception among smallholders that the current livelihood strategy – maize production on steep slopes which highly erodes the soil – is a low-risk income earning activity, respondents should be supported by the government to adopt new technologies and production systems which do not entail as much environmental degradation, yet which may be viewed as too risky (Feder et al., 1985). Support for adopting new production systems could be in the form of credit and/or subsidized inputs. Local field trials are another mechanism to promote the adoption of new production systems and technology. These would allow smallholders to better assess risks associated with new production systems. Follow-up interviews with village heads elicited the importance of seeing and visiting field trials first-hand before smallholders might adopt new systems. Although over half of household heads stated that the most important way to escape poverty is hard work, previous research indicates that the poor remain poor (Lybbert et al., 2004; Naschold, 2012). Households should be supported to recover quickly from shocks and to make investments perceived as risky. Such support could open the door to new livelihood strategies.

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4. DO INFLUENCING FACTORS OF WIVES’ EMPOWERMENT AND HUSBANDS’ DOMINANCE DIFFER BY FINANCIAL DECISION IN RURAL VIETNAM?

THEA NIELSEN

Abstract

Women’s empowerment in decision-making has intrinsic value and is influential for a variety of important outcomes, though few studies analyze its sources. We examine determinants of wives’ empowerment and husbands’ dominance in ten intra-household financial decisions – taking out and repaying four types of loans, family budgeting, and saving – in northwestern Vietnam. The results show that several sources of decision-making power vary by financial decision and subtle nuances are lost through aggregated indices of decisions about loans. Influencing factors of wives’ empowerment include her ability to speak Vietnamese, education, women-controlled income, household income, network-reliance with extended family, and child dependents.

4.1 INTRODUCTION

Women's empowerment not only has intrinsic value (Kabeer, 1999; G. Sen and Batliwala, 2000), but also is influential for a variety of tangible outcomes, including child health, food security, education, and contraceptive use (Allendorf, 2007; Doss, 1996; Hashemi et al., 1996; Jejeebhoy, 2003; Schuler et al., 1997; B. Sen and Hulme, 2004; Smith and Haddad, 2000; Quisumbing and Maluccio, 2000; Thomas, 1990). In addition, women's empowerment is regarded as critical for achieving poverty reduction and human rights (Malhotra and Schuler, 2005). Although several studies have explored the impact of exposure to credit or savings programs on women's empowerment (Ashraf et al., 2010; Hashemi et al., 1996; Holvoet, 2005; Swain and Wallentin, 2007), none have examined what factors increase or decrease empowerment for taking out and repaying loans of various amounts. Other studies, for example, have examined determinants of women's empowerment in decisions about credit in general, household expenditures, and/or mobility, often combining various decision domains together (Allendorf, 2007; Anderson and Eswaran, 2009; Garikipati, 2008; Kantor, 2003; Pitt et al., 2006; Rahman and Rao, 2004; Yusof and Duasa, 2010). We focus on women's role in financial decisions because such decisions may impact strategic life choices (Kabeer, 1999) and both reflect and create a particularly transformative power in women's improved status within the household (Goetz and Gupta, 1996; Kabeer, 2001). Moreover, identifying sources of empowerment in specific financial decisions can help direct policies to improve women's decision-making power in distinct financial domains which, in turn, may improve other important development goals.

Despite its wide use, empowerment is an amorphous concept since it is rarely precisely defined (Goetz and Gupta, 1996; G. Sen and Batliwala, 2000), a universal definition is lacking (Haque et al., 2011; Jejeebhoy and Sathar, 2011), and it represents a complex phenomenon (Kabeer, 2001) operating at multiple levels (Mabsout and Staveren, 2010). We adopt the most widely accepted definition (Haque et al., 2011) from Kabeer (2001, p. 81): empowerment is "an expansion in the range of potential choices available to women so that actual outcomes reflect the particular set of choices which the women in question value." Bargaining power contains the concept of empowerment since it is the "influence component of empowerment" and is defined as "the agent's 'relative ownership' of a particular decision" (Khwaja, 2005, p. 274). Although Kabeer

defines empowerment as a process, most quantitative studies, including ours, rely on cross-sectional data.

Intra-household bargaining power and empowerment are determined by influencing factors at the individual-, household-, and institutional-level (Mabsout and Staveren, 2010),¹⁹ all of which are interrelated (Blumberg and Coleman, 1989; Mabsout and Staveren, 2010; Moore, 1994; Narayan, 2005). Influencing factors at the: individual-level include education, attitudes, inherent characteristics, and bargaining skills; household-level include control over resources and income, including each spouse's threat point²⁰; and institutional-level include legal rights, political structures, and gendered institutions (Agarwal, 1997; Blumberg and Coleman, 1989; Espinal and Grasmuck, 1997; Lundberg et al., 1997; Mabsout and Staveren, 2010; Mason, 2005; Quisumbing and Maluccio, 2000; A. Sen, 1990; Weber et al., 2004). Gendered institutions include customs, norms, and gender ideologies and are defined as "asymmetric social norms, beliefs and practices affecting men's and women's behavior differently, and often unequally" (Goetz, 1997; Mabsout and Staveren, 2010; Staveren and Obebode, 2007). This paper examines factors at the individual-, household-, and institutional-level which may influence husbands' and wives' decision-making power in intra-household financial decisions.

Rather than directly measure empowerment, most studies utilize proxies. These proxies include assets or non-labor income (Doss, 1996; Kusago and Barham, 2001; Schultz, 1990; Thomas, 1990), share of income (Hoddinott and Haddad, 1995; Jianakoplos and Bernasek, 2008; Kusago and Barham, 2001), primary economic activity (Swain and Wallentin, 2007), education (Fletschner, 2009; Quisumbing and Maluccio, 2003), assets brought into marriage (Fletschner, 2009; Quisumbing and Maluccio, 2003), mobility (Chakrabarti et al., 2012; Hashemi et al., 1996; Jejeebhoy and Sathar, 2011), and age and health differences between spouses (Jianakoplos and Bernasek, 2008). Despite the wide use of proxies, there are many disadvantages to their application: proxies are removed from decision-making processes since they measure potential rather than actualized choice which may lead to biased conclusions (Kabeer, 1999); social norms, rather than specific household dynamics, may prevent women from accessing markets or holding

²⁰ A threat point is the "the utility level which is guaranteed to the individual if no agreement or bargain is achieved" (Manser and Brown, 1980, pp. 35-36) should the marriage either dissolve (McElroy, 1990) or have a non-cooperative solution (Kabeer, 2001; Lundberg and Pollak, 1993).

similar assets as men (Kabeer, 2001); and proxies may be context dependent and thus difficult to compare across cultures (Quisumbing and Maluccio, 2000). Therefore, to better understand intra-household dynamics, rather than use proxies, direct measures of empowerment and bargaining power from husbands and wives were elicited separately based on respondents' perceptions of their own roles in intra-household decision-making processes.

This study is innovative in several aspects. First, we analyze and compare sources of bargaining power and empowerment in decisions not only to take out, but also to repay four types of loans. Second, we compare sources of empowerment in loan decisions to those in family budget and savings decisions. Third, we include risk preferences and various proxies of social capital as explanatory factors of empowerment. Fourth, we compare factors influencing empowerment to those influencing bargaining power, which contains the concept of empowerment since it is the "influence component of empowerment" and is defined as "the agent's 'relative ownership' of a particular decision" (Khwaja, 2005, p. 274). Bargaining power is thus a more refined measure of empowerment since it measures the degree to which a woman is empowered, whereas decision-making power refers to both empowerment and bargaining power. Fifth, based on husbands' perceptions of their own role in financial decisions, we examine sources of husbands' dominance and bargaining power in financial decisions. Finally, we assess decision-making roles for credit offered mainly through traditional mechanisms, i.e., the informal credit market. Most studies have examined women's decision-making roles in credit offered through microfinance programs or self-help groups (Ashraf et al., 2010; Garikipati, 2008; Goetz and Gupta, 1996; Hashemi et al., 1996; Holvoet, 2005; Kabeer, 2001; Pitt et al., 2006; Swain and Wallentin, 2007); however, access to formal financial services is extremely limited in developing countries (United Nations, 2009), particularly to smallholder farmers.

This paper proceeds as follows: the following section presents the study context in terms of existing gender norms and financial markets; Section 4.3 describes the sampling procedure, data collection, hypothesized influencing factors of decision-making power, and the empirical strategy; Section 4.4 presents and discusses the results; and the concluding section offers research and policy recommendations.

4.2 STUDY CONTEXT

This study takes place in Yen Chau district, Son La province, in northwestern Vietnam. Yen Chau is mountainous and inhabited primarily by ethnic minorities. Black Thai and H'mong account for 55% and 20% of the district's population, respectively, and Kinh ("ethnic Vietnamese") constitute 13%. Households are engaged in smallholder agriculture with the two main crops being rice for home consumption and maize for cash income. Below, we describe the gender context and available credit and savings markets.

In Yen Chau, both men and women work in the fields; however, men tend to do more physically-demanding work and women tend to be responsible for small livestock and vegetable production (Beuchelt, 2008). Women are additionally responsible for household and childcare tasks. If they have any spare time, they often prepare dowry gifts. Women in Vietnam work, on average, six to eight hours more than men (The World Bank and Department for International Development, 1999). Although official rights and laws are quite advanced in terms of gender equality, traditional customs influenced by feudal and patriarchal Confucianism promote unequal gender relations (Beuchelt, 2008; Dalton et al., 2002; Hatcher et al., 2005; Que, 2000). In case of divorce, women have poor fallback positions since they have difficulty in obtaining assets (Hatcher et al., 2005) and patriarchal tradition passes inheritance to sons (United Nations, 2005; International Fund for Agricultural Development et al., 2004; Que, 2000). Domestic violence is widespread: The majority of ever-married women have experienced emotional abuse and nearly one-third have experienced physical violence by their husbands (General Statistical Office of Vietnam, 2010). The sex ratio at birth also indicates gender inequality: 110.4 boys are born for every 100 girls in Vietnam's Northern midlands and mountain areas (General Statistics Office, 2012a).

Formal credit is offered by two state-owned banks, the Vietnam Bank for Agriculture and Rural Development (VBARD) and the Vietnam Bank for Social Policies (VBSP). The VBSP targets poor households, providing loans without collateral requirements at subsidized interest rates through the following mass organizations: the Women Union, Farm Union, Veteran Union, and Youth Union (Vietnam Bank for Social Policies, n.d.). The VBARD, the leading commercial bank in the country, has the most extensive network of branches in rural areas (Banking with the Poor Network, n.d.). Unlike the VBSP, the VBARD provides higher-value loans with collateral requirements. The vast majority of loans, however, are provided by informal sources.

Informal lenders dominate the credit market, leaving the two formal lenders a much smaller role. To better understand the importance of gender and social capital in securing credit, information on credit transactions covering the years 2008 to 2011 for the 250 households analyzed in this study are presented in Table 4.1 (the following section describes how these households were randomly selected). Over 90% of small, medium, and large agricultural loans were from informal sources. Most loans from informal sources are from neighbors, acquaintances, or relatives who live within the village or district. Social capital is also used to secure formal loans: Intermediaries, such as unions, friends, neighbors, village heads, and relatives, were used to secure about three-quarters and one-fifth of loans from the VBSP and VBARD, respectively. Therefore, most credit transactions rely on social collateral rather than physical collateral (Karlan et al., 2009). The most common primary uses of small and medium loans were for purchasing food and agricultural inputs, while the most common primary uses of large loans were for purchasing livestock, agricultural inputs, and food as well as for financing education.

Gender inequality is present in credit transactions. As shown in Table 4.1, the larger the loan size, the less likely the woman is the borrower: women were borrowers of 42% of small loans, 31% of medium loans, 17% of large loans, and 9% of large agricultural loans. In addition, women seldom receive loans from the formal credit market: Of the 157 loans provided by the VBSP, 31 were to women and of the 64 loans provided by the VBARD, only 4 were to women. Reasons for the low number of women borrowers from formal institutions may include demand-side constraints such as conflicts with household responsibilities, lower literacy, lack of experience with financial institutions, higher risk aversion, and social pressures (Fletschner, 2009). Moreover, women are required to have their husband's identification card to apply for credit at a formal bank if his name is on the Land Use Certificate.²¹ The gender of the household member who applies for a loan, however, does not inform us about the actual intra-household decision-making processes related to taking out and repaying loans. For example, for loans under the woman's name, Kabeer (2001) found that 10% of women had almost no role in decision-

²¹ Land Use Certificates (known as "Red Books") are land titles which grant the holder the right to inherit, transfer, sell, lease, and mortgage land use rights. Land use rights are valid for 20 years for annual crops and 50 years for perennial crops. Land titles were granted between 1991 and 1999 in Yen Chau district. Land Use Certificates issued since 2011 include the wife's name, but those issued before do not.

making about the loan's use and Goetz and Gupta (1996) found that nearly 40% of women had little or no managerial control over loans in their name.

Budgeting and saving also are critical for households in Yen Chau since the majority of cash income typically originates from maize which is harvested once. Moreover, nearly half of households do not grow enough rice to meet their consumption needs and therefore rely on savings or credit to purchase rice. Very few households deposit money into savings accounts and there are no savings groups, so households save on their own. Therefore, examining decision-making processes about family budgeting and saving in addition to those about credit allows better understanding and a more complete overview of how important financial decisions are made within households.

Table 4.1: Credit history in Yen Chau District from 2008-2011

Loan type	Small	Medium	Large	Large agricultural
Loan size (Vietnamese dong)	> 10,000 ≤ 200,000	> 200,000 < 2,000,000	≥ 2,000,000,	≥ 2,000,000
Equivalent in U.S. dollar PPP ^a	> 0.98 ≤ 19.65	> 19.65 < 196.51	≥ 196.5	≥ 196.5
Loan use	Any	Any	Excludes large agricultural loans	In-kind loans for agricultural inputs
Women borrowers	42%	31%	17%	9%
Lenders	-Informal (97%) -Farmer Union (2%) -Women Union (2%)	-Informal (98%) -Women Union (2%)	-Informal (52%) -Vietnam Bank for Social Policies (31%) -Vietnam Bank for Agriculture and Rural Development (13%) -Unions (5%) ^b	-Informal (92%) -Government company (4%) -Farm Union (2%) -Village Board (1%) -Private company (1%)
If informal lender, relation to borrower	-Neighbor or acquaintance (55%) -First degree relative (31%) -Other relative (7%) -Other (8%)	-Neighbor or acquaintance (46%) -First degree relative (35%) -Other relative (11%) -Other (5%) -Close friend (3%)	-First degree relative (38%) -Neighbor or acquaintance (37%) -Other relative (15%) -Close friend (5%) -Other (5%)	-Neighbor or acquaintance (70%) -Other relative (9%) -First degree relative (7%) -Other (13%) -Close friend (2%)
If informal lender, location of residence	-Within village (74%) -Elsewhere in district (24%) -Outside district (2%)	-Within village (67%) -Elsewhere in district (31%) -Outside district (1%)	-Within village (60%) -Elsewhere in district (36%) -Outside district (5%)	-Within village (44%) -Elsewhere in district (51%) -Outside district (4%)
Primary purpose of loan	-Food purchase (47%) -Agricultural inputs (25%) -Social events (5%) -Health care expenses (5%) -Non-farm activity (5%)	-Food purchase (32%) -Agricultural inputs (18%) -Health care (12%) -Social events (12%) -Repayment of other debt (5%)	-Livestock (13%) -Agricultural inputs (10%) -Food purchase (10%) -Agricultural equipment (9%) -Education (8%) -Non-farm activity (7%) -Health care (7%) -Social events (6%) -Repayment of other debt (6%)	-Agricultural inputs (100%)

Notes: Data are for households who took out a loan in the past four years among 250 households with both spouses present. Percentages may not total 100 because of rounding and/or excluding categories with small percentages (categories with less than 1% for lenders and less than 5% for the primary purpose of the loan).

^a Based on the 2011 purchasing power parity (PPP) (10,179 VND = \$1 PPP) (The World Bank, 2012).

^b These are the Women Union, Farm Union, Veteran Union, and Elderly Union.

4.3 DATA AND METHODS

4.3.1 SAMPLING PROCEDURE AND DATA COLLECTION

Data were collected separately from both household heads and spouses in 2011 in a random sample of 300 households, which is representative of Yen Chau district. A cluster sampling procedure was followed in which first, a village-level sampling frame was constructed. All villages in the district were included except for those in four sub-districts bordering Laos because of difficulties in obtaining research permits there. Of these villages, 20 were randomly selected using the Probability Proportionate to Size (PPS) method (Carletto, 1999) based on the number of households in each village. Within each selected village, 15 households were then randomly selected using village-level household lists as the sampling frames. This sampling procedure results in a self-weighting sample since the PPS method accounts for the difference in the number of households between villages (Carletto, 1999). Because some respondents had severe health problems, all 300 households could not be interviewed: data were collected from 291 households. This study analyzes intra-household decision-making dynamics in households with both a husband and wife present for the majority of the year. This excludes 34 single-headed households, most of which are headed by widowed women. We also excluded five households who did not grow either rice or maize in 2011 since we are primarily interested in decision-making for households engaged in agricultural production. Two households with missing data are also excluded. Thus, the final sample consists of 250 couples.²²

Husbands and wives were interviewed separately and asked about their own intra-household decision-making roles in family budgeting, saving, and taking out and repaying four types of loans (shown in Table 4.1). They could respond that they are the sole, main, or joint decision-maker. These concepts were clearly explained to respondents.²³ Nevertheless, we elicit perceptions only since first-hand decision-making processes were not observed. Ambiguity is reduced, however, by avoiding general questions about decision-making roles, such as asking

²² These couples consist of a husband and a wife. Given the traditional society, there are no unmarried couples or same-sex couples in the sample.

²³ We explained the decision-making roles as follows: a sole decision-maker is the only person who makes decisions and therefore does not need to discuss or seek agreement with others; a main decision-maker dominates the decision-making process, though others may be involved; and a joint decision-maker makes decisions together with others with no one having a dominant role. Please refer to Appendix 6.17 for more information.

about who decides on “issues of borrowing money” as in Pitt et al. (2006), which may elicit more normative statements rather than statements based on actual behavior (Schuler et al., 1997). Moreover, measuring perceptions of decision-making power is consistent with the concept that bargaining power is a function of an individual’s perceived contribution or greater sense of self-worth (Agarwal, 1997; Haddad et al., 1994; Kabeer, 2001; A. Sen, 1987, 1990; G. Sen and Batliwala, 2000). According to A. Sen (1987, p. 12), “Perceptions (including illusions) have an influence – often a major impact – on actual states and outcomes.” There are several reasons why husbands and wives were interviewed separately. Based on the underlying assumption that households are composed of individuals with unique preferences who may make decisions alone or together (Browning et al., 1994), respondents may make decisions without the knowledge of others in the household and may want to keep information private from others. Moreover, there was a general concern that if interviews were conducted together, responses may differ from those generated from separate interviews (cf., Bateman and Munro, 2009), particularly given qualitative evidence suggesting that men tend to dominate interviews.

The measurement of empowerment is based on whether the respondent has any say in the decision-making process, whereas the measurement of bargaining power captures the degree of say. To create the bargaining power index, a score of 0 is given if the respondent had no say, 1 if the respondent had joint say, and 2 if the respondent had main or sole say (hereafter, primary say). Few wives claimed sole or main decision-making authority, so these responses are aggregated. Based on bargaining power in loan decisions, three aggregated indices were created: The first index is an aggregation of decisions to repay the four loan types, the second is an aggregation of decisions to take out the four loan types, and the third is an aggregation of decisions to both takeout and repay the four loan types. Similar to other studies using aggregated bargaining power indices, each decision has equal weight (Ashraf et al., 2010; Hashemi et al., 1996; Li and Xiaoyu, 2011). The indices range from 0 (indicating no say in each decision) to 2 (indicating primary say in each decision). There are several disadvantages of analyzing bargaining power through an aggregated index. The aggregation of decisions is based on assumptions of their relative importance. In our bargaining power index, the assumption is that decisions about all four loan types are equally important for bargaining power. In addition, decisions related to dissimilar domains are often aggregated. For example, Ashraf et al. (2010) aggregate decisions about small and large expenditure items, assistance to family members, the

number of children to have, and the use of family planning. As shown in Table 4.1, the primary uses of each loan type greatly vary. Moreover, households with different decision-making patterns may have equivalent index scores. For example, a woman with joint decision-making power over several decisions may have the same index score as a woman with primary decision-making power over a few decisions. Lastly, an index assumes that having more bargaining power is better; however, one can imagine situations in which having more bargaining power is more of a burden than a blessing. For example, is a woman with a husband who is unwilling or unable to make decisions more empowered than a woman who jointly participates in decision-making with her husband? The main rationale of analyzing bargaining power using aggregated indices is to examine whether indices are able to represent an accurate picture of influencing factors of intra-household decision-making in comparison to analyzing decision-making power in separate decisions.

4.3.2 HYPOTHESIZED INFLUENCING FACTORS OF BARGAINING POWER AND EMPOWERMENT

Based on theories and previous studies of intra-household decision-making dynamics, we hypothesize that individual-, household-, and institutional-level factors may influence women's decision-making power for financial decisions. These variables include proxies of social capital – membership in unions,²⁴ network-reliance, and political connections – based on findings which suggest that social capital may influence intra-household decision-making power (Agarwal, 1997; Quisumbing and Maluccio, 2000). Moreover, the most recent *World Development Report* explains that "social capital is the only factor that allows women to feel empowered even when facing high levels of domestic violence in their communities" (The World Bank, 2011, p. 95). In this section, we clarify the measurement of the explanatory variables and hypothesize their influence on wives' decision-maker power in the financial decisions examined in this paper. Table 4.2 and Table 4.3 provide descriptions of the individual-level and household-level variables, respectively, as well as their summary statistics and their hypothesized influence on women's decision-making power for loan decisions.

The following individual-level variables may influence wives' decision-making power

²⁴ There are no other organizations that respondents are members of besides unions.

- Birthplace: a woman born outside of Yen Chau district may have inferior fallback options in case of divorce since she may have more difficulty in returning to her parents' home, which may have a negative effect on her decision-making power.
- Ability to speak Vietnamese: women unable to speak Vietnamese may have more difficulty making decisions about larger loans because informal lenders and bank representatives from outside the village may not speak local languages.
- Education: women who have completed more education may have greater decision-making power in financial decisions (cf., Allendorf, 2007; Garikipati, 2008; Pitt et al., 2006; Rahman and Rao, 2004) because they may be better informed about loan opportunities and about how to budget and save. Education may also allow women to assess loan opportunities and potential investments through improved numeracy. Furthermore, education may help women place more value on their role and status in society, which, in turn, may help improve their decision-maker power.
- Off-farm employment: off-farm employment may increase wives' decision-making power (Allendorf, 2007; Rahman and Rao, 2004) since it can increase information access, social networks, income, and contribution to the household (Haddad et al., 1994). We hypothesize that the effect may be greater for repaying loans since women with off-farm employment may be able to repay loans with money they earn themselves, without having to ask others. Off-farm employment may be endogenous to decision-making power since it is possible that intra-household decision-making power may affect the decision to work off-farm (Anderson and Eswaran, 2009; Goetz and Gupta, 1996). Exogeneity of off-farm employment in the logistic regression models was tested via the Smith and Blundell (1986) test of exogeneity.²⁵ We fail to reject the

²⁵ This test was conducted via the probexog command in STATA (Baum, 1999). We conducted this test using two instrumental variables: whether the respondent thinks that land reallocation within the village after the Land Use Certificate expires will not occur and whether the respondent thinks that income fluctuation in the past five years has been five or greater on a scale of 0 (representing no income fluctuation) to 10 (representing extreme income fluctuation). In each of the models, both instrumental variables are correlated with the possible endogenous variable (off-farm employment) and are uncorrelated with the dependent variable. Diagnostic tests for the instrumental variables were conducted using the ivreg2 command in STATA (Baum, Schaffer, and Stillman, 2007). Results from underidentification tests, the Kleibergen-Paap rk Wald F-statistic (Stock and Yogo, 2005), and overidentification

null hypothesis that the models are appropriately specified with the off-farm employment status being exogenous. Therefore, instrumental variables are not needed to correct for endogeneity.

- Women-controlled income: this is proxied by small livestock revenue based on qualitative evidence that women are traditionally in charge of small livestock production in the study area (Beuchelt, 2008). Fletschner and Carter (2008) used a similar approach in which they proxied women's control over the family budget by the proportion of family wealth held in small animals. We, on the other hand, use revenue rather than asset value or profit because it was easier for respondents to estimate revenue and, in terms of potential impacts on decision-maker power, the impact of revenue may be more relevant because of its greater visibility. We hypothesize that women-controlled income will have an increasing effect on wives' decision-making power (Thomas, 1990).
- Risk aversion: individuals who are more risk averse may prefer not to participate in or to have less say in decisions to take-out loans because they may view using credit to be too risky (Boucher et al., 2008). Moreover, risk preferences may, in part, measure other personality characteristics and attitudes that could be influential in financial decisions (Fletschner et al., 2010). We hypothesize that being more risk averse will decrease decision-making power for large loans. Risk preferences were measured through a variation of pairwise choice lotteries, the multiple price list technique, which is considered the gold standard to assess risk preferences. This method was popularized by Holt and Laury (2002) and has subsequently been used in a number of studies. Respondents were given a set of ten choices between two options – a relatively safer option with a lower variance of payouts and a relatively riskier option with a higher variance of payouts. With each subsequent choice, the probability of winning the higher payout increased. The options were non-hypothetical since one was randomly selected for payout. Risk preferences are based on the total number of safer options chosen, with

tests indicate that the instrumental variables are valid and relevant, though are weakly correlated with the possible endogenous regressor.

higher numbers indicating more risk aversion (Appendix 6.7 provides the instructions, an example, and the choices).

- Membership in unions: we hypothesize that the more unions the wife is a member of, the greater her decision-making power. Greater participation in social networks may increase access to information about financial opportunities (Conley and Udry, 2010), which, in turn, may increase their say in financial decisions.

