Chapter **9**

Risk Preference of Managers and Firm Investments in Lao PDR

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While there have been numerous micro-econometric studies on risk and poverty in rural developing economies, there have only been a few studies of business risks arising from volatile input and output prices and weak enforcement of contracts. In this paper, we aim to bridge this gap in the literature by analysing a unique survey and experiment data from textile and garment firms in Lao PDR, collected exclusively for this study. To investigate the role of risk preferences of firm managers on a variety of firm investment decisions, we elicit measures of managers' risk preferences through experiments. We find that firms with risk averse managers are more likely to self-finance investments than to borrow from banks or informal sources, leading to lower overall asset levels. A risk averse firm manger is more likely to face binding "self-inflicted" borrowing constraints on additional investments. However, our results also indicate that risk averse managers invest more in their factories' safety measures against fires and injuries. We also examine the association between risk preferences of managers and adoption of management practices. While the results are not statistically significant, we find that risk tolerant managers are more likely to have adopted better practices and to have achieved employment stability.

1. Introduction

Studies on developing countries have documented that many medium, small and micro enterprises often fail to implement the optimal level of investments (Kremer, *et al.*, 2013). It would be natural to attribute the observed sub-optimality of investments to firm decision-makers' attitudes toward risk. While there have been numerous micro-econometric studies on risk and poverty in rural developing economies, there have been few empirical studies of business risks arising from volatile input and output prices and weak enforcement of contracts (Fafchamps, 2003). Hardly any studies investigated risk attitudes of firm managers in developing counties. Two exceptions known to us are studies by Kremer *et al.* (2013) and Pattillo and Soderbom (2000), both finding that firms with risk tolerant owners make more investments and grow faster than those with risk averse managers.

In this paper, we aim to fill this gap in the literature by analysing a unique survey and experiment data from textile and garment firms in Lao PDR, collected exclusively for this study. Our analysis has two novelties. First, we examine the nexus between firm managers' risk attitude measures elicited by experiments and a variety of their decisions including choices of financing investments and adoption of different production safety measures. Indeed, in his seminal field experiment, Binswanger (1980) pointed out that risk preference differences are important because policymakers may be able to do something about hindrances to the access of capital, but may be able to do less about the risk attitudes of those whom easier access to capital would help (Cardenas and Carpenter, 2008). We believe we can contribute to the literature by investigating associations between risk preference of managers and a variety of investment decisions that firms make.

Secondly, since the textile and garment sectors are the leading sectors of Lao PDR in generating export revenues and job opportunities, identifying binding constraints on growth in these sectors is critical for designing and implementing better development policies for the country. In this context, it is indispensable to understand individual firm managers' decisions.

To preview our analysis and empirical results, we elicit three measures of risk preference in small and medium garment and textile firms in Vientiane: 1)

small-stake price list risk experiment with monetary rewards, 2) hypothetical price-list risk experiment with large stake, and 3) hypothetical real-world risky investment decisions. We first examine how these measures are associated with firm characteristics. We find that the first measure, the small-stake price list experiment with monetary rewards, is correlated significantly with the second measure, the hypothetical question with large-stake, but is not consistent with the third measure, the investment choice question. The third measure, however, seems to be strongly associated with the firm's actual investments in the last year, implying that this measure is not suitable for use as a yardstick of manager's underlying preference.

As the main part of this study, we investigate how risk preference, measured by the experiment with real monetary reward, is associated with various firm investment decisions and performance measures. We find that, to finance investments, firms with risk averse managers tend to use their own assets or retained earnings rather than borrow from banks or informal sources. Moreover, the overall investment amount of firms with risk averse managers tends to be lower than that of firms with risk tolerant managers. However, risk averse managers tend to invest more in factory safety measures such as fire exits and alarms.