The following household-level variables may impact women's decision-making power:

- Marriage length: qualitative evidence suggests that recently married couples in Yen Chau tend to make more decisions together and that spouses may establish separate spheres as the marriage progresses. This may mean, for example, that wives' decision-making power for small loans may increase with marriage length since nearly half of small loans are for food purchases, the traditional responsibility of women. Previous studies have found a positive impact of women's age or marriage length on their decision-making power (Allendorf, 2007; Rahman and Rao, 2004; Yusof and Duasa, 2010).
- Child dependency ratio: we hypothesize that higher child dependency ratios will have a decreasing impact on wives' decision-making power over large loans because she may not have sufficient time to assess available investments or partake in these decisions. On the other hand, she may have more decision-making power for small loans given their primary use – food purchases.
- Number of other women living in the household: we hypothesize that the more women living in a household, the less decision-making power the wife will have. This hypothesis is based on theory (Mason, 1986) and previous research which have found negative impacts on decision-maker power if the mother-in-law resides in the house (Anderson and Eswaran, 2009; Jejeebhoy and Sathar, 2011). In Yen Chau, mother-in-laws and later daughters and daughter-in-laws may pose threats since it is customary for the wives of sons to move into the household upon marriage.
- Income: proxied by the household's average daily per capita expenditures based on data collected in two periods of 2010. While some studies have found that household wealth increases women's empowerment (Allendorf, 2007; Garikipati, 2008; Mabsout and Staveren, 2010), others have found the opposite (Bernasek and Bajtelsmit, 2002; Pitt et

al., 2006; Rahman and Rao, 2004) or no effect (Yusof and Duasa, 2010). Based on bargaining power theory, as household income increases, women's decision-making power may decrease because their relative contribution to the household is likely to fall.

- Network-reliance with various social networks (first-degree relatives, extended family, friends, the village head, and unions): measures structural social capital which includes more observable social structures such as networks and also measures cognitive social capital which includes less tangible elements such as norms and reciprocity (Grootaert and van Bastalaer, 2002). Greater network-reliance with relatives may have a larger positive influence on wives' decision-making power than network-reliance with non-relatives given the importance of family in traditional Vietnamese society (Hoang et al., 2006). Women living in households with greater network-reliance with relatives may have greater financial decision-making power because of an easier way to secure loans compared to going to the formal sector which involves higher transaction costs. Political connections: this variable equals the number of people any household member knows personally who are members of mass unions. This measures linking social capital which is relationships between people who interact across formal or institutionalized power (Szreter and Woolcock, 2004). We hypothesize that greater linking social capital is likely to have a negative impact on wives' decision-making power because men are more likely to benefit from connections to local authorities.

Because gendered institutions may influence decision-making power (Cleaver, 2005; Fletschner and Carter, 2008; Mabsout and Staveren, 2010; G. Sen and Batliwala, 2000), we examine whether the following institutional-level factors influence wives' intra-household financial decision-making power:

- Ethnicity: previous experiences in the study area suggest that Black Thai and H'mong women have a lower status in the household than Kinh women; however, high and statistically significant correlations of ethnicity with birthplace and with the ability to speak Vietnamese prevent the inclusion of ethnicity in the regression analyses. Instead, separate analyses explore this hypothesis.
- Birthplace: both an individual- and institutional-level variable. If Yen Chau has more restrictive gendered institutions than other districts, wives born outside Yen Chau may

have more decision-making power because of their past experiences of more egalitarian gendered institutions.

Besides analyzing sources of wives' decision-making power, sources of husbands' bargaining power and dominance in financial decisions are examined. Influencing factors are similar to those for wives, though there are a few key differences. Rather than including the husband's ability to speak Vietnamese, we include the wife's *inability* to speak Vietnamese since all but one husband in the sample can speak Vietnamese. Women-controlled income is also excluded.

Pearson's Chi-Square tests examine whether there are statistically significant relationships between the hypothesized individual-level sources of decision-making power and being a wife or husband (shown in Table 4.2). Wives have completed less formal education, are members of fewer unions, and are more risk averse. There is no significant difference in the relationship with the off-farm employment status. The other variables – marriage length, child dependency ratio, number of other women, income, network-reliance, and political connections – are household-level variables.

In the following section, empirical strategies for how to assess influencing factors of wives' and husbands' decision-making power are presented.

Table 4.2: Hypothesized individual-level sources of decision-making power

Variable	Description	Hypothesized impact on wives' decision-making power in loan decisions	Wives (N = 250)	Husbands (N = 250)
			Mean (s.d.)	Mean (s.d.)
Born in district	Dummy = 1 if the wife was born in Yen Chau district, 0 otherwise	?	0.80 (0.40)	-
Speak Vietnamese ^a	Dummy = 1 if the respondent can speak Vietnamese, 0 otherwise	+	0.89*** ^b (0.32)	1.00*** (0.06)
Education	Years of formal schooling completed	+	4.77*** (3.65)	6.61*** (3.93)
Off-farm employment	Dummy = 1 if the respondent works off-farm, 0 otherwise	+	0.33 (0.47)	0.36 (0.48)
Women-controlled income ^c	Proxied by annual small livestock revenue in 2010, in million Vietnamese dong	+	3.77 (8.37)	-
Risk preferences	Number of safer options chosen in the multiple price list technique (higher numbers indicate more risk aversion) ^d	+ for small loans – for large loans – for taking out + for repaying	6.66*** (1.93)	6.21*** (1.97)
Membership in unions	Number of unions the respondent is a member of	+	1.16*** (0.59)	1.55*** (0.86)

Notes:

^a In the regression analyses examining husbands' decision-making power, the wife's inability to speak Vietnamese is included as an explanatory factor given that all but one husband in the sample are able to speak Vietnamese.

^b Pearson's Chi-Square test of whether there is a statistically significant relationship between the independent variable and whether the respondent is a wife or husband are reported.

^c This variable is excluded from the regression analyses examining husbands' decision-making power.

^d Selecting four safer options indicates approximate risk neutrality and selecting less than four indicates risk loving. Just 10.8% of both wives and husbands are approximately risk neutral and 4% and 7.2% of wives and husbands, respectively, as risk loving.

* Significant at the 10% level. ** Significant at the 5% level. *** Significant at the 1% level.

Table 4.3: Hypothesized household-level sources of wives' decision-making power

Variable	Description	Hypothesized impact on wives' decision-making power in loan decisions	Mean (s.d.) of husbands and wives (N = 500)
Marriage length	Years the couple has been married ^a	+ for small loans	22.29 (11.74)
Child dependency ratio	Ratio children under 14 years of age living in the household to the total number of people living in the household	–	0.23 (0.19)
Number of other women in house	Number of women living in the household other than the wife	–	0.73 (0.83)
Income	Average daily per capita expenditures in 2010, in thousand Vietnamese dong	–	19.81 ^b (6.51)
Network-reliance	The sum of “easy” responses from: “If you or another household member asked, would it be easy or not easy to borrow money for education (or for health expenses, a positive social event, a negative social event, or to borrow a water buffalo, or to ask for labor) from (see social networks below).” The maximum is six for each social network category, with the exception of unions which has a maximum of five. ^c		
First-degree relatives		+	5.78 (0.84)
Extended family		+	4.53 (1.95)
Friends		+	4.80 (1.84)
Village head		+	3.98 (2.68)
Unions		+	2.14 (2.05)
Political connections	Number of people any household member knows personally ^d who are members of the Community Party, People’s Committee, Women Union, or Fatherlands Front Union at the commune level	–	1.16 (0.69)

Notes:

^a Because of lack of survey data on marriage length, we estimated the marriage length based on the median age of marriage in rural areas for women in Vietnam, 21 years (Committee for Population, Family and Children and ORC Macro, 2003) and the wife's age. Since the median age at first marriage has not increased in the past 25 years (Committee for Population, Family and Children and ORC Macro, 2003), it is also applicable to older respondents.

^b This is equivalent in purchasing power parity (PPP) to \$2.36 after updating expenditures for inflation and given that 10,178.57 VND/\$1 PPP (General Statistics Office, 2012b; The World Bank, 2012).

^c The ease of borrowing a water buffalo/cow from unions was not asked because it is not applicable.

^d This concept was explained as a two-way relationship in which people talk to each other and know at least basic information about one another.

4.3.3 EMPIRICAL STRATEGY

Influencing factors of wives' empowerment are analyzed using binary logistic regression models for each decision separately. The dependent variable equals 1 if she has any say in the decision-making process (joint or primary say) and equals 0 if she has no say. The number of observations in each model varies between 205 and 228 because respondents were excluded if they stated that the decision is not made in their household.²⁶ In the binary logistic regression models of wives' empowerment in taking out and repaying small loans, the null hypothesis that all regression coefficients equal zero could not be rejected. Therefore, ordinal logistic regression models examine influencing factors of wives' bargaining power in these two decisions.²⁷ The dependent variable equals 0 if the wife has no say, 1 if she has joint say, and 2 if she has primary say. Both binary and ordinal logistic regression models use maximum likelihood estimation. Influencing factors of husbands being the dominant decision-maker are explored using binary logistic regression models in which the dependent variable equals 1 if the husband states that he is the primary decision-maker and equals 0 otherwise. To investigate whether aggregated indices conceal important observations from the models exploring each loan decision separately, influencing factors of husbands' and wives' bargaining power in loan decisions based on aggregated indices are assessed using Ordinary Least Squares (OLS) regressions for respondents living in households that made decisions about all four loan types. Correlations among the explanatory variables in the subsample of wives and of that of husbands are no greater than the absolute value of 0.50 and the mean variance inflation factors are 1.42 and 1.54, respectively, indicating that collinearity does not pose a problem (Midi et al., 2010).

²⁶ In a few cases, one spouse reported that a particular financial decision is made together with his/her spouse while his/her spouse said that the decision is not applicable to their household. In such cases, we excluded both respondents from the analysis of the respective decision.

²⁷ Because of violations of the proportional odds assumption, ordinal logistic regression models could not be used to explore influencing factors of bargaining power for the other loan decisions. We could have analyzed wives' bargaining power for family budget and savings decisions with ordinal logistic regression models; however, for ease of interpretation we apply binary logistic regression models instead.

4.4 RESULTS AND DISCUSSION

This section presents and discusses descriptive results on wives' and husbands' intra-household decision-making power before examining determinants of decision-making power.

4.4.1 DESCRIPTIVE STATISTICS FOR INTRA-HOUSEHOLD BARGAINING POWER AND EMPOWERMENT

Descriptive statistics of intra-household bargaining power and empowerment based on wives' and husbands' perceptions of their own roles in family budget and savings decisions are shown in Table 4.4. Pearson's Chi-Square tests examine whether there is a statistically significant relationship between bargaining power and empowerment and being a wife or husband. Although husbands have more bargaining power (i.e., their degree of say) in family budget and savings decisions, there is no difference between husbands' and wives' empowerment (i.e., their having any say) in these decisions. Distributions indicate that wives are more likely to state that decisions are made jointly, while husbands are more likely to state that they are the main or sole decision-maker.

Husbands have significantly more bargaining power in taking out and repaying all four loans (see Table 4.5). Nevertheless, perceptions of their bargaining power differ greatly by the type of loan. Moreover, wives' bargaining power decreases with the size of the loan. Another observation is that while very few husbands – 3.9% to 7.3% – state that they have no say in each loan decision, few wives state that they are the primary decision-maker, with the exception of small loans. The majority of small loan decisions are made by husbands and wives alone, indicating that most of these loans are taken out and repaid without requiring approval from others. On the other hand, the majority of large loans and large agricultural loans are made jointly. There are also variations in decision-making power based on whether the decision is to take out or to repay the loan: more wives and husbands state that they are the sole decision-maker for repaying large loans and large agricultural loans as opposed to taking these loans out. Asymmetric information between the reported bargaining power by wives and husbands is apparent. Husbands are more likely to state that they are the main or sole decision-maker, while wives are more likely to state that decisions are made jointly, supporting findings by Kabeer (2001).

Table 4.4: Bargaining power and empowerment in family budget and savings decisions

	Family budget		Savings	
	Wives	Husbands	Wives	Husbands
Observations	217	217	212	212
No say	27.6%	23.5%	18.9%	19.8%
Joint say	40.1%	30.0%	50.0%	39.2%
Main say	7.4%	20.3%	6.1%	15.6%
Sole say	24.9%	26.3%	25.0%	25.5%
Mean bargaining power ^a	1.05*** ^b	1.23***	1.12*	1.21*
(s.d.)	(0.77)	(0.81)	(0.70)	(0.75)
Mean empowerment ^c	0.72	0.76	0.81	0.80
(s.d.)	(0.45)	(0.43)	(0.39)	(0.40)

Notes:

^a The bargaining power index equals: 0 if the respondent has no say; 1 if the respondent has joint say; and 2 if the respondent has primary (main or sole say) say in the decision.

^b Pearson's Chi-Square test of whether there is a statistically significant relationship between bargaining power or empowerment and whether the respondent is a wife or husband are reported.

^c The empowerment score equals 0 if the respondent has no say and 1 if the respondent has any say.

* Significant at the 10% level. ** Significant at the 5% level. *** Significant at the 1%.

Table 4.5: Bargaining power and empowerment in credit decisions

	Taking out loans		Repaying loans	
	Wives	Husbands	Wives	Husbands
Small loans				
Observations	205	205	205	205
No say	12.7%	7.3%	13.2%	7.3%
Joint say	22.0%	14.6%	22.0%	14.6%
Main say	4.4%	6.3%	3.4%	3.9%
Sole say	61.0%	71.7%	61.5%	74.1%
Mean bargaining power ^a	1.53** ^b	1.71**	1.52**	1.71**
(s.d.)	(0.71)	(0.60)	(0.72)	(0.60)
Mean empowerment ^c	0.87*	0.93*	0.87*	0.93*
(s.d.)	(0.33)	(0.26)	(0.34)	(0.26)
Medium loans				
Observations	214	214	214	214
No say	15.0%	4.7%	15.9%	3.9%
Joint say	70.6%	46.3%	67.8%	64.5%
Main say	4.2%	22.0%	3.7%	29.4%
Sole say	10.3%	27.1%	12.6%	2.2%
Mean bargaining power	1.00***	1.42***	1.00***	1.44***
(s.d.)	(0.54)	(0.58)	(0.57)	(0.59)
Mean empowerment	0.85***	0.95***	0.84***	0.95***
(s.d.)	(0.36)	(0.21)	(0.37)	(0.21)
Large loans				
Observations	228	228	223	223
No say	12.7%	3.9%	13.2%	4.4%
Joint say	83.8%	64.5%	81.6%	58.8%
Main say	2.2%	29.4%	1.3%	24.1%
Sole say	1.3%	2.2%	3.9%	12.7%
Mean bargaining power	0.91***	1.28***	0.92***	1.32***
(s.d.)	(0.39)	(0.53)	(0.42)	(0.56)
Mean empowerment	0.87***	0.96***	0.87***	0.96***
(s.d.)	(0.33)	(0.20)	(0.34)	(0.20)
Large agricultural loans				
Observations	223	223	223	223
No say	17.9%	5.4%	17.9%	5.4%
Joint say	76.2%	60.1%	74.4%	57.4%
Main say	3.1%	27.8%	2.7%	23.8%
Sole say	2.7%	6.7%	4.9%	13.5%
Mean bargaining power	0.88***	1.29***	0.90***	1.32***
(s.d.)	(0.47)	(0.56)	(0.50)	(0.57)
Mean empowerment	0.82***	0.95***	0.82***	0.95***
(s.d.)	(0.39)	(0.23)	(0.39)	(0.23)

Notes:

^a The bargaining power index equals: 0 if the respondent has no say; 1 if the respondent has joint say; and 2 if the respondent has primary (main or sole) say in the decision.

^b Pearson's Chi-Square test of whether there is a statistically significant relationship between bargaining power or empowerment and whether the respondent is a wife or husband are reported.

^c The empowerment score equals 0 if the respondent has no say and equals 1 if the respondent has any say.

* Significant at the 10% level. ** Significant at the 5% level. *** Significant at the 1% level.

4.4.2 INFLUENCING FACTORS OF WIVES' EMPOWERMENT IN FINANCIAL DECISIONS

Binary and ordinal logistic regression models are used to explore sources of wives' empowerment in each financial decision separately. In binary logistic regressions (shown in Table 4.6), odds ratios report the predicted change in the odds of being empowered in each financial decision (except for small loans) from a one-unit increase in the predictor, given that all other variables are held constant. In ordinal logistic regression models representing decisions to take out and repay small loans (shown in Table 4.7), odds ratios report changes in the odds of the predictor in terms of cumulative groups and can be interpreted in two ways given that all other predictors are held constant: first, the change in the odds of being the primary decision-maker versus the odds of being either a joint decision-maker or having no say in the decision from a one-unit increase in the predictor; and second, the change in the odds of being the primary or joint decision-maker versus the odds of having no say in the decision from a one-unit increase in the predictor. The null hypothesis that all regressor coefficients equal zero can be rejected in each model. Robustness checks confirm that the main implications and interpretations of statistically significant factors remain the same against the removal of insignificant variables, though some variables become marginally significant in the reduced model and others become insignificant.²⁸

²⁸ Variables which become insignificant in reduced models after removing previously insignificant variables from the full model are: birthplace in the family budgeting model; the poorest income tercile in the taking out and repaying small loans models and in the taking out medium loans model; marriage length in the taking out and repaying medium loans models; membership in organizations in the repaying large loans model; network-reliance with extended family in the repaying large loans model; and network-reliance with the village head in the taking out large agricultural loans model.

Table 4.6: Binary logistic regression of wives' empowerment in financial decisions

	Family budgeting	Saving	Taking out medium loans	Repaying medium loans	Taking out large loans	Repaying large loans	Taking out large agricultural loans	Repaying large agricultural loans
Observations	217	212	214	214	228	228	223	223
Constant	0.874 (1.482)	5.876 (11.334)	12.111 (26.100)	2.720 (5.828)	9.499 (22.791)	11.171 (25.408)	22.047 (44.869)	5.690 (11.631)
Born in district	0.174** (0.118)	0.190** (0.139)	0.380 (0.267)	0.458 (0.323)	0.755 (0.548)	0.940 (0.634)	0.442 (0.276)	0.644 (0.401)
Can speak Vietnamese	5.823** (4.745)	8.386*** (6.687)	6.467** (5.174)	7.904** (6.381)	11.555*** (10.893)	4.041 (3.458)	6.966** (5.362)	7.419** (5.756)
Education	1.285*** (0.084)	1.146* (0.083)	1.181* (0.102)	1.190** (0.104)	1.205* (0.125)	1.188* (0.113)	1.182** (0.098)	1.093 (0.089)
Off-farm employment	1.691 (0.688)	1.071 (0.490)	1.948 (1.028)	2.432 (1.317)	3.305* (2.166)	3.506** (2.165)	1.465 (0.709)	2.359* (1.206)
Women-controlled income	0.925*** (0.024)	0.954* (0.027)	0.937* (0.032)	0.942* (0.032)	0.889*** (0.031)	0.909*** (0.030)	0.902*** (0.028)	0.924*** (0.027)
Risk aversion	0.943 (0.094)	0.936 (0.102)	1.023 (0.120)	1.129 (0.130)	1.137 (0.162)	1.144 (0.154)	0.945 (0.115)	1.098 (0.132)
Marriage length	0.996 (0.018)	0.967* (0.019)	0.958* (0.023)	0.959* (0.023)	0.907*** (0.026)	0.907*** (0.025)	0.948** (0.021)	0.934*** (0.022)
Number of other women in house	0.678 (0.168)	0.669 (0.198)	0.647 (0.208)	0.517** (0.168)	0.831 (0.305)	0.793 (0.274)	0.560** (0.165)	0.550** (0.161)
Ratio of children to total residents = 0	1.057 (0.503)	1.551 (0.841)	2.597 (1.835)	1.884 (1.262)	2.982 (2.321)	5.238** (4.075)	2.697 (1.766)	2.804 (1.789)
Ratio of children to total residents \geq 0.33	1.010 (0.477)	1.329 (0.697)	0.384 (0.229)	0.385 (0.234)	0.203** (0.144)	0.322* (0.209)	0.291** (0.167)	0.329* (0.190)
Lowest income tercile (< 17,020 VND/day)	1.625 (0.727)	1.544 (0.797)	2.918* (1.659)	4.121** (2.452)	7.687*** (5.909)	5.371** (3.755)	3.382** (1.847)	4.930*** (2.853)
Highest income tercile (> 22,725 VND/day)	1.649 (0.770)	1.287 (0.670)	1.680 (1.019)	1.506 (0.899)	1.364 (0.923)	1.961 (1.288)	2.095 (1.213)	1.915 (1.077)

(continued from previous page)

	Family budgeting	Saving	Taking out medium loans	Repaying medium loans	Taking out large loans	Repaying large loans	Taking out large agricultural loans	Repaying large agricultural loans
Membership in unions	0.915 (0.319)	0.810 (0.303)	0.506 (0.212)	0.636 (0.269)	0.376* (0.189)	0.458* (0.213)	0.581 (0.240)	0.646 (0.258)
Network-reliance:								
First-degree relatives	1.087 (0.241)	0.926 (0.257)	0.789 (0.235)	0.832 (0.244)	0.627 (0.200)	0.601 (0.187)	0.653 (0.175)	0.671 (0.184)
Extended family	1.017 (0.106)	1.070 (0.125)	1.160 (0.979)	1.226 (0.159)	1.383** (0.197)	1.263* (0.168)	1.305** (0.148)	1.316** (0.156)
Friends	0.925 (0.105)	1.071 (0.136)	0.979 (0.141)	0.993 (0.145)	0.947 (0.149)	1.085 (0.157)	0.937 (0.122)	1.033 (0.136)
Village head	1.037 (0.101)	0.920 (0.101)	1.022 (0.132)	0.917 (0.112)	1.189 (0.166)	1.116 (0.151)	1.298** (0.155)	1.069 (0.127)
Unions	1.106 (0.112)	1.099 (0.127)	1.024 (0.132)	1.018 (0.129)	1.039 (0.164)	1.131 (0.172)	0.976 (0.121)	0.983 (0.123)
Political connections	1.012 (0.052)	1.034 (0.062)	1.078 (0.084)	1.113 (0.090)	1.377** (0.183)	1.308** (0.158)	1.058 (0.077)	1.171* (0.098)
Likelihood Ratio $\chi^2(19)$	46.00***	32.83**	38.07***	45.76***	63.59***	57.34***	55.81***	56.43***
McFadden's Pseudo R ²	0.180	0.1599	0.211	0.244	0.366	0.323	0.266	0.269
Sensitivity ^a	91.72%	98.84%	97.25%	98.89%	97.99%	97.98%	97.27%	96.72%
Specificity ^b	33.33%	22.50%	25.00%	35.29%	48.28%	43.33%	42.50%	40.00%

Notes: Odds ratios are reported in bold with their standard errors in parentheses. The dependent variable equals 1 if the wife has any say in the decision and equals 0 otherwise. Regressions for taking out and repaying small loans are not shown because the null hypothesis that all regression coefficients equal zero could not be rejected for these models (please refer to Table 4.7 for results from ordinal logistic regression models of these decisions).

^a Sensitivity refers to the predictions that the dependent variable is 1, conditional on observed values of 1.

^b Specificity refers to the predictions that the dependent variable is 0, conditional on observed values of 0.

*** Significant at the 1 percent level. ** Significant at the 5 percent level. * Significant at the 10 percent level.

Table 4.7: Ordinal logistic regression models of wives' bargaining power in small loan decisions

	Taking out small loans	Repaying small loans
Observations	205	205
Born in district	1.983 (0.858)	2.237* (0.959)
Can speak Vietnamese	2.825* (1.706)	2.526 (1.522)
Education years	1.011 (0.053)	1.002 (0.052)
Off-farm employment	0.967 (0.324)	1.034 (0.344)
Women-controlled income	1.010 (0.029)	1.009 (0.028)
Risk aversion	1.231** (0.105)	1.240** (0.107)
Marriage length	0.965* (0.018)	0.963** (0.018)
Number of other women in house	0.802 (0.181)	0.805 (0.180)
Ratio of children to total residents = 0	2.293* (1.044)	2.415* (1.099)
Ratio of children to total residents ≥ 0.33	1.140 (0.495)	1.105 (0.475)
Lowest income tercile (< 17,020 VND/day)	0.440** (0.182)	0.507* (0.207)
Highest income tercile (> 22,725 VND/day)	0.638 (0.276)	0.725 (0.310)
Membership in unions	0.713 (0.192)	0.795 (0.214)
Network-reliance:		
First-degree relatives	1.108 (0.211)	1.095 (0.209)
Extended family	0.887 (0.090)	0.871 (0.088)
Friends	1.046 (0.102)	1.034 (0.100)
Village head	1.098 (0.084)	1.105 (0.083)
Unions	0.821** (0.069)	0.825** (0.069)
Political connections	0.999 (0.050)	0.966 (0.056)
Likelihood Ratio $\chi^2(19)$	40.730***	40.650***
McFadden's Pseudo R ²	0.114	0.113

Notes: Odds ratios are shown in bold with their standard errors in parentheses. The dependent variable equals 0 if she has no say, 1 if she has joint say, and 2 if she has primary (main or sole) say in the decision.

*** Significant at the 1 percent level. ** Significant at the 5 percent level. * Significant at the 10 percent level.

The first two models in Table 4.6 represent wives' empowerment in family budget and savings decisions. The wife's ability to speak Vietnamese and her education have positive impacts on her odds of being empowered, whereas being born in the district and living in a household with higher women-controlled income decrease her odds of being empowered for these decisions. The other models represent wives' empowerment in loan decisions. Sources of wives' empowerment differ depending on the loan type as well as on whether the decision is to take out or repay the loan. For example, wives who are more risk averse have higher odds of being empowered for small loan decisions (see Table 4.7), but risk preferences have no significant influence on the odds of her being empowered for any other financial decision. Sources of empowerment differ if the decision is to take out as opposed to repay the same type of loan. For example, the ability to speak Vietnamese has a strong and positive impact on wives' empowerment in taking out large loans, though it has no significant impact on her empowerment in repaying such loans. This supports the hypothesis that being able to speak the national language is important for obtaining large loans. The influence of the child dependency ratio on wives' empowerment shows that wives living in households with a relatively high child dependency ratio have much lower odds of being empowered for decisions about larger loans. This indicates that wives may be too overburdened by childcare tasks to participate in important financial decisions.