We then investigate whether risk preference of managers affects adoption of modern style management practices, workers' turnover rate and firm growth. These investigations are motivated by the fact that, in the study region, 60 percent of the firms in our study pointed to "labour (unstable workforce, frequent turnover, worker shortage)" as one of the main problems (Table 9.A.1). Our estimation finds negative correlation between risk-aversion and adoption of better management practices, although the correlation is not statistically significant. We also find that firms with risk tolerant managers tend to grow faster and achieve lower workers' turnover rates, although these results are not necessarily statistically significant.

The rest of this paper is made up of five sections. In Section 2, we describe our survey, experiments and data set. In Section 3 and 4, we show empirical results on the determinants of risk measures and regression results on various investment decisions, respectively. In Section 5, we present our concluding remarks.

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2. Data and Descriptive Statistics

We use data from a survey of textile and garment firms in the Vientiane district of Lao PDR, designed by the authors and carried out from January to April 2014. The survey targeted all existing and known Lao national or Thai investment firms in the textile and garment industries in Vientiane. For constructing the population database, we used association directories provided by the industry associations in the garment and textile sectors. As to the garment sector, we employed the directory of garment firms provided by the Garment Manufacturing Association. Since the directory includes not only the association's members but also non-member small garment firms, typically subcontracting to the larger garment firms, we believe that the directory provides us with reliable information about all garment factories in Vientiane. On the other hand, the directory of textile firms is composed only of the members of the Textile and Handicraft Association and non-member information is missing. To complete the list of textile firms, we collected additional information through the following procedure. First, we visited local government offices in three large sub-districts (villages) in Vientiane, i.e., Chanthabuly, Sikhottabong and Xaythany, to gather information on the locations of textile clusters within each village, with up to three clusters in each village. We then visited the representative of each sub-village, obtaining information on the location of textile firms. This helped us to find an additional 30 textile firms not included in the directory.

Through initial phone calls, we confirmed that 63 textile and 45 garment firms on the list were operational. By the end of April 2014, we had successfully interviewed 43 textile and 35 garment firm managers, achieving a response rate of 72 percent. In the surveys with each firm manager, we employed a set of structured questions, which was carefully designed for this study. The questionnaire is composed of eight main modules: Module A) "firm and plant basics" on basic characteristics of each firm; Module B) "Production, sales, costs, and assets" on basic data of firm operation; Module C) "Export and marketing" on export, subcontract, and marketing; Module D) "Decision makers in production process" on management decision makers; Module E) "management" on management practices; Module F) "Workplace" on workplace environment; Module G) "Opportunities and Constraints" on

subjective assessments of the opportunities and constraints faced by each firm; Module H) "Uncertainties for plant." We then undertook experiments and subjective questions to elicit the risk attitude of each firm's manager.

We measured risk preference of managers in three ways. First, we carried out a small-stake price list risk experiment with real monetary rewards by asking that "in this experiment, we want to provide you with a small amount of money. You have two options for receiving this money. Which option do you prefer? Option A) receive \$10 for sure, or Option B) toss a coin, and receive \$40 if the coin is head and receive nothing if the coin is tail." The risk tolerant managers in this experiment are defined as the ones opting for the coin toss, i.e., those who choose Option B. Adopting the von Neumann and Morgenstern axioms of a utility function, we can employ the expected utility maximisation framework. For this experiment, those managers who select Option B should satisfy the following condition: $10^{1-\alpha} < 0.5*40^{1-\alpha}$, where α represents the coefficient of relative risk aversion. This inequality is equivalent to the situation where the relative risk aversion coefficient in a constant relative risk aversion (CRRA) utility is greater than 0.5.

Secondly, we conducted hypothetical price-list experiment with large stake to complement the above measure. The question asked was as follows: "If you were to choose between the following two options, which option would you chose? A) receive \$10,000 for sure, B) toss a coin, and receive \$40,000 for sure if the coin is head, and receive nothing if the coin is tail." As before, we defined the risk tolerant dummy for Option B, where the relative risk aversion coefficient is less than 0.5.

Finally, we asked hypothetical questions relevant to real-world risky investment. We first explained that "suppose you have a business opportunity to make an investment. If the business is successful, you receive \$100,000, but if the business is not successful, the investment amount is gone and you receive nothing. We assume that the business has a one in two chance, i.e., a 50 percent probability, of success." Then, we asked that "would you invest if the investment cost is X?" for each X in \$10,000; \$20,000; \$30,000; \$40,000; and \$50,000. The maximum investment cost the respondent is willing to pay for the particular investment opportunity represents the level of risk tolerance. For this intuition, we define the risk tolerance measure from this question by dividing the maximum of X by \$100,000 for normalisation.

In some firms, we could not interview the firm manager but only the general manager or shipping manager, who typically is not responsible for all of the firm's production decisions. As risk measures from these respondents are less likely to be influential than those of the firm managers, we omitted these observations from the sample for analysis. In the final sample, we had 61 responses from firm managers. Fifty-five of these managers were also the owners of the firm and six of them were managers employed by the firm owner.

Our measure on management practices is obtained from a series of closed form questions on adoption of practices often considered to be best practices in the United States and Japan. The questions are mostly the same as the survey in Indian textile firms carried out by Bloom *et al.* (2013) and US Census of Management and Organizational Survey. We asked questions in five areas: monitoring and target, quality control, machine maintenance, information technology usage, and human resources management. We then scored answers for each question and created a standardised score for each area. The overall management score is defined as the average of the scores in all areas.

Descriptive Statistics

Table 9.1 shows descriptive statistics of the main variables. In our data, 59 percent of our respondents are textile factories and the remaining 41 percent are in the garment industry. First, we consider at managers' basic characteristics. Managers are largely well educated, with an average of 11.38 years of education. More than 70 percent of the firm managers are female and average tenure is more than ten years. As to the basic firm characteristics, an average firm owns assets worth USD 29,354, excluding land value, and has an average 49.67 workers. While there is no increasing trend in the number of workers, worker turnover rate has been quite high—according to our data, on average, firms have a 17 percent worker turnover rate per year. In the hypothetical question of financing USD 10,000 investments, 26 percent of firms reported that managers face difficulties trying to finance such an investment.

As we can see from the latter half of Table 9.1, measures of risk tolerance show reasonable variation. About 30 to 40 percent of firms are categorised as risk tolerant according to these measures. The degree of credit constraint is

measured by a question: "suppose you receive a new order which requires additional investment of $10,000. Would you have any source to fund this investment?" We created an indicator variable for credit constraint taking the value of one if the manager answered "no source" to this question.

Table 9.1: Descriptive Statistics

	Mean	Standard error	N
Basic characteristics			
Textile firm dummy	0.59	0.50	61
Years of education of manager	11.38	3.68	61
Tenure of manager	10.83	7.42	60
Female manager	0.72	0.45	61
Asset value in USD (excluding land)	29354	67597	61
Employment size	49.67	103.48	61
Employment growth rate	-0.14	0.34	61
Turnover rate	0.17	0.30	59
Credit constraint	0.26	0.44	61
(No source to fund investment of $10,000)			
Risk preference			
Risk tolerant manager (Coin experiment)	0.39	0.49	61
Risk tolerant manger (Coin hypothetical)	0.34	0.48	61
Risk tolerant manager (Investment hypothetical)	0.43	0.23	61

3. Determinants of Risk Measures

In this section, we first examine how the three risk-preference measures are related to each other. Based on a canonical theoretical framework, we simply assume that an answer to the coin toss price-list experiment represents a deep parameter of firm manager's risk preference. We then consider how the deep risk preference, measured by the coin experiment, as well as other firm and individual factors, influence answers to the hypothetical risk questions of the coin toss and the hypothetical real-world investment question.

The first three columns of Table 9.2 show the results of ordinary least squares (OLS) regressions of risk tolerance measure from the hypothetical coin game on experiment measure with real money reward controlling for manager and firm characteristics. All of the coefficients on risk tolerance are highly positive and statistically significant. Inclusion of various firm and manager characteristics influences neither the level nor the significance of the coefficients of risk tolerance. The influence of covariates like manager's gender and tenure are found to be insignificant.