There are a few unexpected results. First, off-farm employment status has a statistically significant impact on wives' empowerment for decisions about large loans only. Nevertheless, the impact is quite large: the odds of a wife being empowered are 2.3 and 2.5 times greater for taking out and repaying large loans, respectively, if she works off-farm, given that all other variables are held constant. Second, the greater the number of unions that the wife is a member of, the lower are her odds of being empowered for taking out and repaying large loans. An explanation for this may be that unions may reinforce gender norms. Nevertheless, the result is statistically significant at the 10% level only and is not robust since the variable becomes insignificant in restricted models. Third, most network-reliance variables are not significant in influencing wives' empowerment. The exception is network-reliance with extended family, which has a positive impact on wives' odds of being empowered for decisions to take out and repay the two types of large loans: for each additional item (money for four purposes, a water buffalo/cow, or labor) the household can borrow from extended family in times of need, the odds of the wife being empowered are 26% to 38% greater, given that all other variables are held

constant. This result highlights the importance of family in the study area; however, the network-reliance variables have the disadvantage of being at the household-level since they were elicited from household heads only. Fourth, women-controlled income proxied by the household's annual small livestock revenue has a negative impact on wives' empowerment in all financial decisions except for those in small loans. This last unexpected result merits special attention. Although this finding may seem counterintuitive based on the theory that the more women control, the greater their intra-household decision-making power, some findings in previous studies support this result. For example, Kantor (2003) found that women more successful at home-based garment production in India are more likely to lose control of their income. This echoes findings by von Braun (1988) in which women's control over rice production in Gambia is almost perfectly negatively correlated with yields. In other words, the more successful an enterprise becomes, the less women have control over that enterprise. Therefore, as revenues from small livestock increase, the responsibility of small livestock may shift to men. Follow-up interviews conducted with households with very profitable chicken and pig production support this explanation.

The results show that education has a positive impact on wives' odds of being empowered for most financial decisions. To test whether the difference in education between spouses is important for wives' empowerment, separate models were examined in which the difference in education between the husband and wife replaced the wife's education (results are not shown). We find a statistically significant negative impact from a greater educational divide between spouses on wives' empowerment in decisions about family budgeting, saving, and taking out medium loans. However, there is no significant effect on the seven other financial decisions. This indicates that for all but one loan decision, absolute changes in wives' education are critical for their empowerment whereas relative changes compared to their husbands are not.

Predicted probabilities help explain how combinations of different circumstances may change wives' probability of being empowered. Table 4.8 shows predicted probabilities of wives' empowerment in decisions about taking out loans by changing her off-farm employment status and the household's child dependency ratio. All other independent variables are held constant at their means. The importance of these circumstances for her probability of being empowered in taking out loans is evident. For example, a wife who does not work off-farm and lives in a household with a relatively high child dependency ratio has a 75% predicted probability of being empowered for taking out large loans, whereas if she were to work-off farm in such a household,

her predicted probability of being empowered would increase to 86%, given that all other independent variables are held at mean values. On the other hand, her predicted probability of being empowered for taking out small loans varies little depending on these circumstances. These results provide further evidence of the importance of analyzing sources of wives' empowerment in financial decisions separately since impacts greatly differ by loan type.

Table 4.8: Predicted probabilities of wives' empowerment in decisions to take out loans

	Small loans ^a	Medium loans	Large loans	Large agricultural loans
Wife does not work off-farm and does not live in a household with a high child dependency ratio ^b	0.87	0.87	0.89	0.86
Wife does not work off-farm and lives in a household with a relatively high child dependency ratio	0.88	0.76	0.75	0.71
Wife works off-farm and does not live in a household with a relatively high child dependency ratio	0.87	0.92	0.95	0.89
Wife works off-farm and lives in a household with a relatively high child dependency ratio	0.88	0.84	0.86	0.76

Notes: All predicted probabilities are significant at the 1% level. Other independent variables are held at mean values. Predicted probabilities were obtained using the “margins” command in STATA.

^a Predicted probabilities for small loans are from the ordinal logistic regression models and equal sums of predicted probabilities for being either the joint or primary decision-maker.

^b A high child dependency ratio is defined as being greater or equal to 0.33. This is based on the cutoff point of the third tercile of the child dependency ratio in the sample.

The finding that wives born in Yen Chau have much lower odds of being empowered for family budget and savings decisions provides evidence that gendered institutions influence empowerment. To test whether ethnicity is influential for wives' empowerment, separate regressions were examined in which the wives' ability to speak Vietnamese and her birthplace were replaced with two dummy variables representing whether she is Black Thai or H'mong (results are not shown). Being Black Thai or H'mong as opposed to Kinh (the ethnic majority in Vietnam) has a significant and strong negative impact on her odds of being empowered for decisions about family budgeting, saving, and taking out and repaying small loans. This provides further evidence that gendered institutions may not be as important for credit decisions as they are for family budget and savings decisions.

Sensitivity and specificity tests report the share of cases correctly predicted by the models for both empowered and non-empowered sub-groups, respectively. The sensitivity results indicate that the share of cases correctly predicted by the models for the empowered sub-group is high, ranging from 92% to 99%, whereas the specificity results indicate that the share of cases correctly predicted by the models for the non-empowered sub-group range from 23% to 48%. This demonstrates that none of the models are capable of differentiating between empowered and non-empowered women at a satisfactory level of precision and that additional sources of empowerment other than those included in the analyses must also be relevant.

4.4.3 INFLUENCING FACTORS OF WIVES' BARGAINING POWER IN CREDIT DECISIONS USING AGGREGATED INDICES

In this subsection, influencing factors of wives' bargaining power in credit decisions are explored using three aggregated indices (taking out, repaying, and both taking out and repaying all four loan types) via OLS models (shown in Table 4.9). Cronbach's alphas range from 0.7 to 0.9, indicating that each index has a high level of internal consistency and measures a single underlying concept. Robustness checks confirm that the main implications and interpretations of statistically significant factors remain robust against the removal of insignificant variables in the full model with two exceptions.²⁹ Factors significant in increasing wives' bargaining power in all three aggregated indices are her ability to speak Vietnamese, education, and a shorter marriage length. There are differences in sources of wives' bargaining power in taking out and repaying loans. Higher women-controlled income has a negative impact on wives' bargaining power in taking out loans, yet it has no impact on her bargaining power in repaying loans. Moreover, living in a household without child dependents or which is in the poorest income tercile have positive impacts on wives' bargaining power in repaying loans, but no significant impacts on her bargaining power in taking out loans. Therefore, the indices also show the importance of examining decisions to take out and to repay loans separately.

²⁹ Women-controlled income becomes marginally significant in the model of the index for taking out loans and the poorest income tercile becomes insignificant in the model of the index to repay loans.

Table 4.9: OLS estimation of determinants of wives' bargaining power from aggregated indices

	Aggregated index: taking out loans	Aggregated index: repaying loans	Aggregated index: all loan decisions
Observations	183	183	183
Constant	0.899*** (0.304)	0.813*** 0.287	0.834*** 0.272
Born in district	-0.010 (0.077)	0.036 (0.083)	0.013 (0.078)
Can speak Vietnamese	0.295*** (0.104)	0.291** (0.112)	0.293*** (0.106)
Education	0.022** (0.009)	0.019** (0.010)	0.021** (0.009)
Off-farm employment	0.067 (0.058)	0.101 (0.063)	0.084 (0.059)
Women-controlled income	-0.007* (0.004)	-0.006 (0.005)	-0.007 (0.004)
Risk aversion	0.018 (0.015)	0.023 (0.016)	0.021 (0.015)
Marriage length	-0.006* (0.003)	-0.008** (0.003)	-0.007** (0.003)
Number of other women in house	-0.060 (0.039)	-0.053 (0.042)	-0.057 (0.040)
Ratio of children to total residents = 0	0.077 (0.076)	0.147* (0.082)	0.112 (0.078)
Ratio of children to total residents ≥ 0.33	-0.120 (0.077)	-0.093 (0.083)	-0.107 (0.078)
Lowest income tercile (< 17,020 VND/day)	0.096 (0.072)	0.129* (0.077)	0.113 (0.073)
Highest income tercile (> 22,725 VND/day)	-0.017 (0.073)	-0.001 (0.079)	-0.009 (0.075)
Membership in unions	-0.038 (0.048)	-0.023 (0.052)	-0.031 (0.049)
Network-reliance:			
First-degree relatives	-0.025 (0.035)	-0.024 (0.037)	-0.024 (0.035)
Extended family	0.006 (0.016)	0.000 (0.017)	0.003 (0.016)
Friends	0.015 (0.016)	0.019 (0.018)	0.017 (0.017)
Village head	0.009 (0.012)	-0.001 (0.013)	0.004 (0.012)
Unions	-0.018 (0.015)	-0.021 (0.016)	-0.019 (0.015)
Political connections	0.009 (0.008)	0.009 (0.008)	0.007 (0.008)
Cronbach's alpha ^a	0.683	0.727	0.869
F statistic (19,163)	2.460***	2.590***	2.570***
R ²	0.223	0.232	0.231
Adjusted R ²	0.132	0.142	0.141

Notes: Coefficients are reported in bold with their standard errors in parentheses. The dependent variable is an equally-weighted mean index based on responses of decision-making power in each loan decision: 0 represents no say, 1 joint say, and 2 primary say.

^a Cronbach's alpha reports the squared correlation between the observed index score and the true score.

*** Significant at the 1 percent level. ** Significant at the 5 percent level. * Significant at the 10 percent level

The results demonstrate that several insightful findings of sources of wives' power in intra-household financial decisions are lost in the aggregated indices. For example, in the logistic regression models exploring sources of wives' empowerment (in Table 4.7), living in a household in the poorest income tercile has a significantly positive impact on wives' empowerment in decisions to take out and repay medium loans, large loans, and large agricultural loans, yet this variable is statistically significant in the model of the bargaining power index for repaying loans only (in Table 4.9). Moreover, none of the social capital variables are significant in any of the bargaining power indices. In general, subtle nuances of sources of wives' empowerment in decisions about taking out and repaying various types of loans are lost in the aggregated indices. The results clearly show the benefits of examining women's decision-making power in each financial decision separately.

4.4.4 INFLUENCING FACTORS OF HUSBANDS' FINANCIAL DECISION-MAKING POWER

In this subsection, we examine influencing factors of husbands' bargaining power based on aggregated indices and of their dominance in financial decisions. Table 4.10 shows the results based on the aggregated indices. Cronbach's alphas range from 0.8 to 0.9, indicating a high level of internal consistency and that each index measures a single underlying concept. Robustness checks confirm that the main implications and interpretations of statistically significant factors remain robust against the removal of insignificant variables from the full model, with the exception of education which becomes insignificant in each model. In all three aggregated indices, the wife's birthplace within the district, the wife's inability to speak Vietnamese, and the number of women other than the wife living in the household have a positive impact on husbands' bargaining power. On the other hand, more risk aversion, education, and network-reliance with extended family have negative impacts on his bargaining power. This indicates that husbands who are more risk averse may prefer deferring financial decisions to their wives. Although it is surprising that husbands who are more educated have less bargaining power, as mentioned above, this variable becomes insignificant in each model in robustness checks. Comparing results from Table 4.9 and Table 4.10 show the importance of the wife's ability to speak Vietnamese in intra-household decision-making. Moreover, although the wife's birthplace does not have a significant impact on her perceived bargaining power, it has a marginally significant impact ($P < 0.10$) on her husband's perceived bargaining power, providing evidence

that gendered institutions and past experiences of wives may affect intra-household bargaining power. Marriage length is not a significant determinant of husbands' bargaining power, whereas it is for wives, indicating that as the couple ages, younger household members may take away decision-making power from the female household head, but not from the male household head. It could also signal that gendered institutions among various age cohorts may affect wives more than husbands.

Influencing factors for husbands being the primary decision-maker are examined via binary logistic regression models. Results are shown in Table 4.11. The null hypothesis that all regressor coefficients equal zero can be rejected in each model. Robustness checks confirm that the main implications and interpretations of statistically significant factors remain robust against the removal of insignificant variables, though some variables become insignificant.³⁰ The results expose added nuances and differences in influencing factors of husbands' dominance in particular financial decisions. Comparing Table 4.10 and Table 4.11 demonstrate that the aggregated bargaining power indices obscure factors significant in influencing intra-household decision-making power for specific financial decisions.

³⁰ Variables which become marginally significant or insignificant after the removal of insignificant variables from the full models are: the husband's risk aversion in the family budget model; network-reliance with unions in the repaying medium and large agricultural loans models; the wealthiest income tercile in the taking out large loans model; and education in the repaying medium loans model.

Table 4.10: OLS estimation of determinants of husbands' bargaining power from indices

	Aggregated index: taking out loans	Aggregated index: repaying loans	Aggregated index: all decisions
Observations	183	183	183
Constant	1.828*** (0.292)	1.810*** (0.303)	1.819*** (0.291)
Wife born in district	0.153* (0.087)	0.156* (0.091)	0.154* (0.087)
Wife cannot speak Vietnamese	0.314*** (0.114)	0.360*** (0.118)	0.337*** (0.113)
Education	-0.026** (0.011)	-0.024** (0.012)	-0.025** (0.011)
Off-farm employment	0.002 (0.068)	0.012 (0.071)	0.007 (0.068)
Risk aversion	-0.060*** (0.018)	-0.063*** (0.019)	-0.062*** (0.018)
Marriage length	-0.005 (0.004)	-0.004 (0.004)	-0.005 (0.004)
Number of other women in house	0.107** (0.046)	0.081* (0.047)	0.094** (0.045)
Ratio of children to total residents = 0	0.006 (0.088)	-0.045 (0.091)	-0.020 (0.088)
Ratio of children to total residents ≥ 0.33	-0.063 (0.089)	-0.139 (0.092)	-0.101 (0.088)
Lowest income tercile (< 17,020 VND/day)	-0.094 (0.088)	-0.106 (0.091)	-0.100 (0.087)
Highest income tercile (> 22,725 VND/day)	0.072 (0.081)	0.035 (0.084)	0.053 (0.081)
Membership in unions	0.046 (0.042)	0.064 (0.044)	0.055 (0.042)
Network-reliance:			
First-degree relatives	0.038 (0.040)	0.052 (0.042)	0.045 (0.040)
Extended family	-0.069*** (0.018)	-0.074*** (0.019)	-0.072*** (0.018)
Friends	0.011 (0.019)	0.012 (0.020)	0.012 (0.019)
Village head	0.012 (0.014)	0.018 (0.014)	0.015 (0.014)
Unions	-0.012 (0.017)	-0.019 (0.018)	-0.015 (0.017)
Political connections	0.005 (0.010)	0.006 (0.010)	0.006 (0.010)
Cronbach's alpha ^a	0.808	0.837	0.918
F statistic (18,164)	2.59***	2.81***	2.80***
R ²	0.222	0.236	0.235
Adjusted R ²	0.136	0.152	0.151

Notes: Coefficients are shown in bold with their standard errors in parentheses. The dependent variable is an equally-weighted mean index based on responses of decision-making power in each loan decision: 0 represents no say, 1 joint say, and 2 primary say.

^a Cronbach's alpha reports the squared correlation between the observed index score and the true score.

*** Significant at the 1 percent level. ** Significant at the 5 percent level. * Significant at the 10 percent level.

Influencing factors of husbands' dominance in financial decisions mainly confirm results in Table 4.10: the wife's inability to speak Vietnamese, the wife's birthplace, the husband's education, the number of women other than the wife living in the household, and network-reliance with extended family are significant in influencing the odds that the husband is the primary decision-maker in most financial decisions. Given the finding that the wife's birthplace and ability to speak Kinh influence the husband's dominance in almost every financial decision, we ran separate regressions (results not shown) in which these variables were replaced with the husband's ethnicity to examine whether gendered institutions influence his dominance in decision-making. We find that the husband's ethnicity is not significant in influencing his odds of being the primary decision-maker in any financial decision, indicating that gendered institutions may be less important for husbands' perceptions of their own decision-making power than they are for wives' perceptions of their own decision-making power.

Table 4.11: Binary logistic regression models of husbands' dominance in financial decisions

	Family budgeting	Saving	Taking out small loans	Repaying small loans	Taking out medium loans	Repaying medium loans	Taking out large loans	Repaying large loans	Taking out large agricultural loans	Repaying large agricultural loans
Constant	2.181 (2.926)	0.316 (0.462)	0.777 (1.258)	0.777 (1.258)	2.539 (3.601)	2.923 (4.164)	1.948 (2.857)	1.241 (1.747)	7.497 (10.941)	3.700 (5.297)
Wife was born in the district	2.432* (1.190)	3.018** (1.503)	3.196** (1.625)	3.196** (1.625)	2.410* (1.134)	2.370* (1.105)	1.343 (0.644)	1.470 (0.669)	1.495 (0.719)	1.509 (0.707)
Wife cannot speak Vietnamese Education	4.791** (3.326)	2.600 (1.624)	4.322* (3.368)	4.322* (3.368)	2.844* (1.668)	3.532** (2.121)	2.109 (1.215)	2.831* (1.611)	3.433** (1.979)	4.255** (2.455)
Off-farm employment	0.905* (0.046)	0.898** (0.048)	0.981 (0.063)	0.981 (0.063)	0.946 (0.050)	0.944 (0.050)	0.865** (0.050)	0.906* (0.048)	0.883** (0.049)	0.898* (0.050)
Risk aversion	1.038 (0.338)	1.607 (0.557)	1.828 (0.804)	1.828 (0.804)	0.938 (0.320)	1.013 (0.345)	0.978 (0.352)	1.239 (0.419)	0.877 (0.305)	0.809 (0.280)
Marriage length	0.858* (0.072)	0.855* (0.073)	0.929 (0.098)	0.929 (0.098)	0.825** (0.074)	0.832** (0.074)	0.736*** (0.069)	0.781*** (0.068)	0.771*** (0.070)	0.760*** (0.069)
Number of other women in house	0.974 (0.016)	1.008 (0.017)	0.982 (0.021)	0.982 (0.021)	0.978 (0.017)	0.973 (0.017)	0.991 (0.017)	0.991** (0.016)	0.964** (0.017)	0.987 (0.017)
Ratio of children to total residents is 0	1.364 (0.282)	2.336*** (0.557)	1.304 (0.383)	1.304 (0.383)	1.976*** (0.464)	1.927*** (0.454)	2.004*** (0.457)	1.606 (0.343)	1.861*** (0.426)	1.412 (0.316)
Ratio of children to total residents \geq 0.33	0.916 (0.361)	1.346 (0.562)	2.871* (1.669)	2.871* (1.669)	0.729 (0.305)	0.683 (0.286)	0.593 (0.267)	0.542 (0.227)	0.924 (0.394)	0.444* (0.190)
Lowest income tercile (< 17,020 VND/day)	1.096 (0.467)	2.383** (1.038)	0.970 (0.505)	0.970 (0.505)	0.970 (0.439)	0.706 (0.322)	1.648* (0.749)	1.010 (0.439)	1.002 (0.451)	0.719 (0.321)
Highest income tercile (> 22,725 VND/day)	0.569 (0.227)	0.827 (0.347)	0.720 (0.355)	0.720 (0.355)	0.936 (0.392)	0.766 (0.323)	0.704 (0.311)	0.854 (0.352)	0.392** (0.176)	0.427* (0.187)
Membership in unions	1.291 (0.484)	1.712 (0.681)	1.308 (0.664)	1.308 (0.664)	1.682 (0.678)	1.540 (0.619)	2.100 (0.875)	1.724 (0.676)	1.787 (0.717)	1.419 (0.564)
	1.294 (0.249)	0.960 (0.191)	1.014 (0.265)	1.014 (0.265)	0.923 (0.192)	0.987 (0.205)	1.205 (0.261)	1.255 (0.255)	1.074 (0.235)	1.191 (0.258)

(continued from previous page)

	Family budgeting	Saving	Taking out small loans	Repaying small loans	Taking out medium loans	Repaying medium loans	Taking out large loans	Repaying large loans	Taking out large agricultur al loans	Repaying large agricultur al loans
Network-reliance:										
First-degree relatives	1.146 (0.230)	1.086 (0.239)	1.413 (0.337)	1.413 (0.337)	1.195 (0.241)	1.209 (0.245)	1.234 (0.268)	1.201 (0.249)	1.110 (0.228)	1.259 (0.258)
Extended family	0.891 (0.083)	0.945 (0.091)	0.627*** (0.093)	0.627*** (0.093)	0.751*** (0.073)	0.732*** (0.073)	0.782** (0.074)	0.805** (0.073)	0.813** (0.077)	0.798** (0.076)
Friends	0.942 (0.089)	0.945 (0.092)	1.176 (0.140)	1.176 (0.140)	0.993 (0.096)	1.013 (0.099)	1.002 (0.102)	1.046 (0.101)	0.973 (0.095)	0.991 (0.096)
Village head	1.044 (0.069)	1.060 (0.074)	1.076 (0.101)	1.076 (0.101)	1.075 (0.078)	1.089 (0.081)	1.048 (0.072)	1.069 (0.072)	1.069 (0.072)	1.092 (0.074)
Unions	0.906 (0.075)	0.933 (0.083)	0.945 (0.099)	0.945 (0.099)	0.822** (0.073)	0.828** (0.074)	0.899 (0.082)	0.874 (0.076)	0.878 (0.080)	0.817** (0.075)
Political connections	0.974 (0.044)	1.006 (0.046)	1.130 (0.091)	1.130 (0.091)	1.053 (0.050)	1.074 (0.053)	1.037 (0.048)	1.035 (0.047)	1.019 (0.048)	1.038 (0.048)
Observations	217	212	205	205	214	214	228	228	223	223
Likelihood Ratio $\chi^2(18)$	26.66*	36.43***	36.18***	36.18***	43.64***	46.58***	41.01***	35.54***	34.73**	38.24***
McFadden's Pseudo R ²	0.089	0.127	0.168	0.168	0.148	0.157	0.144	0.118	0.121	0.130
Sensitivity ^a	61.39%	43.68%	95.63%	95.63%	59.60%	63.81%	33.33%	36.90%	35.06%	34.94%
Specificity ^b	66.38%	82.40%	17.78%	17.78%	75.65%	69.72%	88.46%	85.42%	86.30%	83.57%

Notes: Odds ratios are reported in bold with their standard errors in parentheses. The dependent variable equals 1 if the husband is the primary decision-maker (main or sole say) and equals 0 otherwise (joint or no say).

^a Sensitivity refers to the predictions that the dependent variable is 1, conditional on observed values of 1.

^b Specificity refers to the predictions that the dependent variable is 0, conditional on observed values of 0.

*** Significant at the 1 percent level. ** Significant at the 5 percent level. * Significant at the 10 percent level.

4.5 CONCLUDING REMARKS

This study has identified influencing factors of wives' empowerment and husbands' dominance in ten financial decisions – family budgeting, saving, and taking out and repaying four types of loans – as well as influencing factors of their bargaining power in loan decisions based on aggregated indices. In general, being able to speak Vietnamese, completing more education, living in a relatively poor household, and living in a household with more network-reliance with extended family increases wives' odds of being empowered in most financial decisions, whereas being married longer, living in a household with higher women-controlled income (proxied by small livestock revenue), and living in a household with a relatively high child dependency ratio decreases wives' odds of being empowered. We also find evidence that gendered institutions (proxied by birthplace and ethnicity) influence wives' decision-making power in family budgeting and saving, whereas they do not for most loan decisions. Positive impacts on husbands' dominance in intra-household decision-making include being married to a wife who was born in the district, being married to a wife who cannot speak Vietnamese, and living in a household with more women, whereas negative impacts include his being more risk averse and living in a household with greater network-reliance with extended family. Although the regressions analyzing sources of wives' and husbands' bargaining power in loan decisions based on aggregated indices find similar influencing factors, they demonstrate disadvantages of relying on aggregated indices, particularly the loss in nuanced findings and the inherent assumptions that sole and main decision-making have more value than joint decision-making.

Before offering recommendations for further research and policy, we address some shortcomings of this analysis. First, the data does not indicate which aspects of decision-making about taking out or repaying loans husbands and wives are involved with. For example, when taking out loans there are several aspects which should be considered, such as the use of the loan, whether there are enough funds or assets to cover the loan in case of default, and the feasibility of the proposed investment. Second, respondents may not have answered truthfully about their decision-making roles and instead may have: answered what they thought to be culturally acceptable (Jejeebhoy, 2003), provided answers which do not conflict with their own personal beliefs on decision-making authority (Anderson and Eswaran, 2009; Festinger, 1957), or devalued their autonomy to conform to social norms (Espinal and Grasmuck, 1997; Jejeebhoy,

2003). Third, data availability limited the inclusion of other factors which may influence intra-household decision-making power, such as past experiences, the household's division of labor, assets held traditionally by women, assets brought into marriage, physical attractiveness, and the perceived need of the spouse (Allendorf, 2007; Blumberg and Coleman, 1989). Fourth, except for membership in unions, the other social capital proxies were measured at the household-level. Finally, as Kabeer (1999, p. 447) writes, "Statistical perspectives on decision-making, however, should be remembered for what they are: simple windows on complex realities."

Future research on women's intra-household decision-making power should explore more institutional-level factors, such as opinions about and experiences with gendered institutions. Data on childcare, household responsibilities, and workloads would further enrich analyses. It should be emphasized that rather than relying on an aggregated index to explore influencing factors of intra-household decision-making power as many studies have done, each decision should be analyzed separately. This allows for identifying influencing factors important for specific decisions as well as for more specific policy recommendations to be made. Moreover, important findings may be lost altogether in an aggregated index.

The results can be used to provide policy recommendations which may increase wives' empowerment in intra-household financial decisions. First, ensuring that women can speak Vietnamese may have the greatest impact on wives' empowerment. In nearly every financial decision examined, the ability to speak Vietnamese has a strong and positive impact on the wife's odds of being empowered. Second, requiring the completion of more education may also increase wives' empowerment since education has a strong impact on wives' empowerment in nearly every financial decision. Education policies need not be gender specific: for most financial decisions, absolute changes in wives' educational level influenced their empowerment, whereas relative changes compared to their husband did not.

Because influencing factors of various financial decisions were examined separately, we are able to recommend policies which may improve wives' empowerment for specific decisions. Here, we do so for four financial decisions: taking out and repaying large loans and large agricultural loans. The results found that off-farm employment increase the odds of women being empowered for most decisions related to larger loans. Therefore, women's employment opportunities should be expanded. However, we remain cautious in our promotion of *off-farm* employment opportunities: It may be more favorable for wives' empowerment to promote *at-*

home employment opportunities, such as small-scale enterprises located in their home or a neighbor's home (Goetz and Gupta, 1996). This is because changes in intra-household decision-making processes may not result from changes in women's employment opportunities (Goetz and Gupta, 1996): gendered institutions may also influence empowerment. For example, unless gender norms change so that household and childcare tasks are shared among other household members or society, off-farm employment may overburden women through higher workloads given (Ackerly, 1995; Goetz and Gupta, 1996; Montgomery et al., 1996), especially given the finding that child dependency ratios impact on the odds of wives' being empowered for larger loan decisions. We also recommend to lengthen the school day and require that lunch breaks are taken at school since these changes may have both short-term and long-term impacts on women's empowerment. The short-term impact is that school may serve as a childcare function and therefore longer school hours and lunch taken at school may allow women more time to participate in financial decision-making processes. The long-term impact is that longer school days may assist the next generation of women since wives completing more education were found to have higher odds of being empowered in nearly every financial decision examined in this paper. These recommendations are targeted to the study area; however, they may be applicable to other areas with similar characteristics.

Our other policy recommendations are more specific to the financial sector. Although very few women borrow from formal institutions and less than 8% are primary decision-makers for large loans and large agricultural loans, we caution against targeting women for credit programs since the evidence is mixed in terms of whether women participating in financial programs targeting women increases their empowerment and well-being (Ashraf et al., 2010; Garikipati, 2008; Kabeer, 2001). Instead, policies and information about financial services should be directed toward both husbands and wives since the majority of decisions about large loans are made jointly. Moreover, programs which include husbands and wives together may be seen as a less drastic change in existing decision-making regimes compared to programs which target women only. Based on the finding that wives living in households with relatively high child dependency ratios have lower odds of being empowered for decisions about larger loans, improving the accessibility of formal credit and reducing the time needed to conduct financial transactions may improve their decision-making power. For example, conducting bank transactions via cellular phones or mobile bank vehicles would require significantly less time. In Yen Chau, every one or

two months a mobile bank vehicle from the VBSP visits the commune center, which means that people still have to travel far to reach these services. To allow bank services to be more accessible, mobile bank vehicles should visit villages if road conditions allow, or at least park alongside the national highway near side roads to remote villages. In addition, inefficiencies and bureaucratic red tape at the VBARD, the only bank with an office in the district, should be reduced; making deposits and withdrawing money, for example, from the VBARD is an extremely slow process and forms are rejected for trivial mistakes.

There is no simple or quick fix to improving wives' empowerment in intra-household decisions. Policies may require years to achieve goals such as those aiming to improve education and language skills. Moreover, group effects and gendered institutions may prevent women from having more clout in intra-household financial decisions because women may follow existing norms and behaviors of other women, which may even have multiplier effects (Fletschner and Carter, 2008; Mabsout and Staveren, 2010). Because sources of empowerment from the individual-, household-, and institutional-level may be reinforced by one another, a multi-level approach is critical to improving wives' empowerment in financial decisions.

4.6 BIBLIOGRAPHY

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5. DISCUSSION AND CONCLUSIONS

Risk preferences and women's empowerment influence how decisions are made and have tangible outcomes, yet there exists no consensus on their determinants or measurement. Risk is central to many aspects of economic life including decisions about insurance, consumption, income, savings, and portfolio choice (Barry and Robison, 1975; Pratt, 1964; Sandmo, 1969, 1970, 1971). The poor and non-poor alike face complex risks such as credit availability, weather, the general economy, and contractual arrangements (Barry and Robison, 2001). High levels of risk aversion are cited as a major cause of poverty traps since risk averse individuals pursue low-risk, low-return livelihood strategies (Dercon, 1996; Lybbert and McPeak, 2012; Morduch, 1994; Rosenzweig and Binswanger, 1993). Women's empowerment is also important for a variety of outcomes including child nutrition, food security, and education (Allendorf, 2007; Doss, 1996; Hashemi et al., 1996; Hoddinott and Haddad, 1995; Quisimbing and Maluccio, 2000; B. Sen and Hulme, 2004; Smith and Haddad, 2000; Thomas, 1990). Moreover, women's empowerment has intrinsic value (Kabeer, 1999; G. Sen and Batliwala, 2000; The World Bank, 2011) and is regarded as vital for achieving poverty reduction and human rights (Malhotra and Schuler, 2005). In Chapter 1 we demonstrated that both risk aversion and low empowerment of women are intricately linked within poverty traps.

This thesis aims to close knowledge gaps on the determinants and measurements of risk preferences and women's empowerment. Improved methods to elicit risk preferences and intra-household decision-making power as well as better understanding of their determinants can allow development policy to better match smallholders' risk preferences and to increase women's empowerment. In the remainder of this final chapter of the thesis, we provide a summary of the main results and our contributions to the existing literature, discuss methodological and data limitations, and offer recommendations for future research and policy.

5.1 SUMMARY OF THE MAIN RESULTS

In Chapter 2 we compared five widely applied methods to elicit risk preferences (a non-hypothetical lottery game called the multiple price list (MPL) technique, financial risk tolerance

question, self-assessment scale, and hypothetical income and inheritance gambles) and four locally-adapted methods (yield and price gambles of the main cash crop, maize, and the main food crop, rice) and examined influencing factors of risk preferences based on each of the elicitation methods. This is the first study to elicit risk preferences in a developing country from such a wide range of techniques as well as to examine whether various facets of social capital influence risk preferences. There is no consensus on how socio-economic characteristics influence risk preferences since some studies have found that risk preferences differ significantly based on gender (e.g., Gilliam et al., 2010), education (e.g., Harrison et al., 2007), age (e.g., Tanaka et al., 2010), number of dependents (e.g., Hallahan et al., 2004), shocks (e.g., Guiso et al., 2011) and/or income (e.g., Cohen and Einav, 2007), while others have found no significant relationship (cf. Harrison et al. (2007) for gender; Anderson and Mellor (2009) for education; Holt and Laury (2002) for age; Picazo-Tadeo and Wall (2011) for number of dependents; Chiappori and Paiella (2011) for shocks; and Tanaka et al. (2010) for income). Our results showed that respondents are, on average, very risk averse. Moreover, correlations between most elicitation methods were statistically highly significant, although most were weak. Thus, risk preference measures related to different decision domains should be compared with caution. We found that significant determinants of risk aversion across most elicitation methods are female gender, older age, lower education, higher network-reliance with first-degree relatives, lower network-reliance with extended family, fewer connections to local authorities, agreement with norms of sharing gains with others, and lack of agreement with norms of helping others who take a risk and fail. Therefore, we found evidence that people's risk preferences are embedded in social institutions and that strong familial attachments may discourage individuals from taking risks. A major contribution to the literature is the analysis of how different facets of social capital affect risk preferences and the comparison of influencing factors across nine elicitation techniques.

In Chapter 3 we examined the stability of risk preferences elicited from the same respondents seven to eight months apart, first in the lean season and then in the maize harvest season, using three widely applied elicitation methods (a lottery game, financial risk tolerance question, and self-assessment scale) and four locally-adapted methods (yield and price gambles of maize and rice). This is the first study to elicit risk preferences over time in a developing country as well as the first to examine whether various facets of social capital affect risk preference changes over

time.³¹ The literature offers no consensus on whether risk preferences remain stable over time and what determinants affect its instability since only a handful of studies exist which have analyzed risk preference stability over time and findings vary (Andersen et al., 2008; Brunnermeier and Nagel, 2008; Chiappori and Paiella, 2011; Doss et al., 2008; Guiso et al., 2011; Harrison et al., 2005; Malmendier and Nagel, 2011; Sahm, 2008; Vlaev et al., 2009). Using a conceptual framework, we hypothesized that both time-variant and time-invariant variables, including several proxies of social capital and other socio-economic characteristics, may cause risk preferences to change from the lean season to the harvest season given the different living conditions in these seasons, such as the availability of food and cash. To better understand how shocks affect risk preferences, we examined both the time component – i.e., how soon the shock had occurred before risk preferences were elicited – and the specific characteristic – i.e., if the shock were a drought, livestock death, another covariate shock, or idiosyncratic – of shocks. The results indicated that for all but one assessment method – the financial risk tolerance question – risk preferences were not stable across seasons. Respondents became less risk averse in the harvest season according to the lottery game and self-assessment scale, yet became more risk averse according to the rice and maize gambles. Correlations between risk preferences across seasons in the lottery game, financial risk tolerance question, and self-assessment scale were weak, while those in the maize and rice gambles were stronger. Characteristics which remained stable across the seasons, such as gender, education and some social capital proxies, as well as characteristics which varied, such as idiosyncratic and covariate shock impacts, were significant in determining changes in risk preferences, although determinants varied by elicitation method. Contrary to expectations, impacts from more recent shocks did not have a greater influence on risk preference changes. Furthermore, livestock death impacts had no significant effect on risk preference changes, although losses from other covariate shocks (excluding drought) and idiosyncratic shocks did. Although the relative impact of shocks on risk preference changes is small relative to the estimated losses incurred, if a household were to experience several severe shocks, this may lead to significant increases in risk aversion over time which may impact livelihood strategies. Factors determining risk preference changes across seasons based on the two self-assessment methods (the financial risk tolerance

³¹ Doss et al. (2008) measure self-identified rankings of risk perceptions over time in East Africa.

question and self-assessment scale) tended to have the opposite effect compared to the methods involving gambles and were often contrary to expectations. Thus, this chapter provided further evidence of the importance of the decision domain and elicitation method when analyzing risk preferences.

Chapter 4 identified influencing factors of wives' and husbands' intra-household decision-making power in saving, family budgeting, and taking out and repaying four different loans. Based on theories and previous research, we hypothesized that individual-, household-, and institutional-level factors may be influential for intra-household financial decision-making. Although several studies have explored the impact of exposure to credit or savings programs on women's empowerment (Ashraf et al., 2010; Hashemi et al., 1996; Holvoet, 2005; Swain and Wallentin, 2007), none have examined influencing factors of women's empowerment in intra-household decision-making processes for taking out and repaying loans of different sizes. Other studies, for example, have examined influencing factors of women's empowerment in decisions about credit in general, household expenditures, and/or mobility, often combining various decision domains together (Allendorf, 2007; Anderson and Eswaran, 2009; Garikipati, 2008; Kantor, 2003; Pitt et al., 2006; Rahman and Rao, 2004; Yusof and Duasa, 2010). We found that sources of decision-making power vary by financial decision and demonstrated that important findings are lost altogether in aggregated indices composed of several decisions. Being able to speak Vietnamese, completing more education, living in a relatively poor household, and having more network-reliance with extended family increased wives' decision-making power in most financial decisions, whereas being married longer, living in a household with a relatively high child dependency ratio, and living in a household with greater women-controlled income (proxied by small livestock revenue) decreased wives' odds of being empowered. Although this latter result may seem counterintuitive, previous studies and follow-up interviews suggest that the more successful the woman's domain becomes, the greater the chance men take it over. Advantages of asking about specific loans rather than loans in general were evident: We found stark and important differences between decision-making power and its sources in small loans versus larger loans.

5.2 DATA LIMITATIONS

There are some methodological and data limitations of this thesis. The main limitation is that risk aversion and decision-making power may not be known even to respondents themselves and may be subject to emotions and moods at a particular state of time (Kuhnen and Knutson, 2011; Leith and Baumeister, 1996; Lerner and Keltner, 2011; Slovic et al., 2004). Moreover, particular events may be remembered by some respondents more than others and may also be reinforced by others' experiences (Takarangi and Strange, 2010). For example, when a respondent was asked about their willingness to take risks for rice prices, they may have more vividly remembered when they had been negatively impacted by higher rice prices than when they had benefited from lower rice prices. Furthermore, negative memories may be more vivid if others had commented on the event. In regards to eliciting decision-making power, respondents may, for example, have remembered events in which they had greater roles in decision-making processes and may have tended to forget events in which they had smaller roles. Thus, memory, emotions, and others' experiences may have influenced responses in this study. Nevertheless, because we were unable to observe actual decision-making processes about risks and intra-household decision-making processes, we must rely on other methods.

There exist limitations to some explanatory variables of risk preferences and decision-making power examined in this study. For example, in Chapters 2 and 3 we included shock impacts as an explanatory variable of risk preferences, yet respondents may not have been able to accurately estimate losses from shocks. Moreover, the time in which the shock occurred may not be the best indicator of when the impact of the shocks was actually felt. In Chapter 4, data limitations prevented measuring the relative share of wives' and husbands' income in household income because of lack of data on individual income earners in the household. Instead, we relied on a proxy of women-controlled income (small livestock revenues in 2011) based on qualitative evidence that women tend to be responsible for small livestock. In addition, we were unable to compute a share of small livestock revenues in total household income for 2011 because we lacked good quality income data for that year. Thus, for future research we recommend collecting data on the division of labor and on who controls different sources of income.

Although a number of determinants of risk preferences, changes in risk preferences over time, and intra-household decision-making power were significant in several regression analyses

across the various elicitation methods, there are unanswered questions on remaining determinants. The effect of most past experiences is particularly neglected in this study. In Chapter 2, we briefly explored the influence of parental risk aversion on respondents' risk preferences years later, yet the measure was rudimentary since it relied on respondent's own assessment of their parents' risk preferences. Risk preferences may be influenced by experiences from people other than parents, such as other family members and neighbors. It is a challenging task to examine how past experiences affect risk preferences through quantitative survey methods. If the impact of past experiences on risk preferences is to be researched, we recommend a qualitative research approach, such as in-depth interviews on experiences with risks and investments. Similar problems hold true for examining the influence of experiences on intra-household decision-making power. For example, does a woman who grew up in a household where her mother had a low-level of decision-making power counter or imitate her mother's role? Again, qualitative research could help uncover influences of the past.

Despite these above data limitations, this thesis represents an important contribution to the literature given its analysis of a wide range of risk preference elicitation techniques as well as its identification of determinants of risk preferences and decision-making power. Limitations to the elicitation methods and recommendations for future research are discussed below.

5.3 LIMITATIONS TO THE ELICITATION METHODS AND RECOMMENDATIONS FOR FUTURE RESEARCH

Because this research is the first to elicit risk preferences and analyze their determinants from such a wide range of techniques, as well as the first to examine how various proxies of social capital affect risk preferences and intra-household decision-making power, we are able to recommend more suitable and informative methods for measuring risk preferences and intra-household decision-making power as well as for identifying influencing factors of risk preferences and decision-making power.

This thesis revealed that social capital has varying effects on risk preferences and intra-household decision-making power depending on its proxy. For example, different types of norms and network-reliance with varying social networks had unique effects on risk preferences and decision-making power. Thus, we recommend using several proxies of social capital rather than only one. Moreover, the most widely applied proxy of social capital – the number of

organizations a respondent is a member of – may not be applicable in particular areas. For example, this proxy is not very suitable in Vietnam given the highly bureaucratic nature and strong governmental ties in organizations (Gray, 1999; Kerkvliet et al., 2003).

Although the MPL involving non-hypothetical lottery gambles is considered the gold standard to elicit risk preferences, is incentive compatible, and lacks framing effects, it has many disadvantages. For example, it measures windfall gains which are not applicable to most smallholder farmers, it is expensive since training costs are higher and payouts are non-hypothetical, it is time-intensive to manage logistically, it involves high time inputs to explain to respondents, it requires numeracy, and it is more difficult for respondents to comprehend than the other methods since it involves varying probabilities. In addition, luck and superstitions may influence choices (Knight, 1921) and it is not possible to detect the seriousness of responses. Some respondents appeared to answer the questions carefully, while others did not and viewed the gambles as being pre-determined based on luck or "just for fun" since they involved tossing a ten-sided die which some found entertaining. Distinguishing serious responses from non-serious ones is a difficult task and may be impossible using quantitative survey methods. For these reasons, we do not recommend the MPL for eliciting risk preferences, particularly in a developing country. Nevertheless, this method may be suitable in a developed country among educated respondents, yet the payouts should be sufficiently high to be significant for respondents which may have implications for the research budget.

We also elicited risk preferences using two methods which rely on respondents to assess their own risk preferences – the financial risk tolerance question and self-assessment scale. A major disadvantage of these two methods is that they do not elicit a CRRA which can be compared across contexts. Moreover, in Chapter 3 we found that determinants of changes in risk preferences across seasons based on these two self-assessment methods tended to have the opposite effect compared to the other elicitation methods and that the effects were often contrary to expectations and theoretical foundations. Some explanations for this anomaly are: responses may have reflected how respondents would like their risk preferences to be or how they would like others to view their risk preferences to be rather than what they actually are; and responses may be a reflection of confidence in how past situations were handled rather than a reflection of how future situations may be handled. These findings question the validity of these two assessment techniques. In addition, the financial risk tolerance question is not satisfactory

because of the dual thrust of response categories, the unfamiliar nature of financial investments for many, and the problematic conversion of responses into numerical categories of risk aversion (Hanna and Lindamood, 2004). The self-assessment scale may be a good alternative to the MPL and financial risk tolerance question since it has behavioral validity with responses to the MPL, is easier to administer and comprehend, is less expensive, and can be adapted to different scenarios (e.g., Dohmen et al., 2012) to assess preferences for different types of risks such as for income, food security, and investment decisions. Nevertheless, changes are necessary if the self-assessment scale is to assess risk preferences more accurately. The easily identifiable middle category, 5, on the scale from 0 to 10 should be removed and the time component (i.e., if the measurement is based on recent past, current, or near future situations) should be more explicit.

Hypothetical gambles were also applied. The inheritance gambles were not applicable to respondents since very few have expectations of receiving a substantial inheritance. Although, the hypothetical income gambles have several disadvantages, such as framing effects, difficulty among some respondents in understanding the scenarios, and requiring more time to explain than the self-assessment scale, the income gambles involve potential losses which are familiar to most. The income gambles should be adapted to better reflect smallholders' lives, such as by posing questions about a decision to reallocate land to a new cash crop with possible gains and losses. We also tested four locally-adapted hypothetical gambles involving prices and yields of the main cash crop (maize) and food crop (rice). In our opinion, the maize and rice gambles present the greatest potential for assessing risk preferences of smallholders since they elicit a CRRA which is comparable across studies and contexts, were found to be relatively easy for respondents to comprehend, and involve decisions which are more applicable and familiar. In addition, the method could be adapted to other regions of the world based on local cash and food crops. Improvements in these gambles, however, are necessary: We recommend altering the gambles to create more refined CRRA intervals by including additional choices which are closer in value, such as differences of 5% or 10%, rather than 15%.

Given the varying degrees and influencing factors of risk aversion found using different elicitation methods, we recommend that future research also elicit risk preferences via several methods rather than rely on one method only. Respondent fatigue, however, should be considered as well as the order in which risk preferences are assessed. If the MPL technique is applied, we recommend that respondents first select their responses to the MPL and then answer questions

from the other elicitation techniques before payouts from the MPL are determined: Determining payouts from the MPL before the other elicitation techniques are answered may bias responses in the other methods.

To measure intra-household decision-making power, we recommend that future research avoid relying on an index composed of several decisions. Instead, each decision should be individually analyzed. If possible, the husband and wife should be interviewed separately about their decision-making power within the household. This would allow for more robust findings and provide a more in-depth analysis of intra-household dynamics. Moreover, we recommend that questions about intra-household decision-making power should state that the question refers to the past few cases in which that decision was made. This may garner more accurate responses by allowing respondents to reflect on the past few cases only, rather than eliciting more generalized answers. We also emphasize that researchers should inquire about decisions meaningful to women's status in the household – having decision-making power over shampoo purchases is much different from that over credit decisions. In addition, qualitative research on wives' and husbands' roles in intra-household financial decision-making can improve quantitative research as well as provide important insights on its own.

In summary, we are wary of accepting lottery gambles as the gold standard and suggest that given the importance of measuring risk aversion, more research eliciting risk preferences using different measures needs to be conducted similar to past work on finding appropriate methods to elicit household income through Living Standards Measurement Studies in which there were many tests of different versions of the questionnaire. The quest for better methods should be continued.

5.4 POLICY RECOMMENDATIONS

The results of this thesis can be used to target safety nets, encourage investments, and improve women's clout in financial decision-making. These recommendations may be able to help households and individuals avoid poverty traps or escape them, as well as help both poor and non-poor households improve their livelihoods, achieve tangible outcomes like improved child nutrition and education, and make better investment and consumption decisions.

There are several policy recommendations stemming from the result in Chapter 2 and 3 that most respondents are very risk averse. Given that the current livelihood strategy – maize

production on steep slopes which highly degrades the soil – is perceived by farmers in Yen Chau to be a low-risk income earning activity, respondents should be supported to adopt new production systems which do not entail as much environmental degradation, yet which may be perceived as risky. Support for adopting new production systems could be in the form of credit, subsidized inputs, and local field trials. Opportunities for smallholders to participate in the hands-on operations of local field trials may help them overcome risk aversion to new production systems and technologies, increasing the likelihood of adoption (Feder et al., 1985; Foster and Rosenzweig, 1995 in Ravallion, 2002). The results also found that specific socio-economic characteristics determine increases in risk aversion. Furthermore, based on the finding in Chapter 3 that shocks can cause individuals to become even more risk averse, such policies may reduce the increasing effect of shocks on risk aversion by helping households mitigate the influence of shocks. Policy options to help the poor escape poverty should improve opportunities and help prevent the non-poor from falling into poverty traps from external shocks by guaranteeing a subsistence level of consumption and helping households rely less on low-risk, low-return livelihood strategies (Hulme and Shepherd, 2003). These policy options include ex-post consumption credit and other credit (Carter and Barrett, 2006; Eswaran and Kotwal, 1989, 1990; Rosenzweig and Binswanger, 1993; Townsend, 1995; Zeller et al., 1997; Zeller and Sharma, 2000; Zimmerman and Carter, 2003), agricultural or weather insurance (Barrett et al., 2006; Barnett et al., 2008; Lybbert et al., 2004; Rosenzweig and Binswanger, 1993), improved health insurance and health care, effective cash or food transfer programs such as safety nets (Barrett and Swallow, 2006; Chronic Poverty Research Center, 2009; Dasgupta, 1997; Naschold, 2012), irrigation and agricultural research to reduce yield risk (Barrett and Swallow, 2006; Barrett et al., 2006; Zimmerman and Carter, 2003), and infrastructure investments to help better link areas to markets and reduce price fluctuations from local shocks (Hulme and Shepherd, 2003; Zimmerman and Carter, 2003). Improvements in education, employment, and family planning would also help households escape and remain out of poverty traps (Woolard and Klasen, 2005) as well as have other beneficial outcomes such as improved livelihoods and reduced childcare requirements.

Developing additional arenas to expand social capital may also help households. We found that more reliance on family has an increasing effect on risk aversion, while that with extended family, friends, and the village head has a decreasing effect on risk aversion. Social capital has

the potential to help households cope with shocks (Adato et al., 2006), yet a barrier to the further development of social capital in Vietnam is a government regulation requiring that registered associations have a bank account with a balance between \$6,000 and \$10,000 (Uhrig, 1995 in Gray, 1999). The result of this regulation is that small organizations, particularly those at the village-level, are unable to be recognized. We believe that this inhibits the formation of social capital in Vietnam, given that already existing organizations are largely bureaucratic and strongly connected to the government (Gray, 1999; Kerkvliet et al., 2003). If this regulation were lifted, smallholders could reduce their risk by forming organizations which could improve their livelihoods, such as rotating savings and credit organizations, microfinance institutes, and producer organizations to procure inputs at lower rates (Barrett and Swallow, 2006).

The findings in Chapter 4 can be applied to provide policy recommendations to increase wives' intra-household decision-making power for specific financial decisions. These include ensuring fluency in Vietnamese, increasing education, supporting at-home employment opportunities, lengthening the school day, and requiring that children eat lunch at school. Recommendations specific to the formal financial sector are to target financial services to both husbands and wives, offer mobile banking, and reduce red tape for conducting financial transactions. These recommendations may also yield tangible outcomes important for child nutrition and education based on previous research (Allendorf, 2007; Quisimbing and Maluccio, 2000; B. Sen and Hulme, 2004; Thomas, 1990). Because sources of empowerment from the individual-, household-, and institutional-levels may be mutually reinforcing, a multi-level approach is critical.

To conclude, comparing a variety of methods to elicit risk preferences and intra-household decision-making power and examining their influencing factors has shown the importance of using a variety of techniques and allowed us to provide specific research recommendations to better identify risk preferences and decision-making power as well as to provide policy recommendations relevant to development: the status quo for measuring risk preferences and decision-making power should be re-examined and support should encourage the adoption of new production systems, help households better cope with shocks, and increase women's clout in financial decisions, thereby opening the door to new livelihood strategies.

5.5 BIBLIOGRAPHY

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6 APPENDICES

In the appendices, we include sections from the questionnaire applicable to this thesis.

6.1 POVERTY PERCEPTIONS

Perception of characteristics of poverty

	What do you think are the main characteristics of a poor household? <i>Please give up to 5 characteristics and rank them by importance, starting with the most important one. (Code 1)</i>	What do you think are the main characteristics of a well-off household? <i>Please give up to 5 characteristics and rank them by importance, starting with the most important one. (Code 2)</i>
Most important		
2 nd most important		
3 rd most important		
4 th most important		
5 th most important		

Perception of causes of (chronic) poverty

	What do you think are the most important causes for a household to be poor? <i>Please give up to 5 causes and rank them by importance, starting with the most important one. (Code 3)</i>	What do you think are the most important causes for a household to be well-off? <i>Please give up to 5 causes and rank them by importance, starting with the most important one. (Code 4)</i>
Most important		
2 nd most important		
3 rd most important		
4 th most important		
5 th most important		

Perception of causes of poverty dynamics

	<p>What do you think are the most important causes that could make a non-poor household fall into poverty? <i>Please give up to 5 causes and rank them by importance, starting with the most important one. (Code 5)</i></p>	<p>What do you think are the most important causes that could make a poor household escape poverty (become better off)? <i>Please give up to 5 causes and rank them by importance, starting with the most important one. (Code 6)</i></p>
Most important		
2 nd most important		
3 rd most important		
4 th most important		
5 th most important		

Code 1: Characteristics of poor households	Code 3: Causes of poverty	Code 5: Causes of falling into poverty
1=Shortage of land	1=Shortage of land	1=Drought
2=No irrigable land	2=No irrigable land	2=Flooding/landslide
3=Poor quality of land (low fertility, steep slopes)	3=Poor quality of land (low fertility, steep slopes)	3=Declining soil fertility
4=No large livestock (cattle, buffalo)	4=Poor roads/poor access to markets	4=Output price decrease
5=Temporary food shortages	5=Poor access to credit	5=Input price increase
6=Poor housing condition	6=Poor access to agricultural extension	6=Death/illness of a working household member
7=Poor access to credit	7=Lack of family labor	7=Expenses for ceremonies (funeral, wedding)
8=Often indebted	8=Low level of education	8=Alcoholism
9=Large share of dependent household members	9=Lack of farming experience	9=Bad habits (e.g. gambling, wasteful life style)
10=Low level of education	10=Poor social network	10=Taking a risk that fails
11=No/poor knowledge of national language	11=Being member of ethnic minority	11=Other (specify):
12=No voice in local decision-making	12=Poor health	
13=Other (specify):	13=Laziness	
	14=Alcoholism	
	15=Bad habits (e.g. gambling)	
	16=Generally adverse climatic conditions	
	17=Not willing to take a risk	
	18=Other (specify)	
Code 2: Characteristics of wealthy households	Code 4: Causes of wealth	Code 6: Causes of escaping poverty
1=Abundance of land	1=Generally favourable climatic conditions	1=Support by local social network
2=Availability of irrigable land	2=Abundance of land	2=Support by remote social network or remittances
3=Good quality of land (fertile soils, relatively flat)	3=Availability of irrigable land	3=Government support
4=Some large livestock (cattle, buffalo)	4=Good quality of land (fertile soils, relatively flat)	4=NGO support
5=No food shortages	5=Good roads/good access to markets	5=Windfall monetary gains (e.g. inheritance)
6=Sound housing condition	6=Easy access to credit	6=Being hard-working
7=Easy access to credit	7=Easy access to agricultural extension	7=Being thrifty
8=No debts	8=Abundance of family labor	
9=Small share of dependent household members	9=Relatively high level of education	10=Taking a risk that pays off
10=Relatively high level of education	10=Sound farming experience	11=Other (specify):
11=Knowledge of the national language	11=Good social network	
12=Influence in local decision-making	12=Being Kinh	
13=Other (specify):	13=Strong health	
	14=Being hard-working	
	15=Being thrifty	
	16=Generally good climatic conditions	
	17=Willing to take a risk	
	18=Other (specify)	

6.2 SHOCKS

Interviewer: Explain to the respondent first that a shock is an event that led to a serious reduction in your asset holdings, and/or caused your household income to fall substantially, and/or led to a significant reduction in consumption.