The third to sixth columns of Table 9.2 present the results of using a risk measure based on a hypothetical risky investment choice as a dependent variable. First, risk tolerance deduced from the investment question is positively associated with risk tolerance deduced from the coin game, but the magnitudes of estimated coefficients are small and they tend to be insignificant as we add more control variables. Second, risk measure deduced from the investment question is highly significantly associated with manager's tenure (number of years in the current position). Interpreting this result, it is worthwhile to note that the payoff of risky investment is fixed for every respondent. Therefore, in theory, having more experience and knowledge of how to change the payoff in real investment settings should not affect the choice of investment. This does not, however, eliminate a possibility that more experienced managers know better how to cope with the realised shock. In other words, each manager's response to the investment question might have reflected that manager's past experience of coping with the shocks his/her real business experienced. Third, the last column indicates that preference on riskier investment is positive and significantly (at 10 percent) associated with the

actual recent investment (log of investment in over the last year +1). A possible interpretation of this result is that the investment question lets the manager consider how she/he reacted to such investment opportunities in recent years. Another interpretation, of course, is that preference on risky investment affects the real investment decisions. But if this is the case, we should also observe positive association between choice of risky investment and asset as a long-run outcome. We tested this conjecture using the asset data, finding that choices on risky investment are uncorrelated with higher asset level.

Table 9.2: Determinants of Risk Measures based on Hypothetical Questions

OLS	Risk tolerant (hypothetical coin toss game with large stake)			Risk tolerant (hypothetical investment question)		
Risk tolerant manager	0.875***	0.862***	0.855***	0.109*	0.0771	0.0898
(Money reward)	(0.0686)	(0.0751)	(0.0769)	(0.0583)	(0.0590)	(0.0557)
Tenure		-0.00242	-0.00113		0.00957**	0.00836**
		(0.00300)	(0.00250)		(0.00391)	(0.00374)
Female		0.133	0.120		0.0470	0.0363
		(0.0936)	(0.110)		(0.0926)	(0.0889)
Education		0.00281	0.00420		0.00375	0.00953
		(0.00627)	(0.00783)		(0.00801)	(0.00906)
Credit constraint		-0.0328	-0.0254		0.00571	-0.00717
		(0.0690)	(0.0706)		(0.0680)	(0.0660)
Log(investment Over last year)			-0.0105			0.0155**
			(0.0123)			(0.00731)
Log(employment Last year)			-0.0260			-0.0132
			(0.0537)			(0.0299)
N. obs.	61	61	61	61	61	61

Notes: textile dummy and manager's years of education, tenure, and gender are controlled in all regressions. Robust standard errors are shown in parentheses.

4. Risk Preference and Firm Performance

In this section, we report the main results of our econometric analysis. We first estimate the empirical model of manager's risk attitude and choice of investment financing sources. We then show the results of decisions on a variety of investments in equipment, safety measures, management practices, and human resources.

4.1. Financing Investments

In Table 9.3, we show estimated regression results on the determinants of investment financing sources. In this table, dependent variables are dummy variables constructed from the survey question, "Suppose you received a new order, which requires additional investment of $10,000 within a month. Would you have any source to fund this investment, and if so what is the primary source?" The first to the sixth columns of the table show that firms with risk averse managers tend to use own assets or retained earnings to finance new investments instead of borrowing money from bank or informal sources. This indicates that firm manager's risk attitude is significantly related to the choice of investment financing. Presuming that there are natural limitations on self-financing new investments, a risk averse firm manager is more likely to face binding "self-inflicted" borrowing constraints on additional investments. In contrast, the last three columns indicate that having no source is not associated with risk preference of the firm managers, indicating that there is no systematic relationship between a manager's risk attitude and exogenously imposed credit constraints.