Shocks since January 1st, 2012 (or since last interview date in case of second survey round in 2011 conducted in Nov./Dec., 2011).

4.1.1 Which shocks have affected your household since the beginning of last year, i.e., since January 01, 2010? (Code 1)	4.1.2 When did the shock occur? <i>Note: for home consumed crops take harvest time, for cash crops take time when most produce is sold</i> (month/year)	4.1.3 How widespread was the shock? (Code 2)	4.1.4 Can you estimate the amount of loss to your household without considering methods taken to reduce the shock? <i>Note: For lost/destroyed items take replacement value.</i> (‘000 VND)			4.1.5. What did you do to deal with the consequences of the shock? <i>Note: If 91, 92, or 93 >> 2.1.6. If not 91, 92, or 93 >> 2.1.7.</i>	4.1.6. Was the off-farm employment you increased agricultural, non-agricultural or both? 1 = agricultural 2 = non-agricultural 3 = both	4.1.7. What was the net value of all coping activities? ? (‘000 VND)	4.1.8 Did the shock lead to a reduction of your household’s level of regular consumption? (1 = yes, 2 = no) <i>Note: If yes >> 2.1.8.</i>	4.1.9 Did the shock lead to a reduction of your household’s level of food consumption? (1 = yes, 2 = no)	4.1.10 How long did it take your household to economically recover from the shock? (Code 4)
			4.1.5.1 Most important coping activity (Code 3)	4.1.5.2 2 nd most important coping activity (Code 3)	4.1.5.3 3 rd most important coping activity (Code 3)						
1	/										
2...											

EVENT ID	Which other major events have positively or negatively affected your households’ asset base and/or income since January 1 st , 2010? (Code 5)	When did the event occur? (month/yr)	What was the value of the asset/amount of money received by the household from this event? (‘000 VND)	What was the amount paid by the household for this event? (‘000 VND)
1		/		
2...				

Code 1: Type of shock*A) Natural shocks*

- 1: Drought
- 2: Flood
- 3: Landslide
- 4: Fire outbreak

B) Agricultural production shocks

- 5: Yield loss due to pests/diseases
- 6: Crop loss during storage
- 7: Animal death

*C) Market shocks**Agricultural (unprocessed goods):*

- 8: Substantial increase in input prices
- 9: Substantial decline in output prices
- 10: Inability to sell agricultural products
- 11: Lack in working capital (credit)

Non-agricultural (includes processed goods and resale of agricultural goods):

- 12: Decrease in demand
- 13: Decrease in sales price
- 14: Increase of production costs
- 15: Lack in working capital (credit)
- 16: Total business failure

D) Political shock

- 17: Land redistributed by government
- 18: Forced migration/resettlement
- 19: Forced financial contributions/taxation

E) Criminal shocks

- 20: Destruction or theft of tools or inputs
- 21: Theft of valuables (e.g. jewellery, motorbike)
- 22: Theft/destruction of crops
- 23: Theft of animals

F) Idiosyncratic shocks

- 24: Illness of working HH member
- 25: Death of working HH member
- 26: Illness of dependent HH member
- 27: Death of dependent HH member
- 28: Loss of job
- 29: Divorce
- 30: Payment of fine/legal dispute
- 31: Other _____

Code 2: How widespread

- 1: Affected only my HH
- 2: Affected some HH in the village
- 3: Affected all HH in the village
- 4: Affected many HH in the district

Code 3: Coping activity

- 1: Did nothing
- 2: Used own monetary savings
- 31: Sold livestock to someone within village
- 32: Sold livestock to someone outside village
- 41: Sold household assets to someone within village
- 42: Sold household assets to someone outside village
- 51: Sold farm equipment to someone within village
- 52: Sold farm equipment to someone outside village
- 61: Borrowed in cash or in-kind from friends/relatives within village at low or at zero interest rate
- 62: Borrowed in cash or in-kind from friends/relatives outside village at low or at zero interest rate

71: Borrowed in cash or in-kind from informal sources (such as moneylender, shopkeeper, trader, landlord) within village at high interest rate

72: Borrowed in cash or in-kind from informal sources (such as moneylender, shopkeeper, trader, landlord) outside village at high interest rate

8. Borrowed from bank located/based outside village

91: Increased off-farm employment within village

92: Increased off-farm employment outside village (without temporary migration)

93: Increased off-farm employment (with temporary migration of one HH member)

94: Increased off-farm employment (with temporary migration of several HH members)

10: Received government aid

11: Received remittances/gifts from people within village

15: Received remittances/gifts from people outside village

12: Change in agricultural practice (e.g. input use, change in

pursued activities, changes in marketing strategy) (specify):

13: Postponed the purchase of an asset

14: Other

(specify) _____

Code 4: Time to recover

1: Less than 1 year

2: Approximately 1 year

3: Not yet recovered

4: Not applicable, no recovery time

Code 5: Major event

1: Wedding

4: Inheritance

2: Received major funds/assets (specify):

3: Other (specify) _____

Code 1 type of organization

Mass organisation

- 1 = Farmer Union
- 2 = Women Union
- 3 = Youth Union
- 4 = Veteran Union
- 5 = Fatherland Front
- 6 = Eldery Union

NGO providing services

- 7 = NGO providing extension service
- 8 = NGO providing microfinance services
- 9 = Other NGO (family planning, health care, school education, and services for any other social sector)

Financial organization

- 10 = VBSP Credit group
- 11 = Other formal Credit group
- 12 = Other informal credit/finance group

Agriculture/trade organization

- 14 = Extension club
- 15 = Cooperative
- 16 = Labour / worker union
- 17 = Professional association
- 18 = Trade union

Political organization

- 20 = Communist Party
- 33 = People's Council
- 21 = People's committee
- 22 = Village board
- 23 = Ethnic committee

Other groups/organizations

- 13 = Environmental group
- 24 = Religious group
- 25 = Cultural association
- 26 = Parent group
- 27 = School committee
- 28 = Health committee
- 29 = Sport group
- 31 = Forest protection service
- 32 = Community security group
- 30 = Other (specify)_____

Code 2 degree of participation

- 1 = Any leader (leader, vice-leader)
- 2 = Very active (other responsibility than leader)
- 3 = Active (participate in all/almost all meetings)
- 4 = Give help from time to time (participate in some meetings)
- = Not active (do not attend any meetings)

6.4 SOCIAL CAPITAL: CONNECTIONS TO LOCAL AUTHORITIES

	Type of organisation and level <i>Note: If respondent does not know which organization or level, do NOT add a "1" to that category. Just write an extra note below to explain the number and relation.</i>	3.2.1. How many people do you or any member of your household know personally who are members of [organisation]? <i>By know personally, this is a two-way relationship in which people talk to each other and know at least basic information about one another.</i> If 0 >> next organization	3.2.2. How many are relatives of the household head or the spouse?	3.2.3. How many are close friends of a household member? <i>A close friend is someone who you or a HH member knows very well and could ask favors from</i>
1	Communist party at commune level			
2	People's committee at commune level			
3	Women Union at commune level			
4	Fatherlands front union at commune level			
5	Communist party at district level			
6	People's committee at district level			
7	Women Union at district level			
8	Fatherlands front union at district level			
9	Communist party at province level			
10	People's committee at province level			
11	Women Union at province level			
12	Fatherlands front union at province level			

6.5 SOCIAL CAPITAL: NETWORK RELIANCE

	If you or another HH member asked, would it be easy or not easy to [problem] from [person from your network]? 1= easy 2= not easy	3.3.1. First degree relatives of HH head or spouse	3.3.2. Other relatives of HH head or spouse	3.3.3. Friends/ Neighbour, excluding village head	3.3.4. Village head	3.3.5. Unions
1	Borrow money for education					
2	Borrow money for health expenses					
3	Borrow money for any positive event, such as a wedding					
4	Borrow money for any negative event, such as a funeral					
5	Borrow a water buffalo / cow					
6	Ask for labour					

6.6 SOCIAL CAPITAL: SOCIAL NORMS

For the next few questions, I will ask you if you strongly agree, agree, disagree or strongly disagree with a statement.

1= Strongly agree

2 = Agree

3= Neither agree nor disagree (neutral)

4= Disagree

5 = Strongly disagree

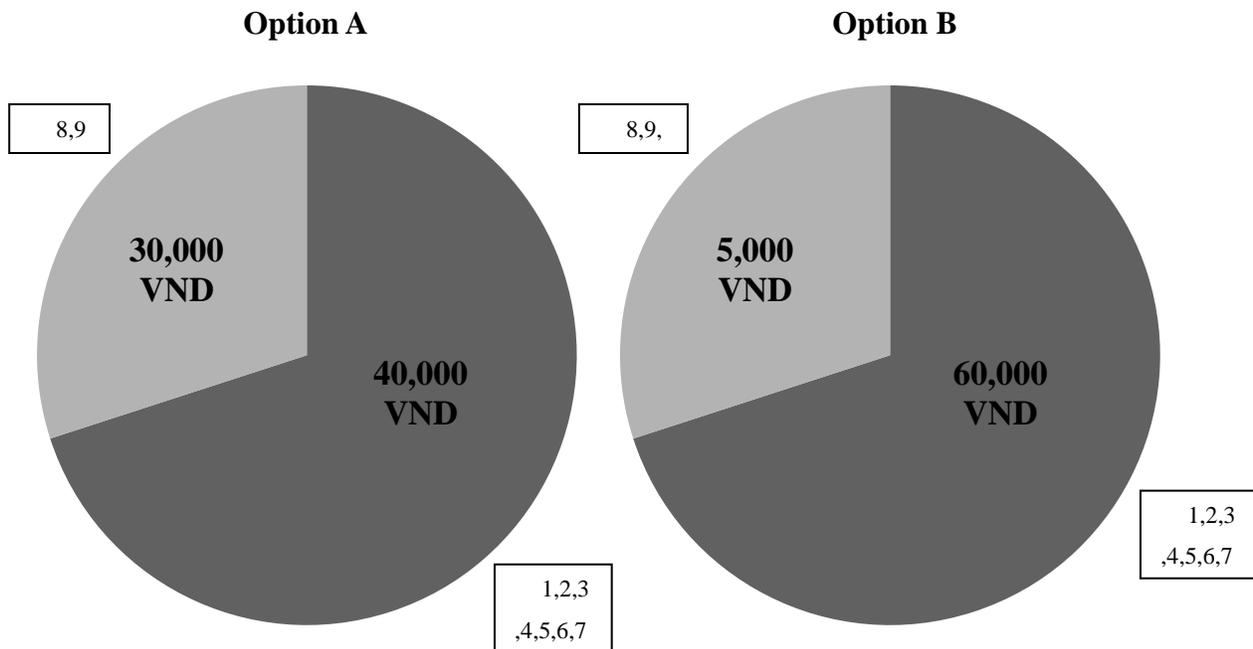
If a household takes a risk and gains, this household is expected to share its gain with others in the village.	
---	--

If a household takes a risk and loses, others in the village are expected to help this household.	
---	--

6.7 LOTTERY GAME

We will show you different options for an actual payout. You will be making choices between two options. Here is an example of a choice between two options:

Option A	Option B
70% chance of receiving of 40,000 VND, 30% chance of receiving of 30,000 VND	70% chance of receiving of 60,000 VND, 30% chance of receiving of 5,000 VND



After you have chosen between Option A and Option B, we will roll a dice to determine which payout you will receive. For example, if you chose Option A, if the dice is rolled and it shows a 1,2,3, 4, 5, 6, or 7 then you would receive 40,000 VND and if the dice is rolled and it shows a 8, 9 or 10 then you would receive 30,000 VND.

The first monetary amounts listed and darker parts of the circle under Option A and Option B, correspond to lower digits on the dice and the last monetary amounts listed under Option A and Option B correspond to higher digits on the dice.

For example, if you choose Option B and the dice is rolled and it shows a 8, 9 or 10, then you would receive 5,000 VND. If the dice is rolled and it shows a 1 through 7, then you would receive 60,000 VND.

Do you understand the choice between Option A and Option B?

We will show you ten decisions similar to the one above, but only one of these 10 decisions will be played for real money **after** you have made all 10 decisions.

For example, if the dice is rolled and it shows a 7, then decision number 7 will be played for real money. No pair of choices is any more likely to be used than any other and you will not know in advance which one will be selected, so please think about each question carefully.

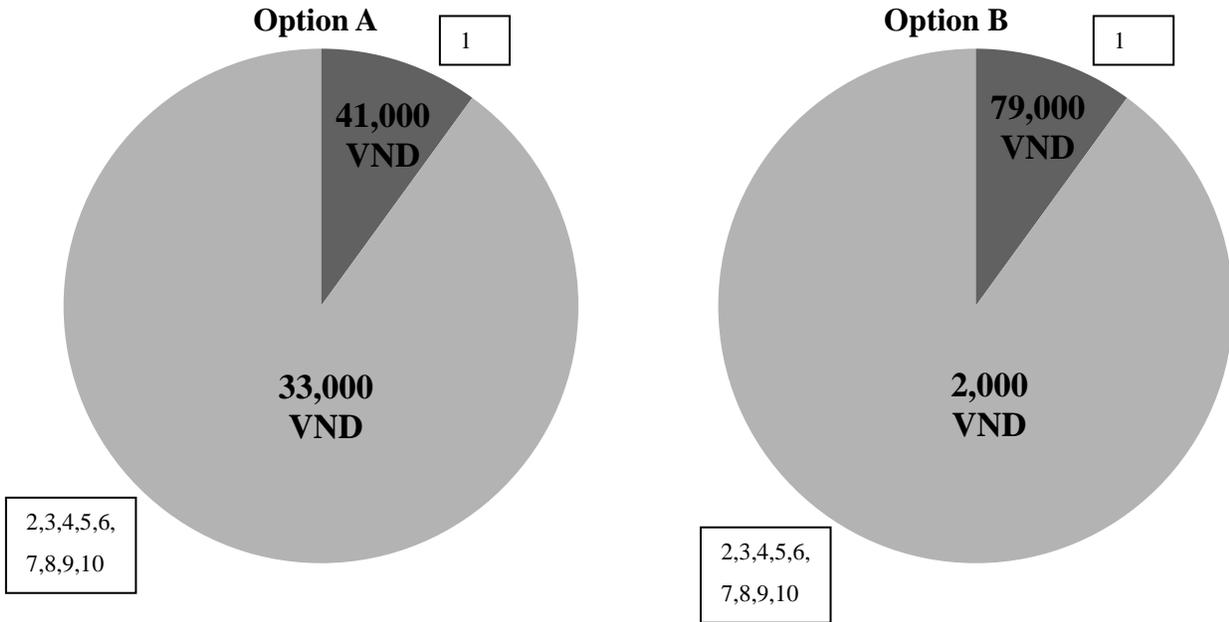
After the dice is rolled to determine which choice pair will be played, we will refer to the questionnaire to see whether you had previously chosen Option A or Option B. Then, we will roll the dice again to determine the prize.

There is no chance that you will lose any money by participating in this game.

Do you understand how the decisions and payouts are selected randomly by rolling a dice?

Now we will begin the questionnaire before one of these 10 questions is randomly selected for an actual payout. A field assistant will come to select which of the 10 questions will be chosen and to give the actual payout.

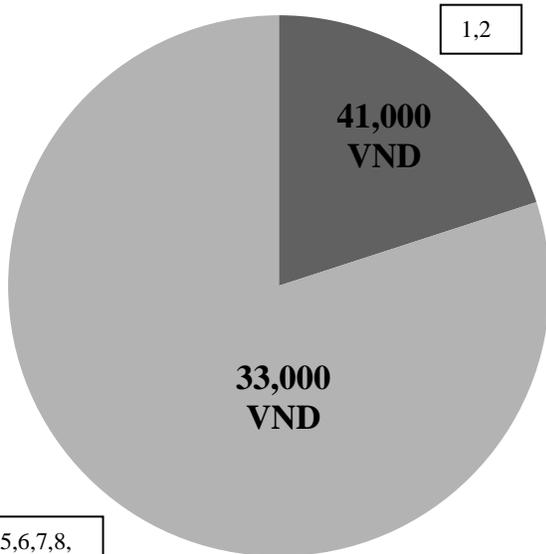
Option A	Option B
10% chance of receiving 41,000 VND, 90% chance of receiving of 33,000 VND	10% chance of receiving of 79,000 VND, 90% chance of receiving of 2,000 VND



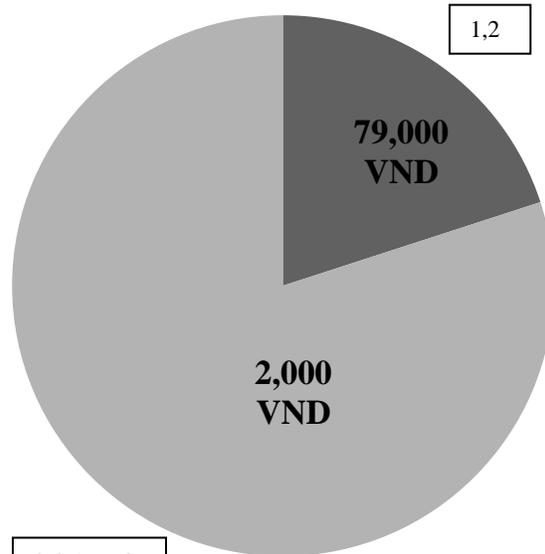
Note: In the survey conducted in November and December, 2012, prices were adjusted for inflation to: 35,000 VND vs. 44,000 VND in Option A and to 2,000 VND vs. 85,000 VND in Option B.

Option A	Option B
20% chance of receiving 41,000 VND, 80% chance of receiving 33,000 VND	20% chance of receiving 79,000 VND, 80% chance of receiving 2,000 VND

Option A

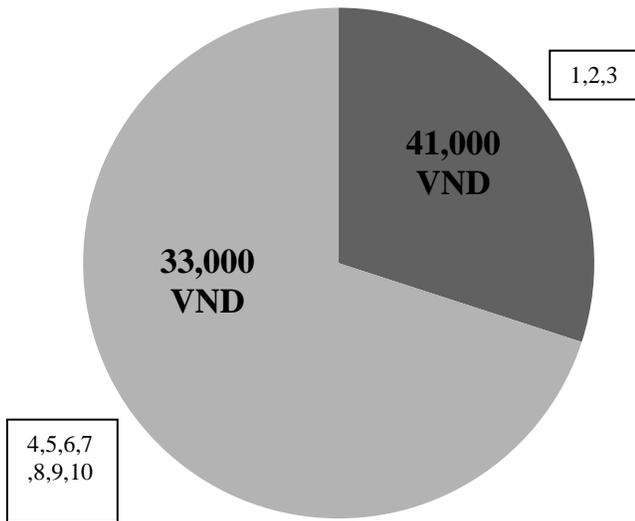


Option B

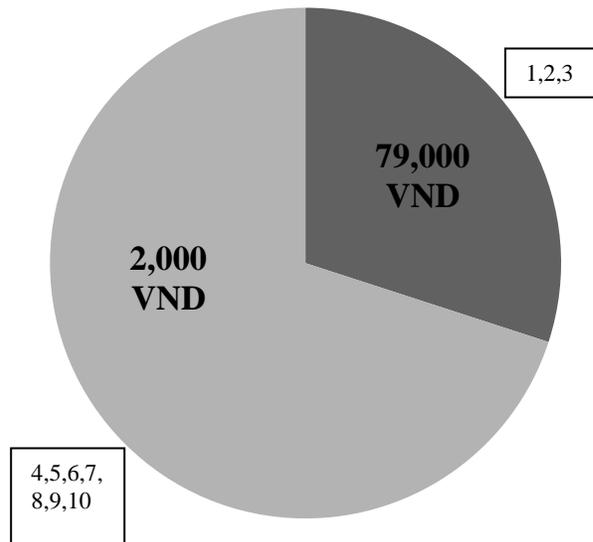


Option A	Option B
30% chance of receiving 41,000 VND, 70% chance of receiving 33,000 VND	30% chance of receiving 79,000 VND, 70% chance of receiving 2,000 VND

Option A

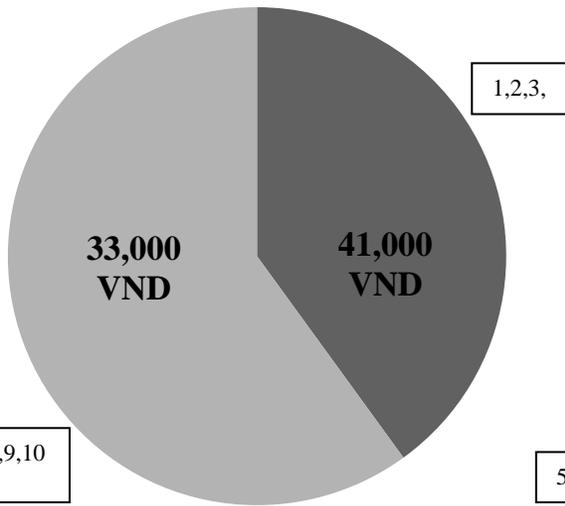


Option B

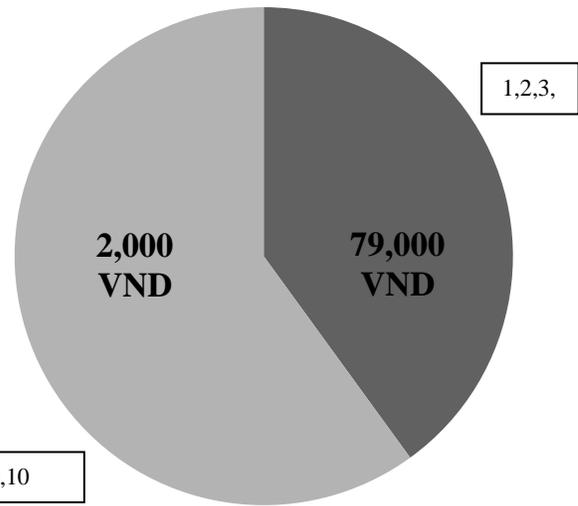


Option A	Option B
40% chance of receiving 41,000 VND, 60% chance of receiving 33,000 VND	40% chance of receiving 79,000 VND, 60% chance of receiving 2,000 VND

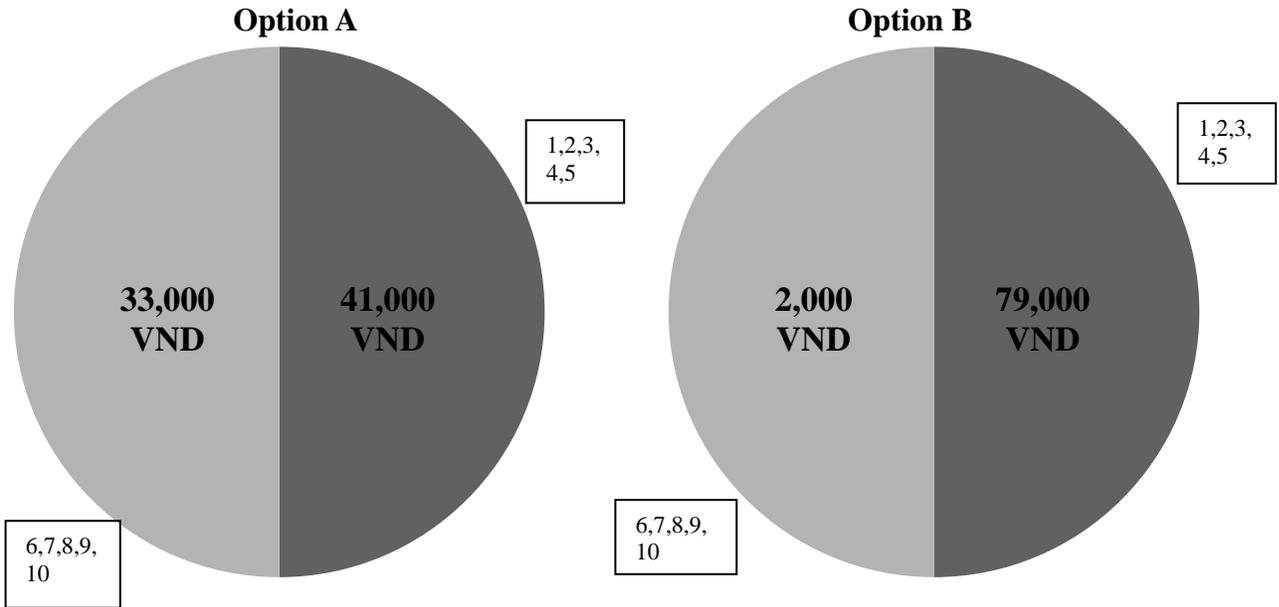
Option A



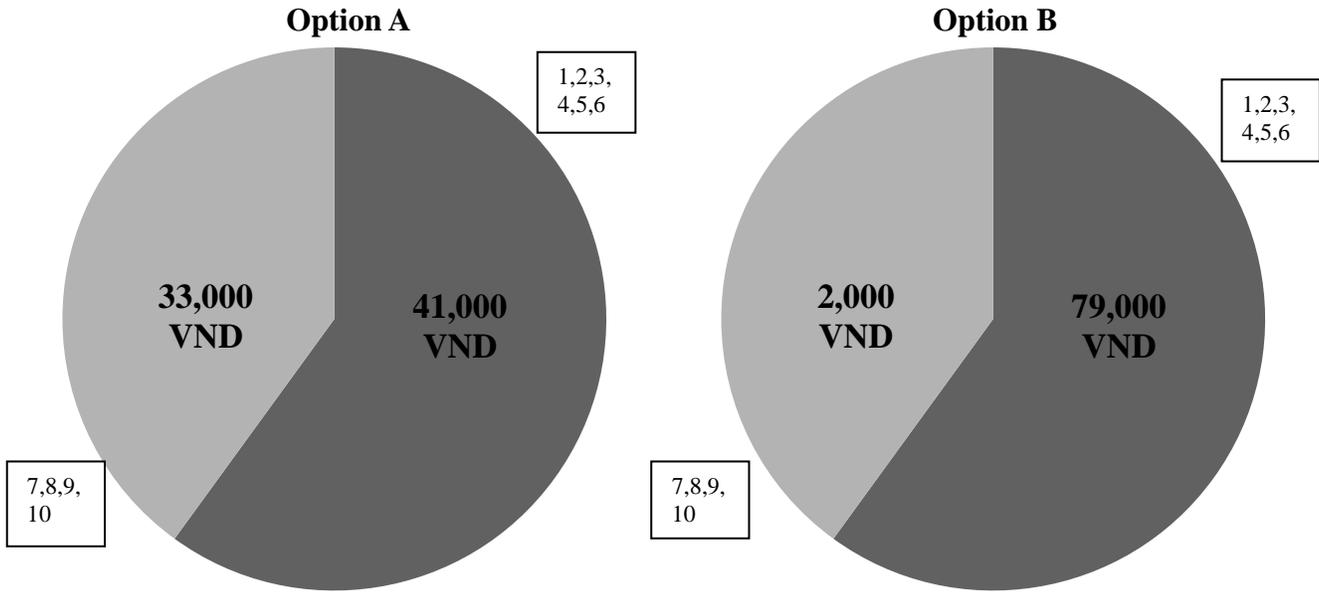
Option B



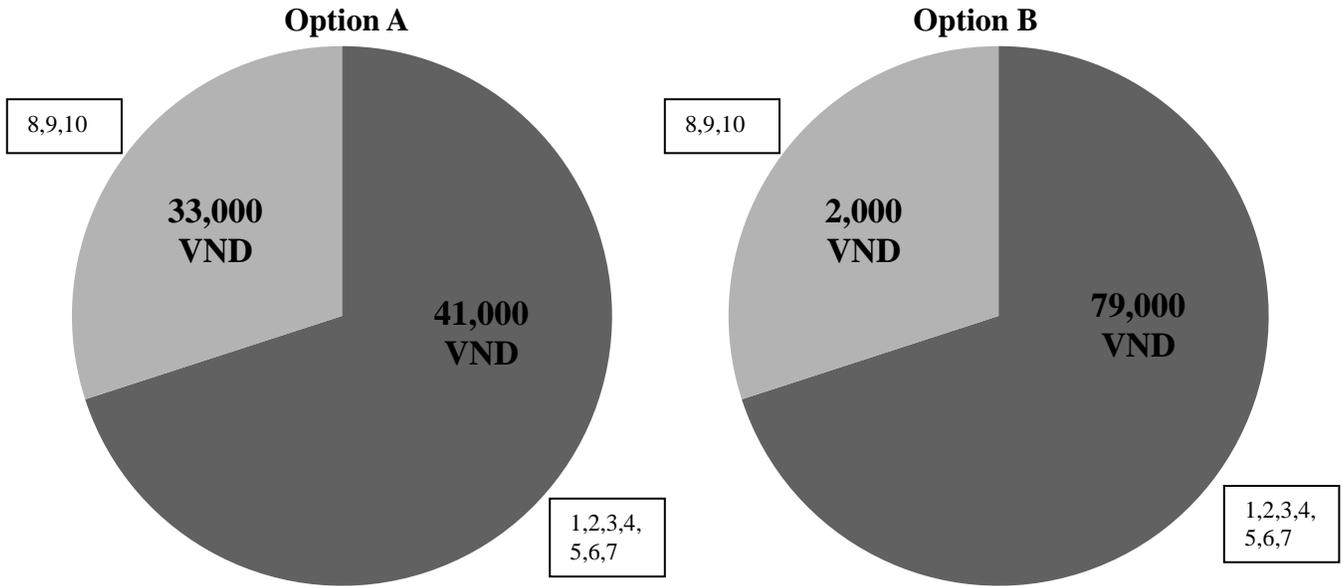
Option A	Option B
50% chance of receiving 41,000 VND, 50% chance of receiving 33,000 VND	50% chance of receiving 79,000 VND, 50% chance of receiving 2,000 VND



Option A	Option B
60% chance of receiving 41,000 VND, 40% chance of receiving 33,000 VND	60% chance of receiving 79,000 VND, 40% chance of receiving 2,000 VND

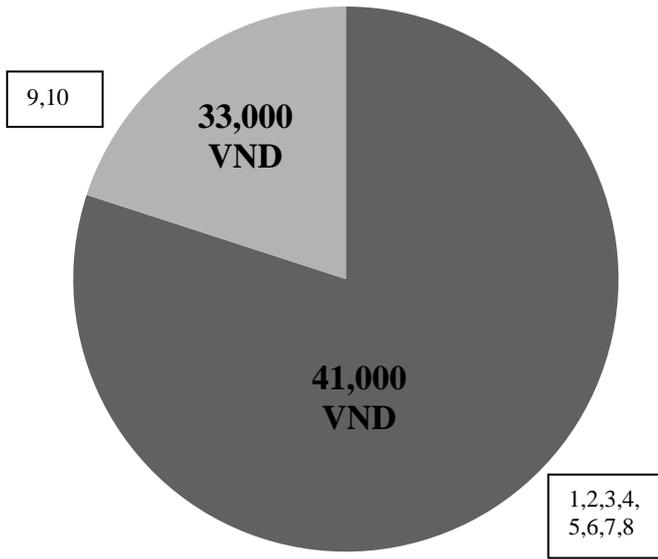


Option A	Option B
70% chance of receiving 41,000 VND, 30% chance of receiving 33,000 VND	70% chance of receiving 79,000 VND, 30% chance of receiving 2,000 VND

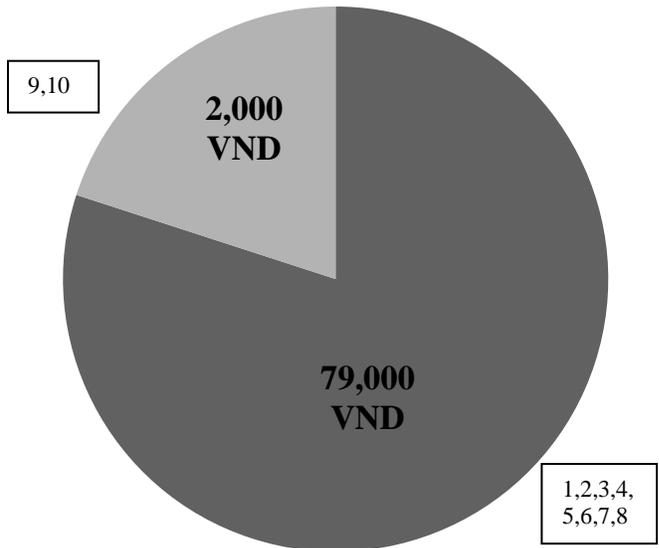


Option A	Option B
80% chance of receiving 41,000 VND, 20% chance of receiving 33,000 VND	80% chance of receiving 79,000 VND, 20% chance of receiving 2,000 VND

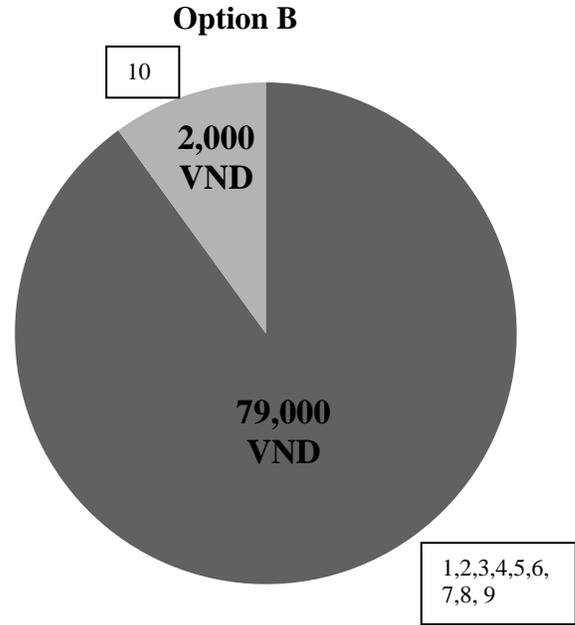
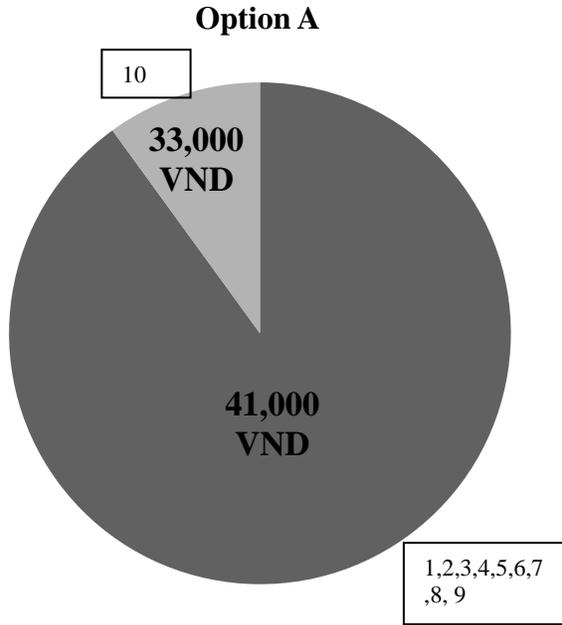
Option A



Option B

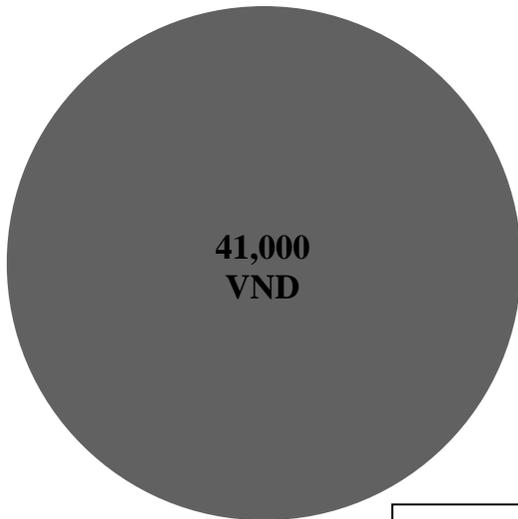


Option A	Option B
90% chance of receiving 41,000 VND, 10% chance of receiving 33,000 VND	90% chance of receiving 79,000 VND, 10% chance of receiving 2,000 VND



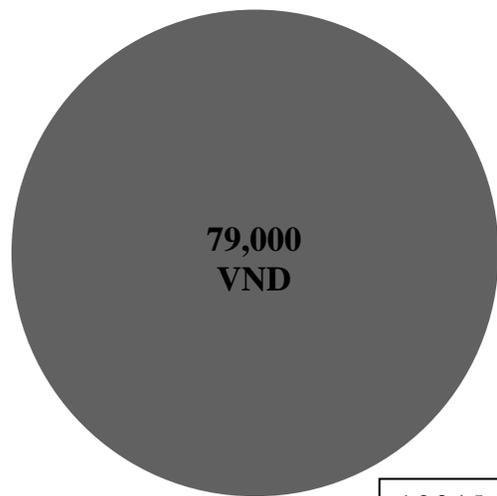
Option A	Option B
100% chance of receiving 41,000 VND, 0% chance of receiving 33,000 VND	100% chance of receiving 79,000 VND, 0% chance of receiving 2,000 VND

Option A



1,2,3,4,5,6,7,
8,9, 10

Option B



1,2,3,4,5,6,7,
8,9, 10

Answer sheet for recording lottery game:

1. Payout Option	1= Option A 2 = Option B
1.1	
1.2	
1.3	
1.4	
1.5	
1.6	
1.7	
1.8	
1.9	
1.10	
Ask respondent to look over their responses again in case they want to make any changes.	
1.11	If HH chose Option A for 1.10 mark "1" here and re-ask 1.1 to 1.10 over again!!
1.12	<i>If respondents insists on choosing Option A in 1.10, put a one in the box and, ask his/her reasoning and write in detail here why:</i>
1.13	If the respondent chooses Option B for all cases, ask his/her reason and write in detail here why:
1.14	If the respondent switches between Option A and B, ask his/her reason and write in detail here why:

Receipt sheet for lottery game

First roll of dice: (1, 2, 3, 4, 5, 6, 7, 8, 9, or 10)

(This first roll of the dice determines which option will be played for real money.)

Household's previous choice of Option A or B for selected option:
(Refer to answer given previously in the questionnaire)

1= Option A
2= Option B

Second roll of dice:
(to determine payout) (1 to 10)

Amount received from payout option (Determined by a second roll of the dice. Refer to game selected in the questionnaire (2.1-2.10) for which number on the dice corresponds to which payout)

_____ VND

Signature of the interviewer: _____

Signature of the respondent: _____

6.8 FINANCIAL RISK TOLERANCE QUESTION

Which of the following statements describes closest the amount of financial risk that you are willing to take when you save or make investments:

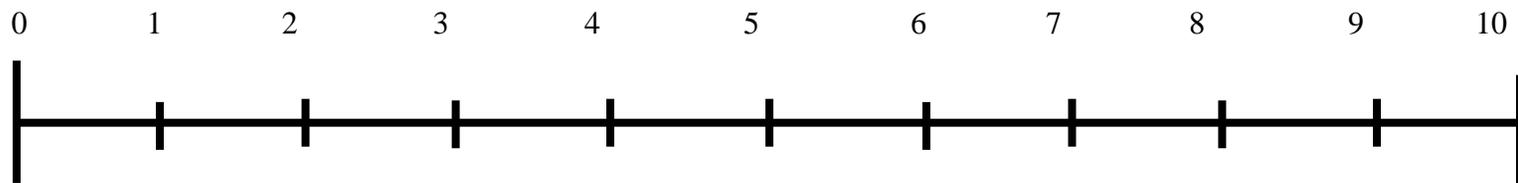
1. Take substantial financial risk expecting to earn substantial returns
2. Take above average financial risks expecting to earn above average returns
3. Take average financial risks expecting to earn average returns
4. Not willing to take any financial risks

6.9 SELF ASSESSMENT SCALE

6.8.1 How do you see yourself: Are you generally a person who is fully prepared to take risks or do you try to avoid taking risks? Please rank yourself from a scale of 0 to 10 with 0 as fully avoiding risks and 10 as fully prepared to take risks. You can choose ANY value between 0 and 10. *Interview: Show scale, kb = do not know.*

6.8.2 When you young were still dependent on your parents, would you say that your father was avoiding taking risks or are you fully prepared to take risks? *Interview: Show scale 77 = not applicable, kb = do not know*

6.8.3 When you young were still dependent on your parents, would you say that your mother was avoiding taking risks or are you fully prepared to take risks ? *Interview: Show scale 77 = not applicable, kb = do not know*



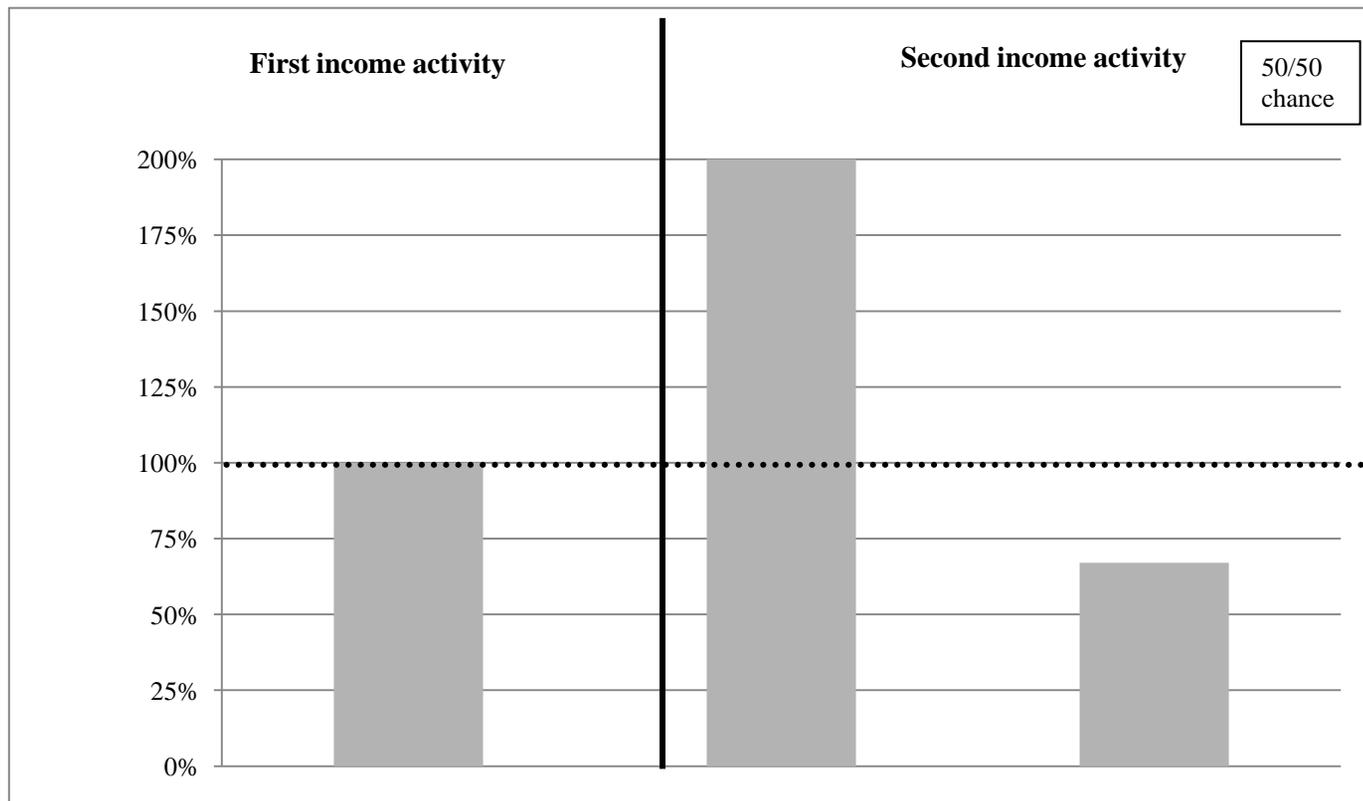
Fully avoiding taking risks

Fully prepared to take risks

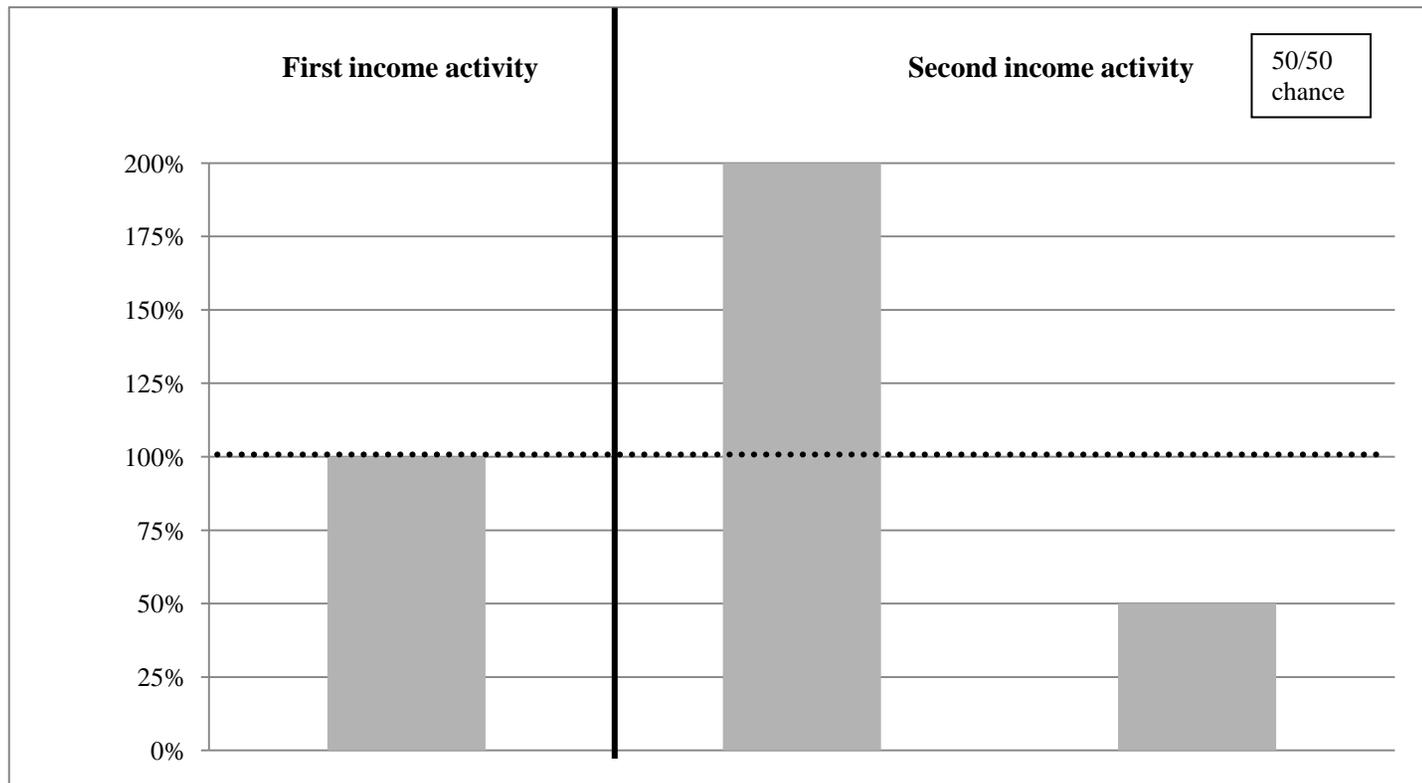
6.10 INCOME SERIES

Interviewer: show participants the graph while explaining the question.

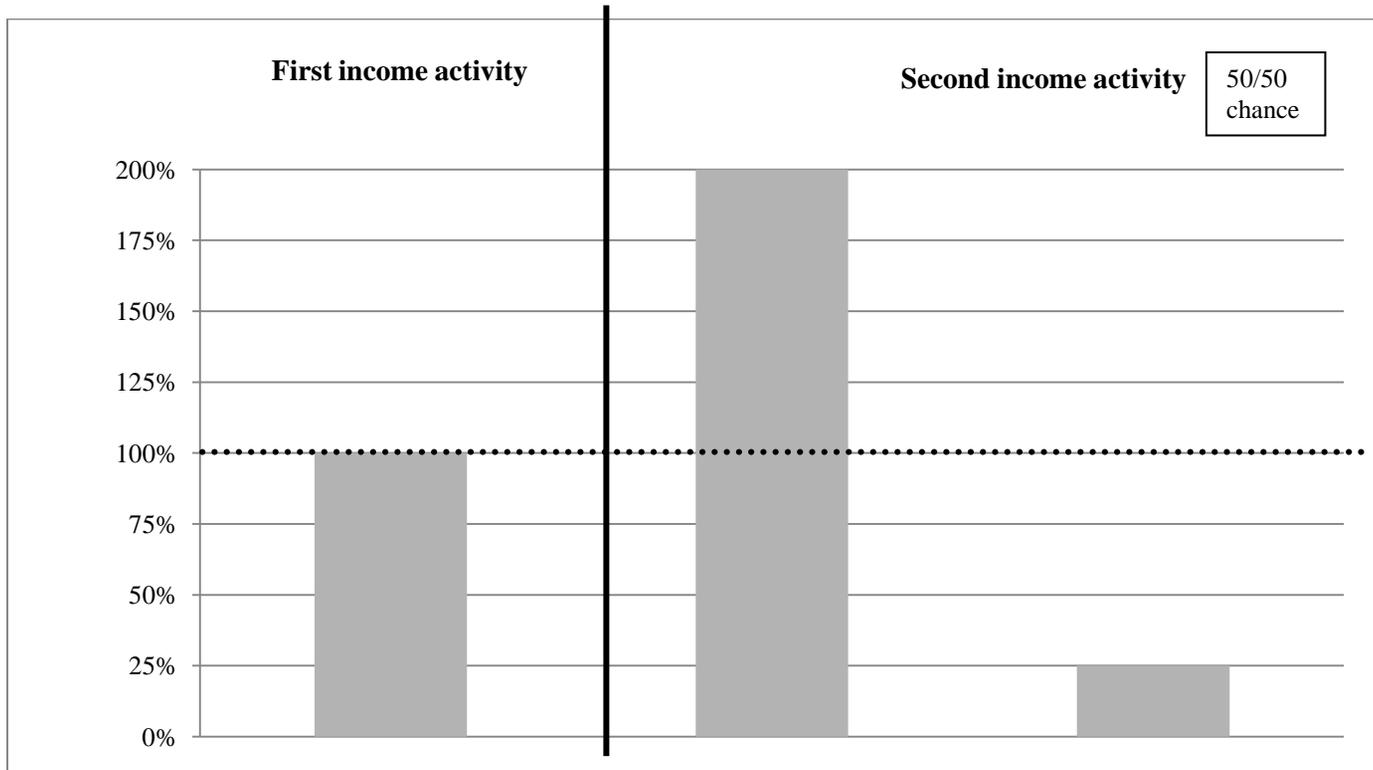
Suppose you are the only income earner in your household. You are told that you must change your income earning activity and have two possibilities. The first income earning activity would guarantee you an annual income for life that is equal to your current total family income. The second is possibly a better paying income earning activity, but the income is less certain: there is a 50% chance that the second income earning activity would double your total lifetime income and a 50% chance that it would cut it by one-third. Which income earning activity would you take?