Table 9.3: Risk Preference and Investment Sources

OLS	Invest from private asset or retained earning			Invest from bank or informal sources			No source of investment		
Risk adverse manager	0.266*	0.277*	0.280*	-0.329***	-0.315***	-0.316***	0.0630	0.0380	0.0357
	(0.151)	(0.157)	(0.160)	(0.114)	(0.112)	(0.114)	(0.141)	(0.148)	(0.150)
Years of education	0.0117	0.0222	0.00354	0.00209	-0.00561	0.000981	-0.0138	-0.0166	-0.00452
	(0.0198)	(0.0209)	(0.0218)	(0.0120)	(0.0139)	(0.0138)	(0.0170)	(0.0185)	(0.0197)
Years of experience	-0.00964	-0.00833	-0.0120	0.00860	0.00543	0.00674	0.00103	0.00290	0.00530
	(0.0103)	(0.0128)	(0.0111)	(0.00685)	(0.00827)	(0.00829)	(0.00994)	(0.0123)	(0.0111)
Female	0.199	0.209	0.220	-0.0915	-0.130	-0.134	-0.108	-0.0788	-0.0863
	(0.181)	(0.191)	(0.185)	(0.150)	(0.152)	(0.152)	(0.167)	(0.162)	(0.165)
Family owned	-0.123	-0.0912	-0.0474	0.189	0.0187	0.00328	-0.0651	0.0725	0.0442
	(0.261)	(0.300)	(0.282)	(0.208)	(0.248)	(0.237)	(0.178)	(0.220)	(0.239)
Textile dummy	0.213	0.142	0.223	-0.426***	-0.379***	-0.408***	0.213	0.237	0.184
	(0.162)	(0.184)	(0.168)	(0.119)	(0.136)	(0.135)	(0.165)	(0.170)	(0.163)
Thai investment	0.304	0.284	-0.0128	-0.477***	-0.806***	-0.701***	0.173	0.521	0.714**
	(0.293)	(0.428)	(0.406)	(0.158)	(0.197)	(0.202)	(0.309)	(0.325)	(0.328)
Log employment			0.141*			-0.0497			-0.0910
			(0.0782)			(0.0537)			(0.0813)
District FE	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
N. obs.	61	61	61	61	61	61	61	61	61

Notes: Risk adverse is measured as 1- risk tolerant using an experiment with monetary reward. Dependent variables are dummy variables constructed from an answer to a question "Suppose you received a new order, which requires additional investment of $10,000 within a month. Would you have any source to fund this investment, and if so what is the primary source?". Robust standard errors are shown in parentheses.

4.2. Firm Investments

In terms of the amount of investment, firms with risk averse managers tend to invest less in equipment, as shown in Table 9.4. Yet, the standard errors are large, making these estimated coefficients statistically insignificant. Since differential impacts of risk preference are expected by industry and type of equipment, i.e., textile firms using weaving machines and garment firms using sewing machines, we separately estimate the coefficients of risk aversion by industry. The results are reported in the third and fourth columns of Table 9.4. According to the results, an influence of risk aversion tends to be more negative and significant in the textile industry than that in the garment sector.

Contrary to the results on the general equipment investment, firms with risk averse managers tend to invest more on fire safety measures. In the fourth to eighth columns of Table 9.5, we show empirical results with the number of fire safety measures as the dependent variable. For example, this safety measure takes on five when the firm has fire exits, fire hoses, fire alarms, and route maps, and practices fire drills. The estimated coefficient implies that risk averse firm managers tend to have 0.23 more fire safety measures compared with their risk-tolerant counterparts. Moreover, in the last specification, we can see that this risk aversion effect on safety measures is strong in the textile industry.