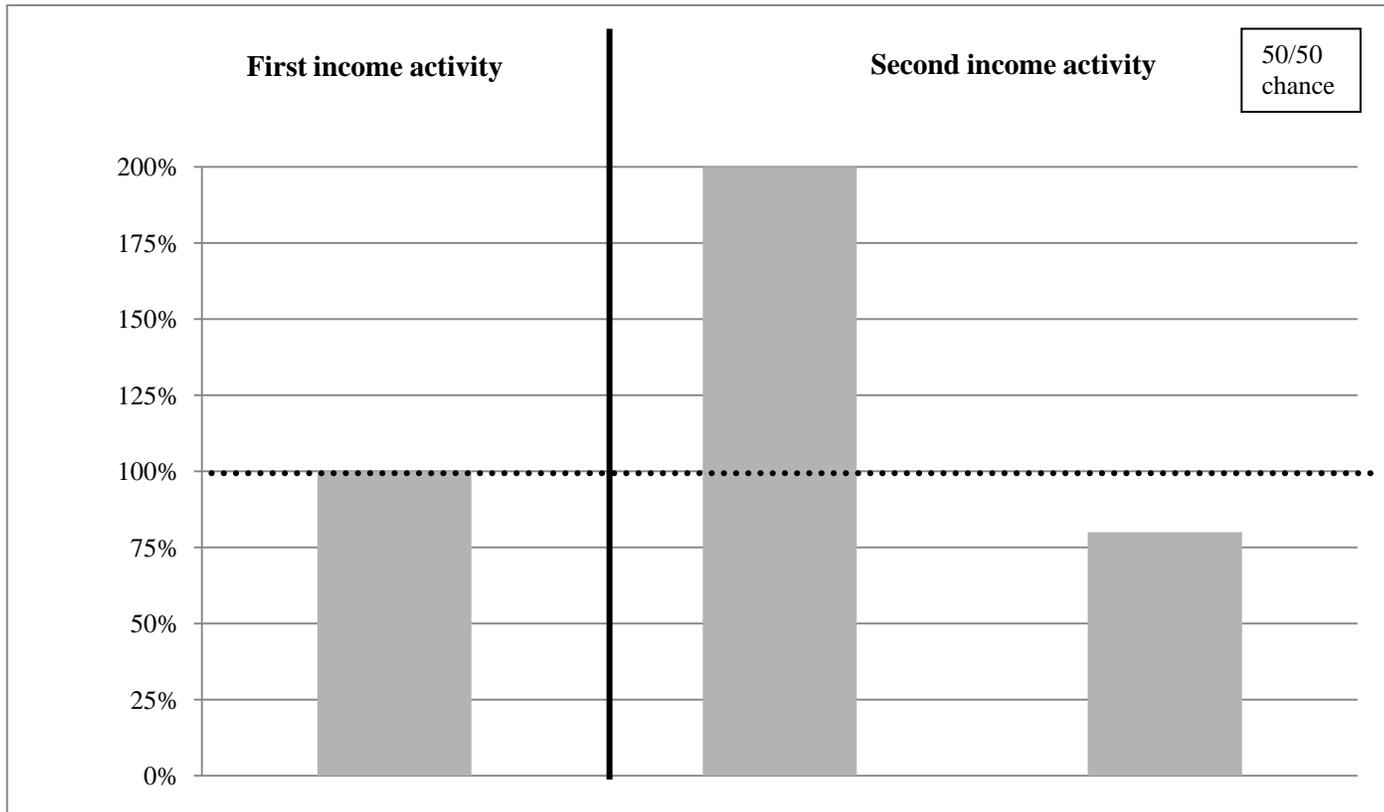
Suppose the chances were 50% that the second income earning activity would double your lifetime income and a 50% chance that it would cut it in half. Would you take the first income earning activity or the second income earning activity?



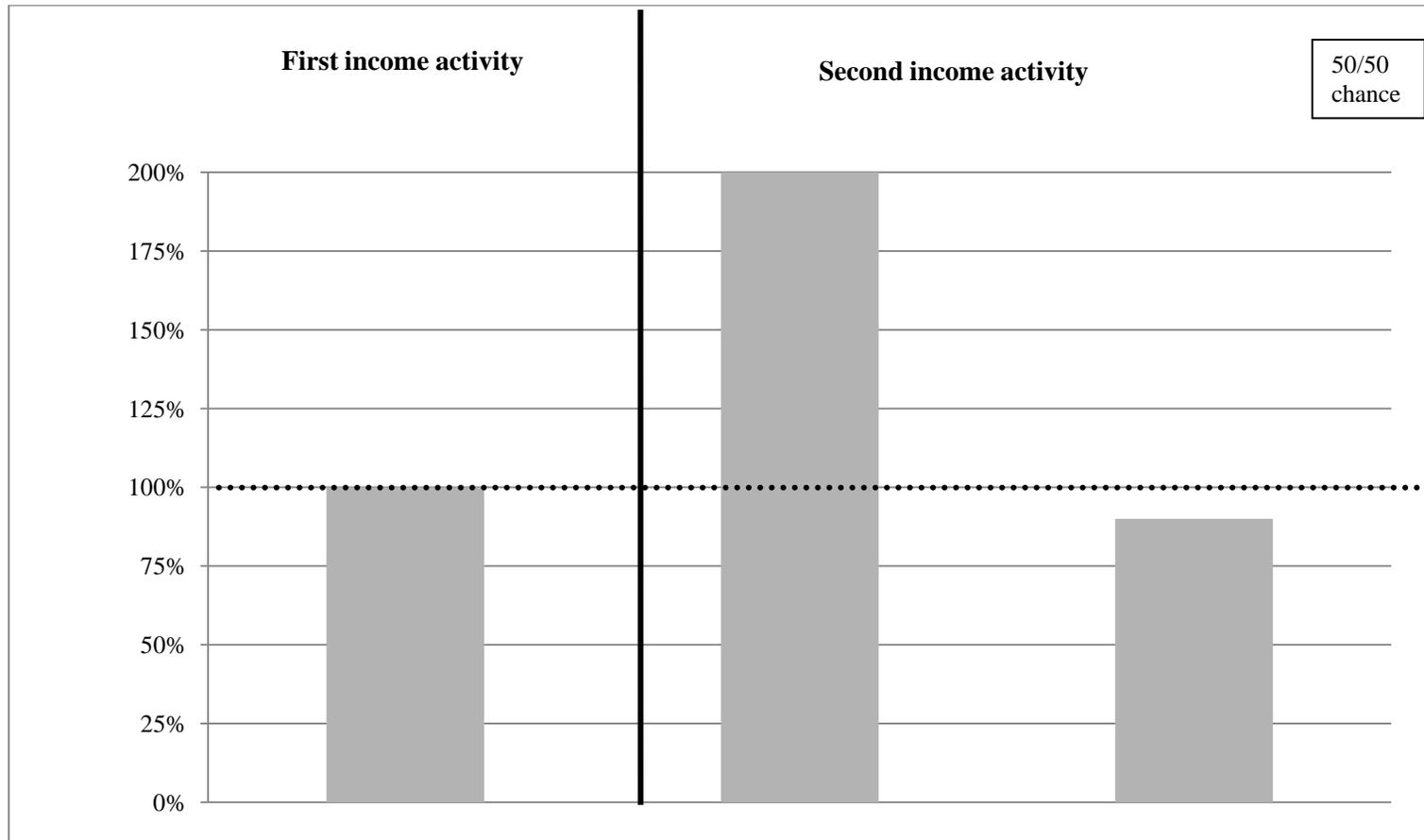
Suppose the chances were 50% that the second income earning activity would double your lifetime income and 50% that it would cut it by 75%. Would you take the first income earning activity or the second income earning activity?



Suppose the chances were 50% that the second income earning activity would double your lifetime income and 50% that it would cut it by 20%. Would you take the first income earning activity or the second income earning activity?

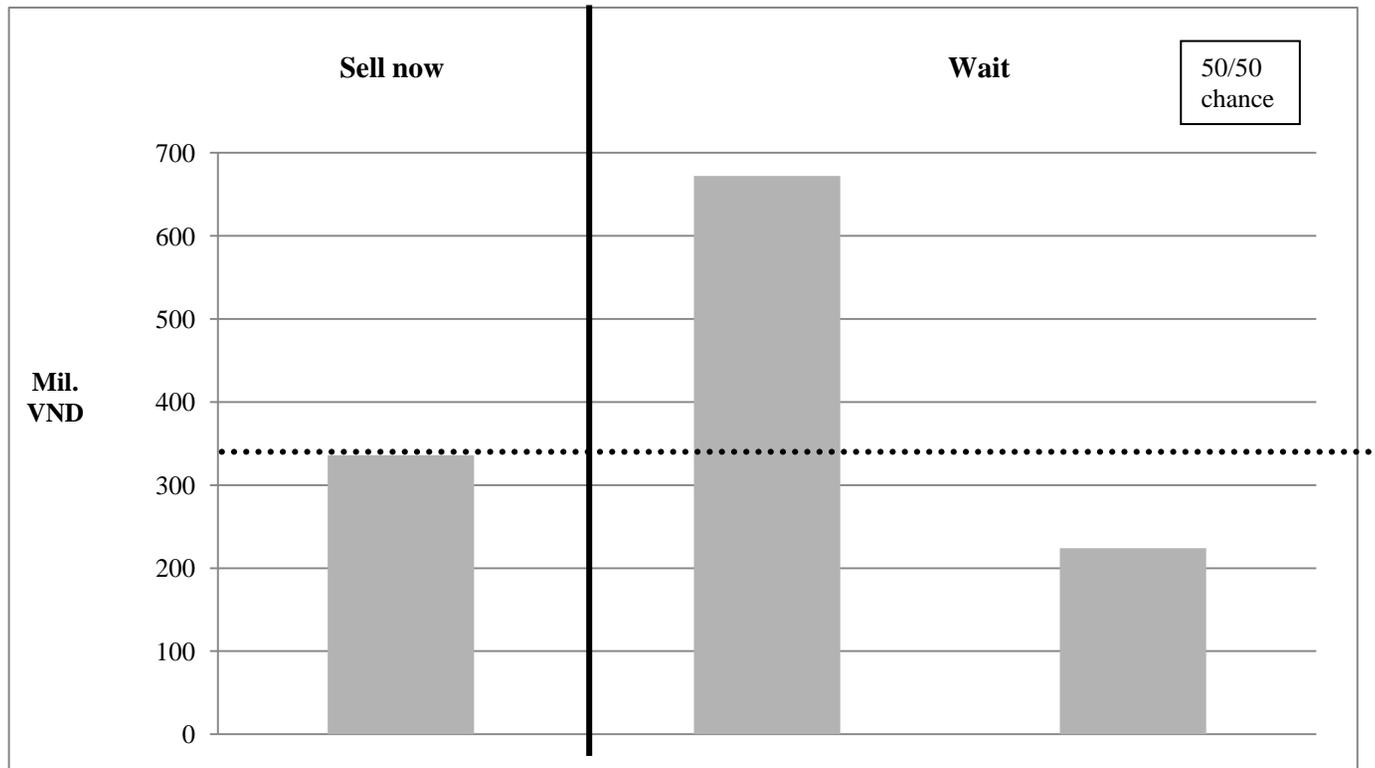


Suppose the chances were 50% that the second income earning activity would double your lifetime income and 50% that it would cut it by 10%. Would you take the first income earning activity or the second income earning activity?

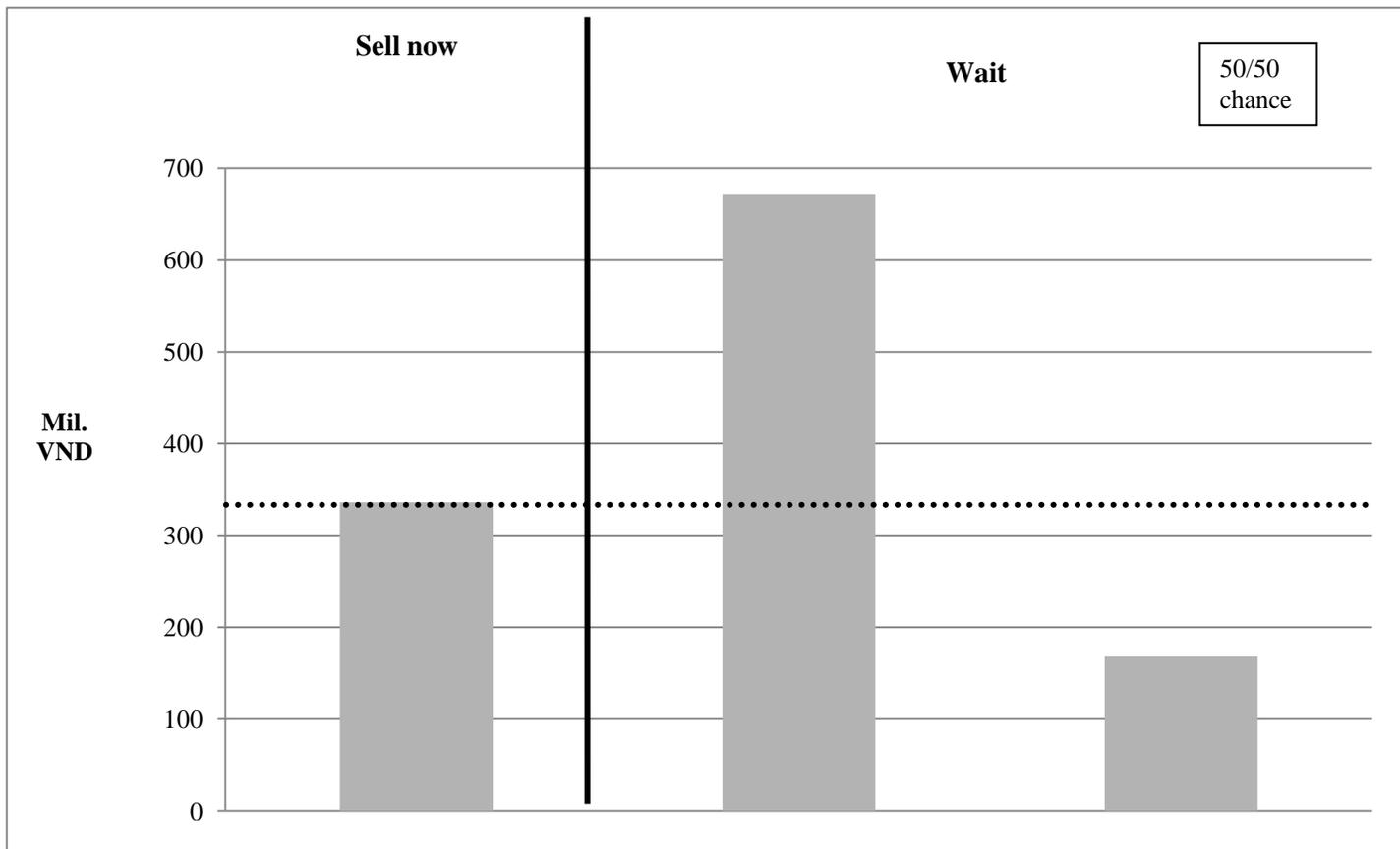


6.11 INHERITANCE SERIES

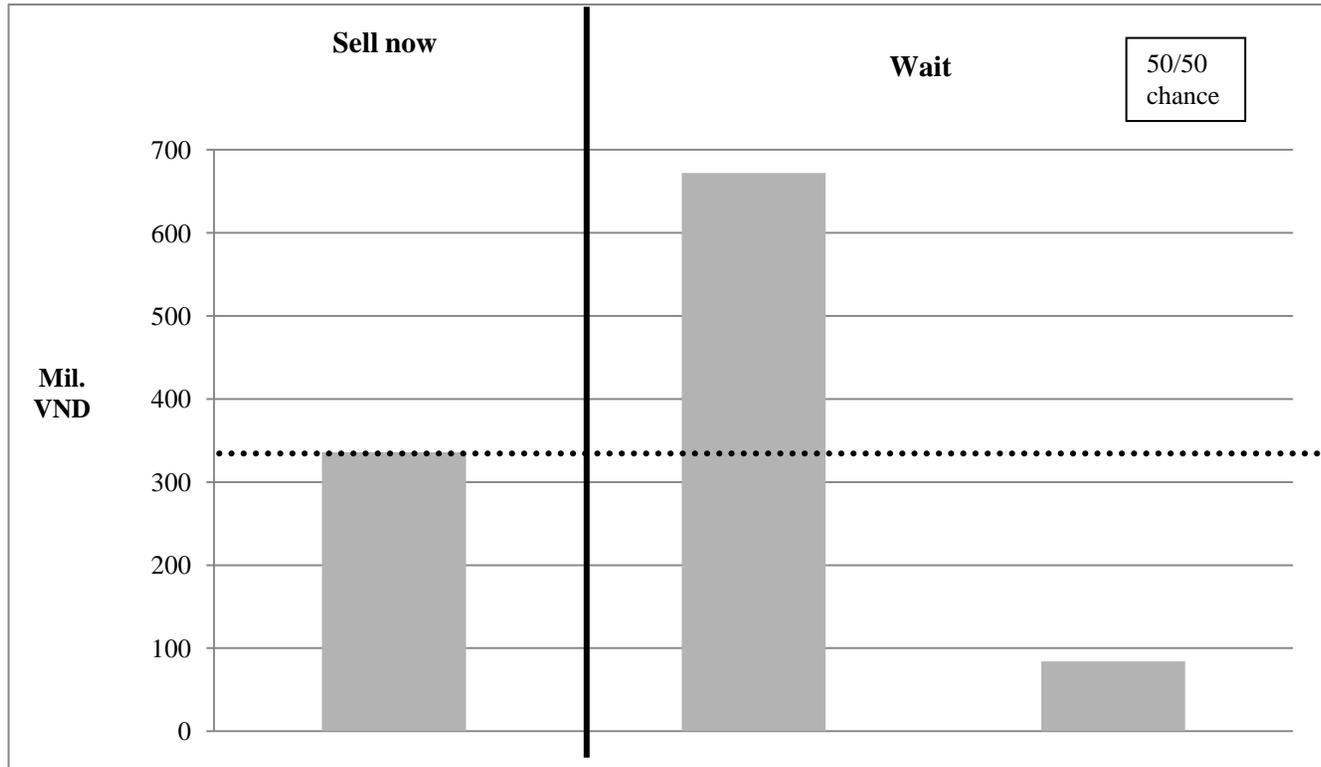
Suppose a relative who owned a gas station passed away and you inherited the gas station which is worth 336 million VND. You have to decide whether to sell the gas station and receive 336 million VND or to sell the gas station in one month and have a 50% chance of doubling your money to 672 million VND and a 50% chance of losing one-third of it, leaving you with 224 million VND. Would you sell the gas station now or wait a month?



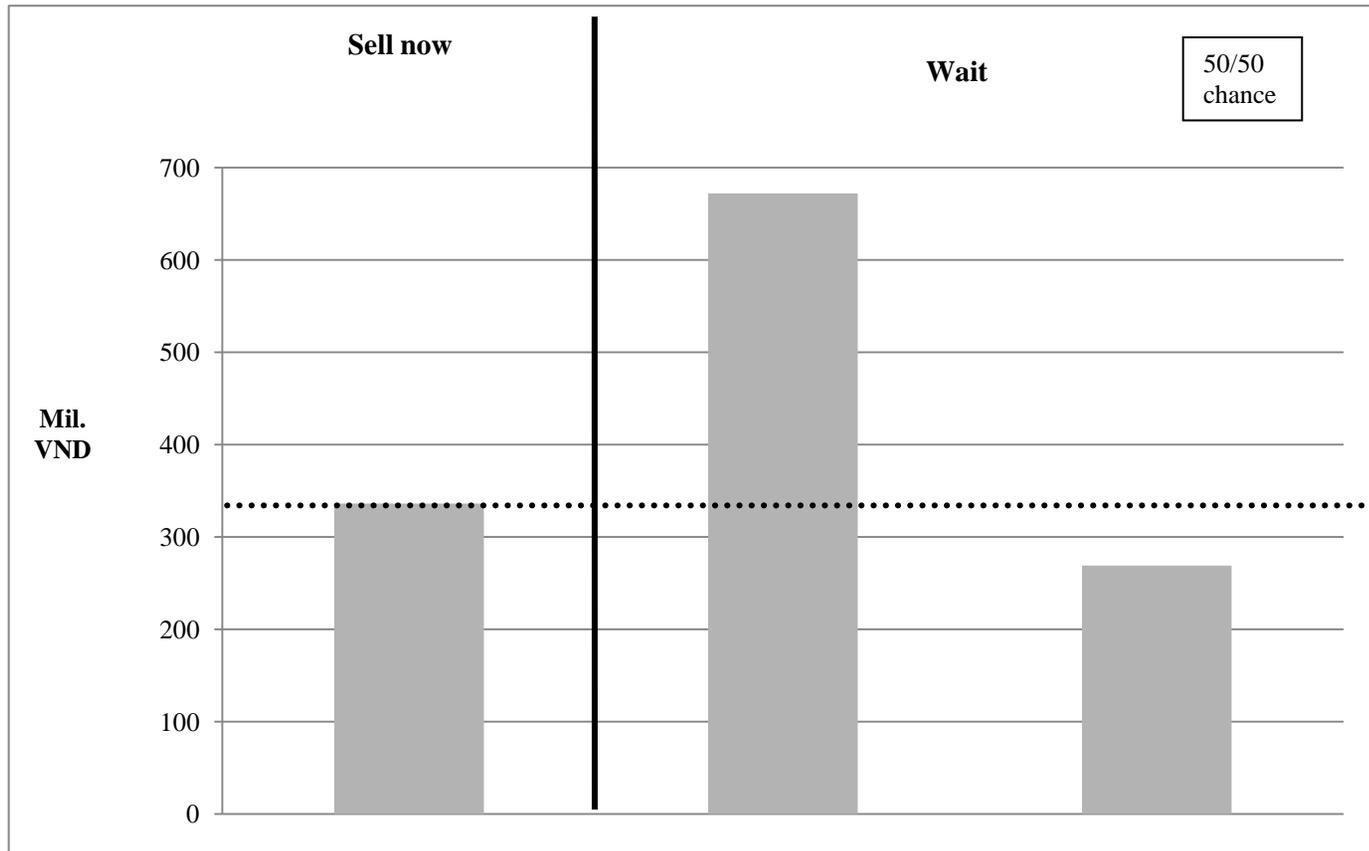
Suppose that waiting a month would result in a 50% chance that the money would be doubled to 672 million VND and a 50% chance that it would be reduced by half, to 168 million VND. Would you sell the gas station now or wait a month?



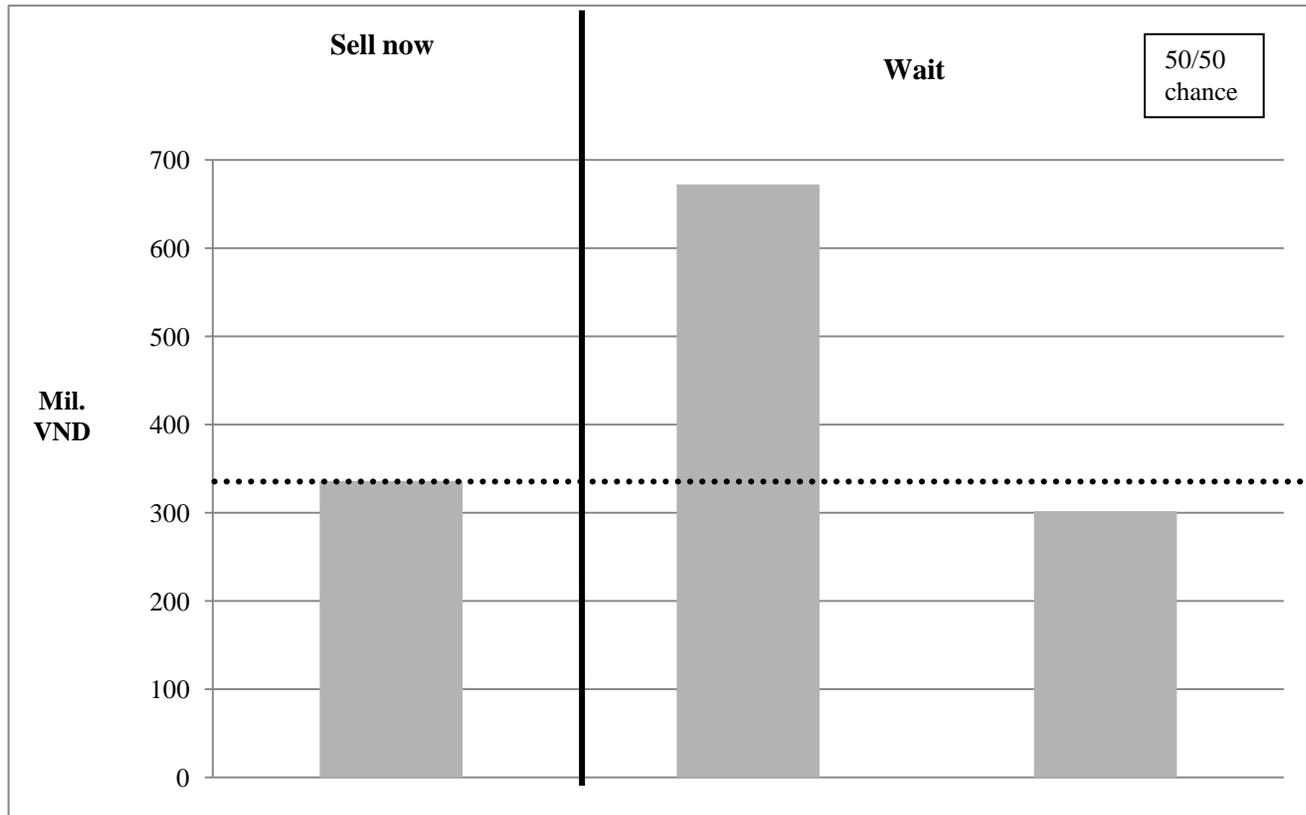
Suppose now that waiting a month would result in a 50% chance that the money would be doubled to 672 million VND and a 50% chance that it would be reduced by 75%, to 84 million VND. Would you sell the gas station now or wait a month?



Suppose that waiting a month would result in a 50% chance that the money would be doubled to 672 million VND and a 50% chance that it would be reduced by 20%, to 269 million VND. Would you sell the gas station now or wait a month?