Table 9.4: Risk Preference and Investment on Equipment and Fire Safety Measures

OLS	Log (value of equipment)				Number of fire safety measures			
Risk adverse manager	-0.391	-0.378			0.231	0.234*		
	(0.422)	(0.278)			(0.145)	(0.139)		
Risk adverse manager x Textile			-0.646*	-0.495			0.246	0.328*
			(0.379)	(0.393)			(0.150)	(0.164)
Risk adverse manager x Garment			0.0626	0.0757			0.214	0.171
			(0.422)	(0.459)			(0.273)	(0.249)
Years of education	0.160***	0.0324	0.0392	0.0347	0.0534**	0.0221	0.0217	0.00941
	(0.0502)	(0.0460)	(0.0491)	(0.0519)	(0.0241)	(0.0287)	(0.0284)	(0.0258)
Years of experience	0.0645	0.0430*	0.0389*	0.0391	0.0139	0.00859	0.00878	-0.00195
	(0.0409)	(0.0228)	(0.0230)	(0.0283)	(0.0125)	(0.00927)	(0.00969)	(0.0126)
Female	-0.321	-0.206	-0.173	-0.318	0.658***	0.687***	0.685***	0.626**
	(0.491)	(0.330)	(0.338)	(0.342)	(0.244)	(0.244)	(0.245)	(0.234)
Family owned	-0.691	-0.292	-0.510	-0.985	-0.0812	0.0173	0.0271	-0.0863
	(0.868)	(0.642)	(0.644)	(0.670)	(0.487)	(0.472)	(0.466)	(0.333)
Textile dummy	-1.830***	-1.249***	-0.826	-0.831	-1.308***	-1.165***	-1.184***	-1.031***
	(0.443)	(0.334)	(0.587)	(0.616)	(0.222)	(0.245)	(0.308)	(0.283)
Thai investment	1.862**	-0.212	-0.266	-0.740	1.844*	1.332	1.335	0.916
	(0.741)	(0.529)	(0.515)	(0.760)	(0.993)	(0.969)	(0.982)	(0.871)
Log employment		1.003***	0.976***	0.976***		0.247**	0.248**	0.243***
		(0.147)	(0.143)	(0.154)		(0.110)	(0.108)	(0.0833)
District FE	No	No	No	Yes	No	No	No	Yes
N. obs.	61	61	61	61	61	61	61	61

Notes: Risk adverse is measured as 1- risk tolerant using an experiment with monetary reward. Robust standard errors are shown in parentheses.

4.3. Management Practices

We then analyse the association of risk preference and firm management practices, turnover rate, and employment growth. As shown in Table 9.5, although all of the coefficients of risk aversion are insignificant, we still see some qualitative patterns that are worth investigating in future research. On firm management practices, the results indicate that risk averse managers are less likely to have adopted modern style management practices. This could be a result of the fact that the adoption of new practices requires trial and error, which can be regarded as risky investment.

As evident from the fourth to the last column of Table 9.5, risk averse managers are more likely to be suffering from a high turnover rate and lower employment growth. While their estimated coefficients are statistically insignificant, these qualitative features might be related to the lower rate of adoption of better management practices among the risk averse firm managers, which generates constraints in employing and retaining workers.

Table 9.5: Risk Preference, Management Practices, Turnover, and Firm Growth

OLS	Management score			Worker turnover rate			Employment growth		
Risk adverse manager	-0.110	-0.103	-0.106	0.0941	0.0825	0.0775	-0.110	-0.108	-0.118
	(0.256)	(0.202)	(0.224)	(0.0900)	(0.0799)	(0.0855)	(0.114)	(0.106)	(0.113)
Years of education	0.0966**	0.0319	0.0179	-0.00588	0.00486	0.0110	0.00223	-0.0126	-0.0154
	(0.0368)	(0.0339)	(0.0362)	(0.00752)	(0.0121)	(0.0147)	(0.0116)	(0.0140)	(0.0146)
Years of experience	-0.00227	-0.0132	-0.0216	-0.00103	8.64e-05	0.00167	-0.00377	-0.00628	-0.00811
	(0.0191)	(0.0112)	(0.0140)	(0.00931)	(0.00811)	(0.00904)	(0.00770)	(0.00631)	(0.00815)
Female	-0.306	-0.248	-0.270	0.0770	0.0519	0.0655	0.226*	0.239*	0.249*
	(0.331)	(0.224)	(0.231)	(0.0785)	(0.0584)	(0.0615)	(0.123)	(0.124)	(0.140)
Family owned	-0.955**	-0.751**	-0.771	-0.0485	-0.114	-0.0730	0.208	0.255**	0.288*
	(0.390)	(0.358)	(0.484)	(0.0866)	(0.0986)	(0.112)	(0.129)	(0.114)	(0.171)
Textile dummy	-0.207	0.0883	0.176	0.0935	0.0641	0.0527	-0.0647	0.00293	0.0327
	(0.326)	(0.232)	(0.229)	(0.0866)	(0.0828)	(0.0815)	(0.118)	(0.134)	(0.142)
Thai investment	0.117	-0.939**	-0.947*	-0.0155	0.212	0.356	0.269	0.0276	-0.0135