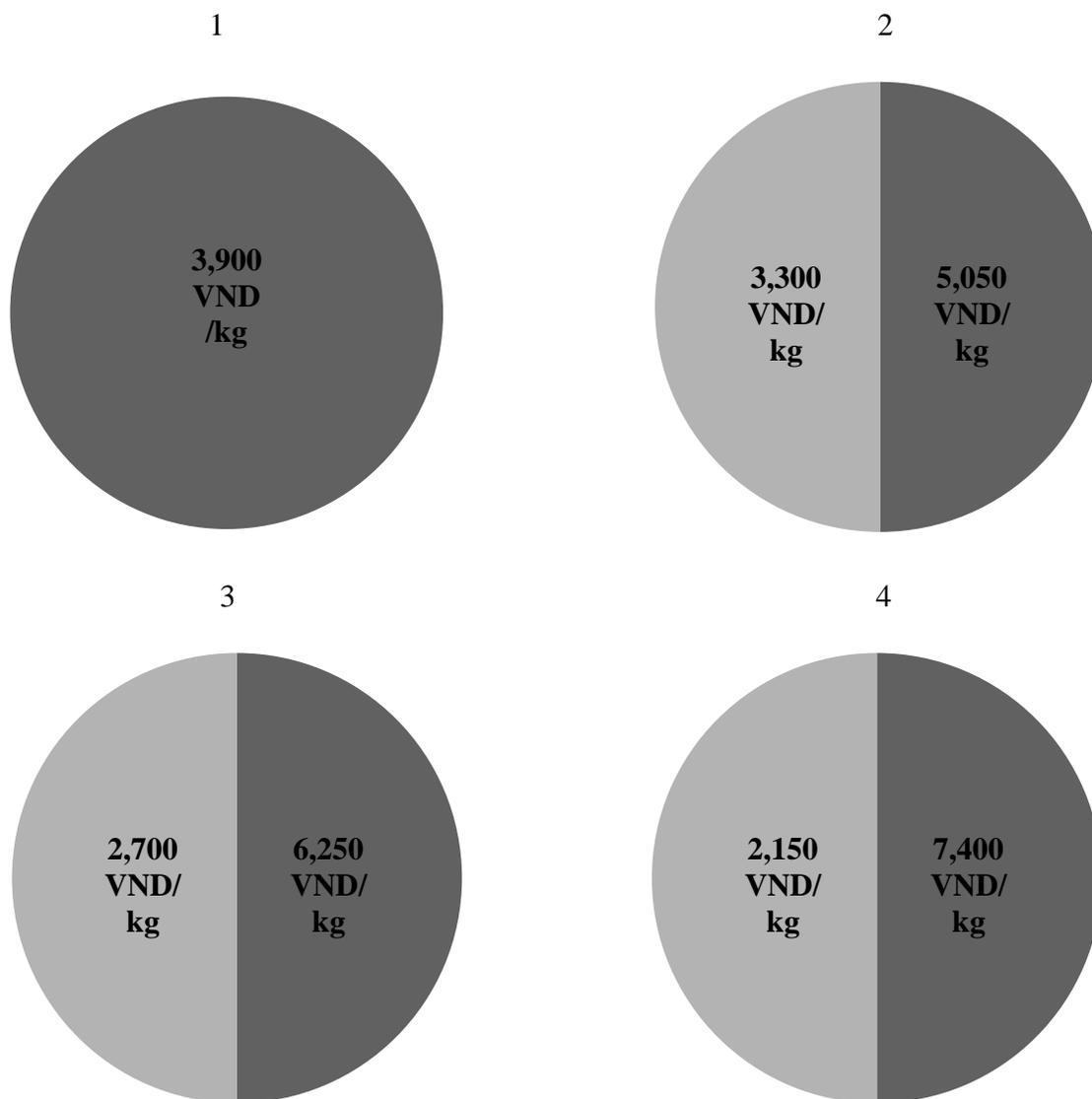
Suppose that waiting a month would result in a 50% chance that the money would be doubled to 672 million VND and a 50% chance that it would be reduced by 10%, to 302 million VND. Would you sell the gas station now or wait a month?



6.12 MAIZE PRICE SERIES

Which of the following dry seed maize selling prices would you prefer, assuming that yields stay constant?

- 1 3,900 VND/kg, every year
- 2 3,300 VND/kg with 50% probability and 5,050 VND/kg with 50% probability, every year
- 3 2,700 VND/kg with 50% probability and 6,250 VND/kg with 50% probability, every year
- 4 2,150 VND/kg with 50% probability and 7,400 VND/kg with 50% probability, every year

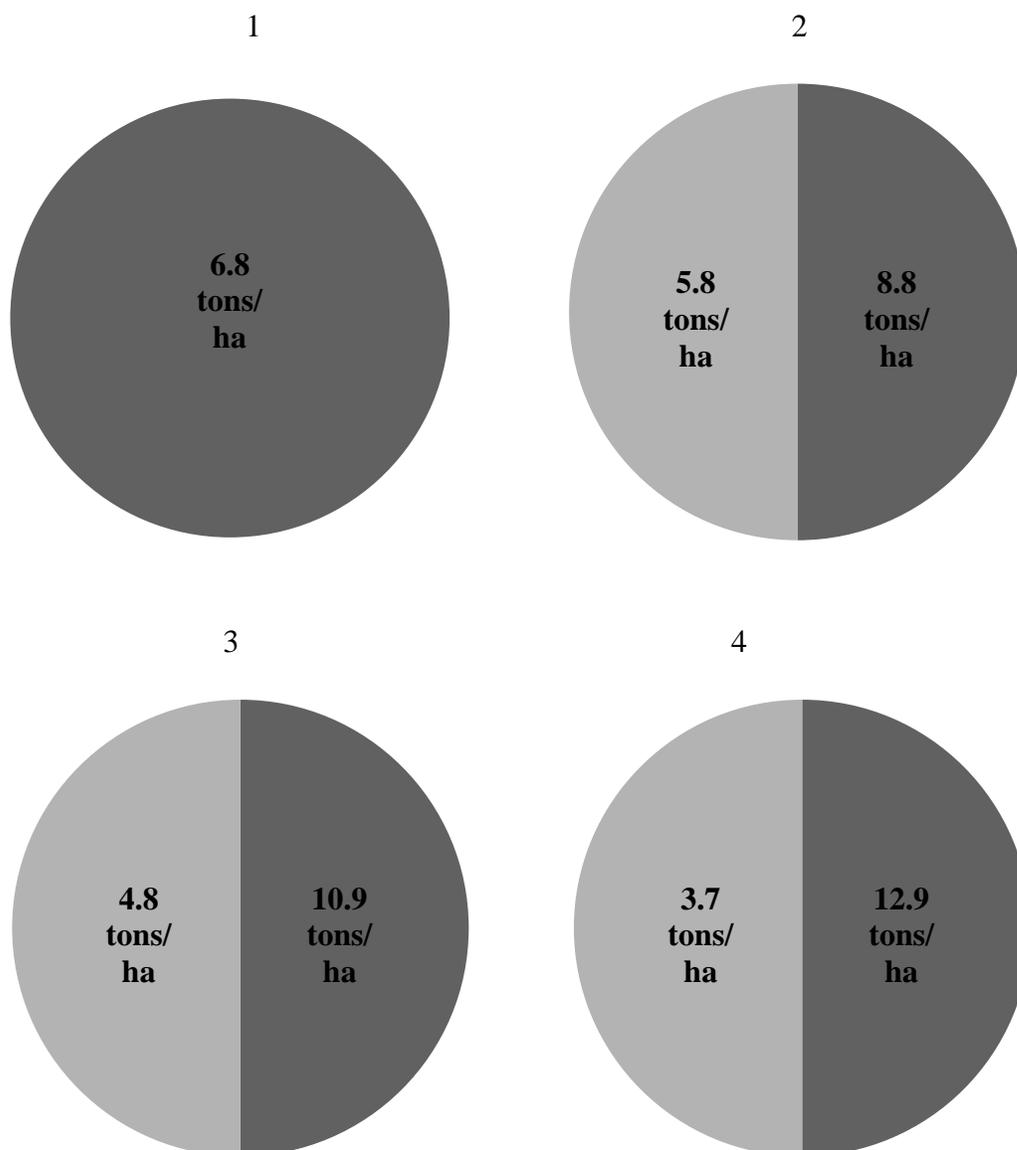


Notes: These are based on median prices in 2009 (adjusted for inflation). In the survey conducted in November and December, 2011, these were adjusted for median prices in Yen Chau in 2010 (adjusted for inflation) and were: Option 1: 5,000 VND; Option 2: 4,250 VND vs. 6,500 VND; Option 3: 3,500 VND vs. 7,000 VND; Option 4: 2,750 VND vs. 8,500 VND.

6.13 MAIZE YIELD SERIES:

Which of the following dry seed maize yields would you prefer, assuming that prices stay constant?

- 1 6.8 tons/ha every year
- 2 5.8 tons/ha with 50% probability and 8.8 tons/ha with 50% probability, every year
- 3 4.8 tons/ha with 50% probability and 10.9 tons/ha with 50% probability, every year
- 4 3.7 tons/ha with 50% probability and 12.9 tons/ha with 50% probability, every year

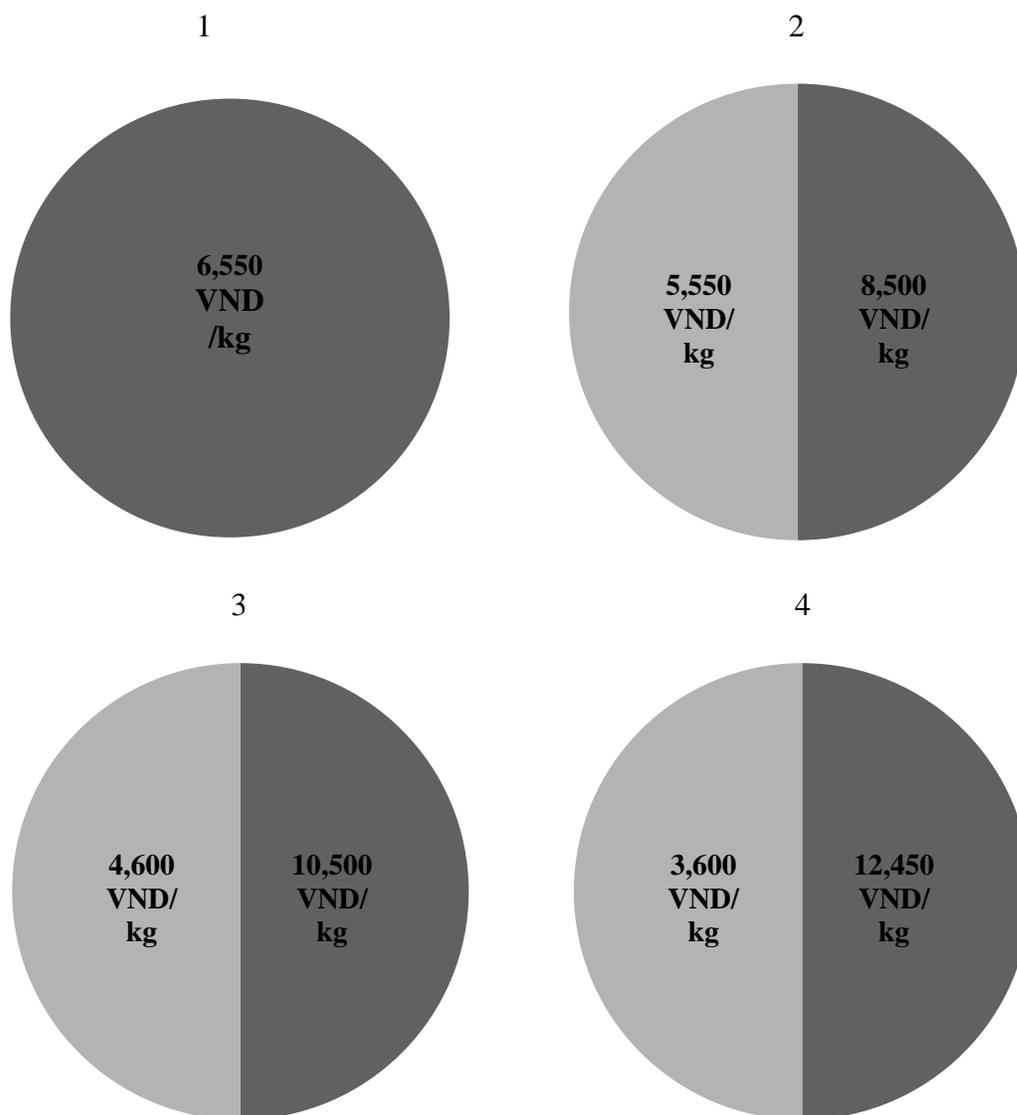


Notes: These are based on median yields in 2009. In the survey conducted in November and December, 2011, these were adjusted for median yields in Yen Chau in 2010 and were: Option 1: 6.0 tons; Option 2: 5.1 vs. 7.8 tons; Option 3: 4.2 vs. 9.6 tons; Option 4: 3.3 vs. 11.4 tons.

6.14 RICE PRICE SERIES:

Which of the following unhusked rice prices would you prefer in the rainy (summer) season, assuming that yields stay constant?

1. 6,550 VND/kg, every year
2. 5,550 VND/kg with 50% probability and 8,500 VND/kg with 50% probability, every year
3. 4,600 VND/kg with 50% probability and 10,500 VND/kg with 50% probability, every year
4. 3,600 VND/kg with 50% probability and 12,450 VND/kg with 50% probability, every year

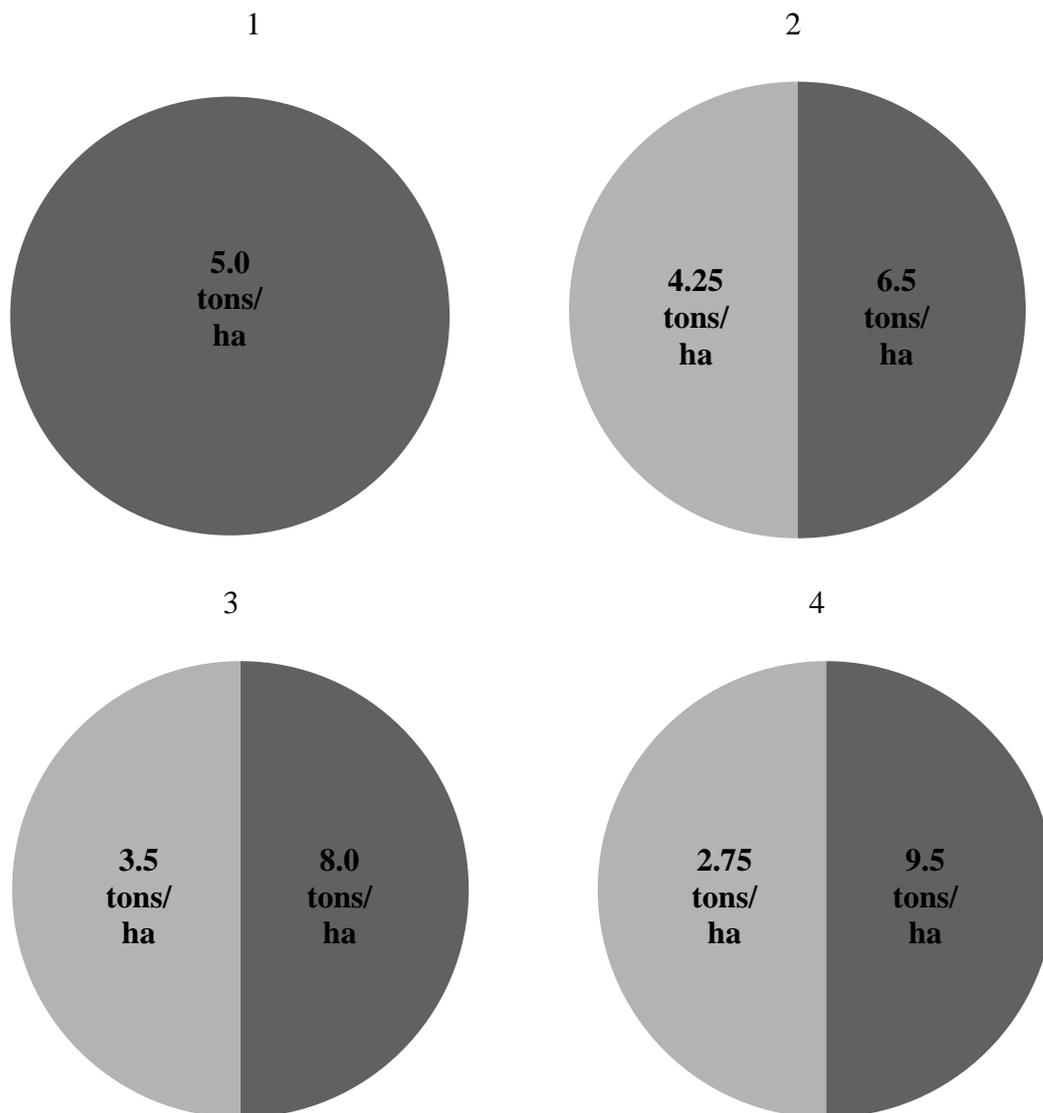


Notes: These are based on median prices in 2009 (adjusted for inflation). In the survey conducted in November and December, 2011, these were adjusted for median prices in Yen Chau in 2010 (adjusted for inflation) and were: Option 1: 9,000 VND; Option 2; 7,700 VND vs. 11,700 VND; Option 3: 6,300 VND vs. 14,000 VND; Option 4: 5,000 VND vs. 17,000 VND.

6.15 RICE YIELD SERIES:

Which of the following rice yields would you prefer in the rainy (summer) season, assuming that prices stay constant?

- 1 5 tons/ha every year
- 2 4.25 tons/ha with 50% probability and 6.5 tons/ha with 50% probability, every year
- 3 3.5 tons/ha with 50% probability and 8 tons/ha with 50% probability, every year
- 4 2.75 tons/ha with 50% probability and 9.5 tons/ha with 50% probability, every year



Notes: These are based on median yields in 2009. In the survey conducted in November and December, 2011, these were adjusted for median yields in Yen Chau in 2010 and were:

Option 1: 4.8 tons; Option 2: 4.1 vs. 6.2 tons; Option 3: 3.4 vs. 7.7 tons; Option 4: 2.6 vs. 9.1 tons.

6.16 PICTURE RANKING OF RISKS

For these three questions, show the respondent the pictures (mixed) on a flat surface and have them order them. Then, write down the order. If respondent cannot rank, write the code in the “do not know” row. If 2+ answers are “tied”, then write the codes separated by a “/”.

<p>Please rank the following crops in terms of their riskiness for your household’s income from low risk to high risk: expansion of: rice, maize, mango, pig production, cattle trading, cattle production for meat, fish ponds, chicken production.</p> <p style="text-align: right;">code 2</p>	<div style="border: 1px solid black; height: 100%; width: 100%;"></div>
<p>Please rank the following in terms of their riskiness from low risk to high risk: taking out an agricultural loan from a bank for all inputs for maize, taking out an agricultural loan from an informal source for all inputs for maize, applying more fertilizers, applying more inputs excluding fertilizers, using high-yielding varieties</p> <p style="text-align: right;">code 3</p>	<div style="border: 1px solid black; height: 100%; width: 100%;"></div>

Code 2:

- 1 = rice
- 2 = maize
- 3 = mango
- 41 = Ban pig
- 42 = exotic pig
- 5 = cattle trading
- 6 = cattle production for meat
- 7 = fish ponds
- 8 = chicken production

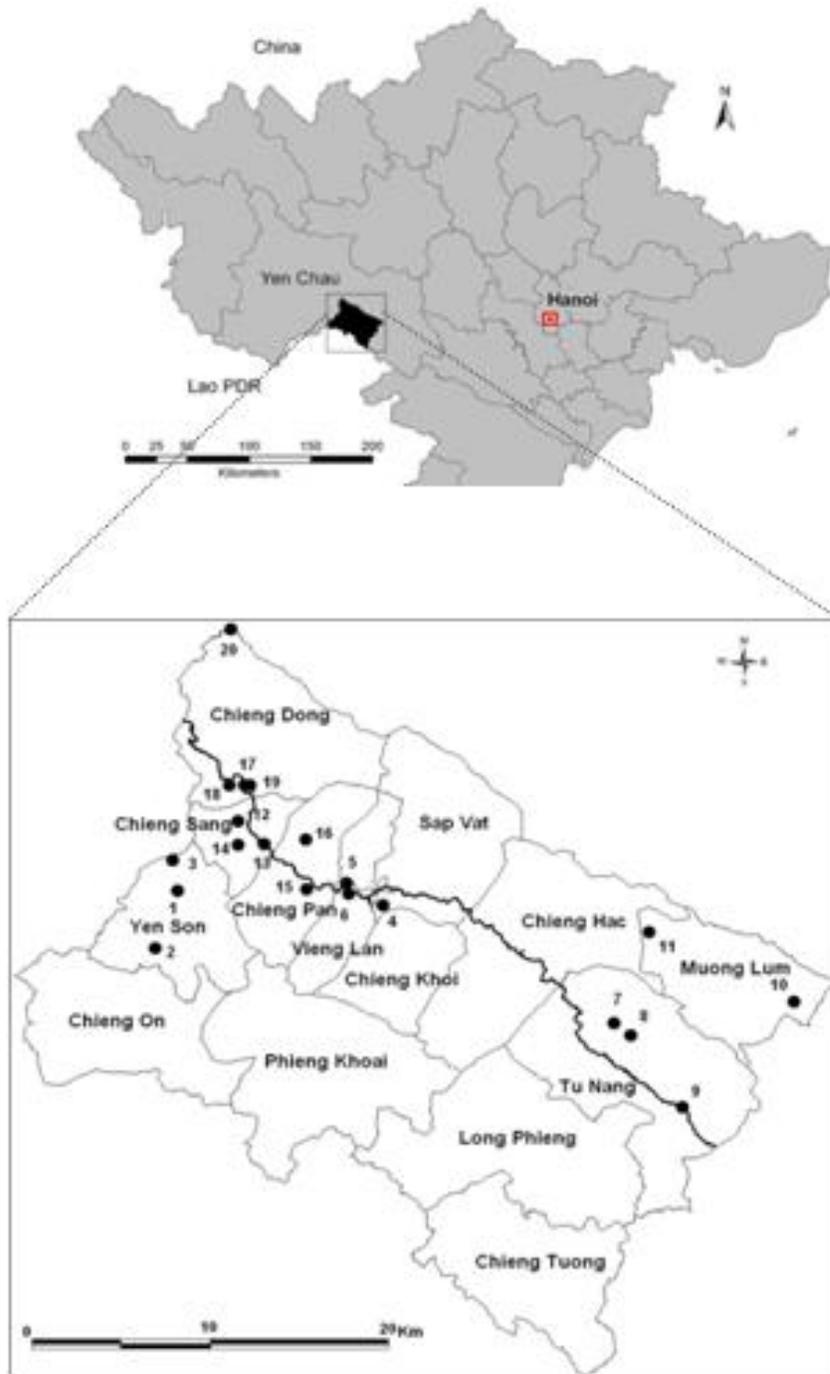
Code 3:

- 1 = taking out an agricultural loan from a formal source for all inputs for maize (such as VBSP, VBARD)
- 2 = taking out an agricultural loan from an informal source for all inputs for maize
- 3 = applying more fertilizers
- 4 = applying more inputs, excluding fertilizers
- 5 = using high-yield varieties

6.17 DECISION-MAKING POWER

Explain each category of decision making (sole, main and joint) and give an example for each.		Sole decision maker: no need to discuss/have agreement with others	Main or dominant decision maker: others may be involved but the decision-making process is dominated by you	Joint decision maker: you are involved in the decision and you nor others have a dominant position in decisions.	
Decision making within HHs		1.2.1 Are you the only person who makes decisions for (source)? 1 = Yes >> next source 2 = No 3 = Not applicable/none of source >> next source	1.2.2 Are you the main decision maker, for [source]? 1 = Yes >> next source 2 = No	1.2.3 Do you make decisions jointly about [source] with others? 1 = Yes 2 = No >> next source	1.2.4 With whom do you make joint decisions with in your HH for [source]? 1 = male head/spouse 2 = female head/spouse 3 = son 4 = daughter 5 = other (specify) _____
1	Keeping track of family finances				
2	Savings				
3	Taking out a cash or in-kind loan greater or equal to 2 million VND, excl. in-kind input loans				
4	Repaying [above]				
5	Taking out an in-kind input loan greater or equal to 2 million VND				
6	Repaying [above]				
7	Taking out a cash/in-kind loan over 200,000 & up to 2 million VND				
8	Repaying [above]				
9	Taking out a cash/in-kind loan between 10,000 and 200,000 VND				
10	Repaying [above]				

6.18 MAP OF YEN CHAU



Source: Taken from Saint-Macary, C. 2011. Microeconomic impacts of institutional transformation in Vietnam's Northern Uplands: Empirical studies on social capital, land and credit institutions. Ph.D. Dissertation. University of Hohenheim. Stuttgart, Germany.

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PUBLICATIONS

Nielsen, T., Keil, A., Zeller, M. 2013. Assessing farmers' risk preferences and their determinants in a marginal upland area of Vietnam: A comparison of multiple elicitation techniques. *Agricultural Economics*. 44(5).

Nielsen, T. (2013). Consumer buying behavior of genetically modified fries in Germany. *Journal of Food Products Marketing*, Vol. 19(1): 41-53.

ORAL PRESENTATIONS AT CONFERENCES (SELECTIONS OF)

Nielsen, T., Zeller, M., 2013. The impact of idiosyncratic and covariate shocks on changes in risk preferences between the lean and harvest seasons for smallholder farmers in Vietnam. DIAL Development Conference "Institutions and Development". University of Paris-Dauphine, France.

Nielsen, T., 2012. Determinants of women's intra-household bargaining power in savings and credit decisions in northwestern Vietnam. PhD Conference on International Development. Ruhr-University Bochum, Germany.

Nielsen, T., Keil, A., and Zeller, M., 2012. Determinants of smallholder farmers' risk preferences in Vietnam. 52nd Annual Conference of the German Society of Economic and Social Sciences in Agriculture (GEWISOLA). University of Hohenheim, Stuttgart, Germany.

Nielsen, T., 2012. How do concerns about pesticides impact consumer willingness to buy genetically modified French fries in Germany? Results from a purchasing experiment. 6th International European Forum on System Dynamics and Innovation in Food Networks, Innsbruck-Igls, Austria.

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AUTHOR'S DECLARATION

I hereby declare that this doctoral thesis is a result of my own work and that no other than the indicated aids have been used for its completion. All quotations and statements that have been used are indicated. Furthermore, I assure that the work has not been used, neither completely nor in parts, for achieving any other academic degree.

Stuttgart, 2013

Thea Nielsen