	(0.511)	(0.419)	(0.485)	(0.0698)	(0.177)	(0.239)	(0.187)	(0.199)	(0.201)
Log employment		0.511***	0.519***		-0.0837	-0.0941		0.117*	0.117*
		(0.121)	(0.112)		(0.0648)	(0.0652)		(0.0602)	(0.0607)
District FE	No	No	Yes	No	No	Yes	No	No	Yes
N. obs.	61	61	61	59	59	59	61	61	61

Notes: Risk adverse is measured as 1- risk tolerant using an experiment with monetary reward. Robust standard errors are shown in parentheses.

5. Concluding Remarks

While previous studies have shown firm managers' risk preferences matter for investment in physical assets, the effect of managers' risk attitudes to the adoption of broader investments and management practices were largely unknown. In this study we aim to fill this gap in the literature by employing measures of management practices as well as a variety of measures of risk preference in Lao firms.

Testing for consistency among risk measures, we first found that answers to hypothetical investment questions are only weakly associated with risk preference measured from the coin toss game with real monetary reward and largely influenced by managers' tenure and recent investment cases. It is likely that, when firm managers are asked about choices on risky investment, they think back to how they behaved in such situations in recent years. Therefore, we decided to mainly use risk measures from experiments in the regression analysis.

We subsequently found that risk averse firms are more likely to use own assets and retained earnings to fund investments, rather than trying to obtain credit from banks or informal sources. These results suggest that, for risk averse managers, binding credit constraints for various investments arise not from a lack of access to credit markets but from self-inflicted borrowing constraints. This finding postulates a difficult policy question since policymakers can relax credit constraints by improving access to capital but may be able to do less about the self-inflicted credit constraints arising from risk aversion (Binswanger, 1980; Cardenas and Carpenter, 2008).

Our results also indicate that risk averse firms are equipped with lower levels of machinery capital, but with higher levels of fire safety measures. We also looked at how risk preference is associated with firm management practice and employment stability. While the results are not statistically significant, we found that risk tolerant firms tend to adopt better management practices, to increase employee numbers and achieve lower employee turnover rates.

Since the textile and garment sectors are Lao PDR's leading sectors in terms of generating export revenues and jobs, identifying binding constraints on growth in these sectors is critical for designing and implementing better development policies for the country. We believe the results of our studies have important policy implications in terms of the light they shed on individual firm managers' decisions. But our paper has an important caveat—the small number of observations. Because of the lack of statistical power, we cannot draw firm conclusions as to the statistical significance of the estimated parameters. This calls for future research to collect more data for a better understanding of the validity of risk measures.

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Appendix

Table 9.A.1. Source of the Most Significant Uncertainty for Profit

	Percentage
Weather (seasonality, rainfall, temperature, and etc.)	27.87
Labor situation (frequent worker turnover, unstable workforce, and etc.)	24.59
Foreign exchange rate	13.11
Consumer preference (change in trend, and etc.)	6.56
Government economic policies (tax, subsidies, regulations, and etc.)	8.2
Trade policies (licensing, tariff, and etc.)	1.64
Other	18.04

Appendix