The Right Amount of Income Variability: Evidence from Small Retailers in Vietnam*

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Abstract

Recent influential literature suggests that poverty by itself reduces cognitive capacity. We hypothesise that it is the income variability typically associated with poverty that impedes cognitive functioning of low-income people. To test this hypothesis, we experimentally induced thoughts about finances to a sample of small low-income retailers in Vietnam whose businesses are exposed to different levels of income variability. We found that cognitive performance in financial stressful situations is not affected by absolute poverty as measured by wealth or income. However, cognitive performance in financial stressful situations has an inverted U-shaped relationship with income variability. Being exposed to very low or very high income variability can be detrimental for cognitive capacity. There seems to be an optimal amount of income variability which potentiates the cognitive capacity of the retailers when they face financial stressful situations.

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1 Introduction

Most of the poor in the developing world are small entrepreneurs vulnerable to all sort of negative shocks and material constraints associated with lack of development. They spend most of their lives in the premises of their small businesses, coping with frequent income shocks, juggling expenses, and making difficult tradeoffs. Lack of access to formal credit or savings to smooth consumption worsen their realities and increases their financial vulnerability. As Banerjee and Duflo (2011) describe with several vivid case studies, "risk is a central fact of life for the poor, who often run small business or farms or work as casual laborers [...]. In such lives, a bad break can have disastrous consequences."

Evidence from psychology and neuroscience suggests that the human cognitive system has limited capacity (Luck and Vogel, 1997; Vohs, 2013). Entrepreneurs' preoccupations with pressing budgetary concerns and income variability can impair such limited capacity, leaving them with a reduced pool of mental resources to guide their decisions. In line of this view, Mani et al. (2013) argue in an influential paper that poverty can directly impede cognitive function. The authors test this hypothesis by experimentally inducing thoughts about finances to shoppers at a New Jersey mall. They found that this reduces cognitive performance among poor but not in well-off participants and present evidence that rules out explanations such as difference in time available, nutrition, work effort, or stress, concluding that it may be poverty *by itself* that reduces cognitive capacity.[1]

In this paper we go a step further and investigate a possible channel through which poverty can affect cognitive function. We hypothesise that it is the income variability typically associated with poverty that impedes cognitive functioning of low-income people. To test this hypothesis, we replicate Mani's et al. (2013) experimental design with a sample of low-income small retailers who are heterogenous with respect to the income variability they face in their businesses. We ran the experiment in their natural setting in a local market in Vietnam and we also administered a survey to gather detailed information about the business, income and wealth of the entrepreneur.

In the experiment, each retailer was presented with four hypothetical scenarios a few minutes apart. Each scenario described a financial problem the retailers might experience and required the retailer to think about how to solve the problem. By touching on monetary issues, the scenarios were meant to trigger thoughts about the retailers own finances. Retailers were randomly assigned either to a "hard" condition, in which the scenarios involved relatively high costs or to an "easy" condition, where costs were lower. The latter condition was expected to evoke low cognitive load in all the sample. In contrast, the large sums in the "hard" condition were hypothesized to evoke monetary concerns in the retailers

[1] In their experimental study, a poor (respectively a rich) person was defined as a participant whose income was below (respectively above) the median income of their sample of participants. According to the authors, the income distribution of their sample of participants provides a cross-section of the United States, the poor in their sample roughly corresponding to those in the lower quartile or third of the U.S. income distribution.

who face higher financial variability, but less in the rest. After viewing each scenario, and while thinking about how they might go about solving the problem, retailers performed two paper based tests to measure their cognitive function: Ravens Progressive Matrices and a Stroop test. Upon completion of these tests, retailers responded to the scenario and they would move on to the next scenario.

The experimental results suggest the existence of a link between income variability and cognitive performance. Specifically, we found that cognitive performance has an inverted U-shaped relationship with income variability in the "hard" condition but is not correlated with income variability in the "easy" condition. This points to the existence of an optimal degree of income variability. Retailers who are used to face some intermediate degree of fluctuations in their revenues reach the highest cognitive performance in our sample when they are confronted with financially stressful situations. Too much or too little income variability seems to be, however, detrimental for cognitive capacity. This result is in line with recent literature from psychology, which reports evidence that stressful environments in childhood do not universally impair mental functioning, but can actually enhance specific types of cognitive performance in the face of uncertainty (Mittal et al., 2015).

Moreover, we don't find an overall effect of the scenarios on the cognitive function of our sample of low-income retailers, irrespective of the measure of cognitive performance we use. This remains true even for the poorest retailers in our sample. This latter result is at odds with Mani's et al. (2013) results, who found that the cognitive performance of the poorer shoppers in the mall were significantly affected by the hard financial scenarios.[2]

The rest of the paper is organized as follows. Section 2 describes the sample and the experiment. Section 3 introduces the data collected. Section 4 analyzes the data and presents the results and Section 5 concludes.

2 Description of the Experiment

2.1 The Sample

The experiment was carried out in May 2015, in Tam Bac Market, Hai Phong, Vietnam. Tam Bac Market is one of the biggest markets in Hai Phong, with about 700 registered small shops concentrated within a sheltered area of approximately 2000 square meters.[3] These shops are typically small cubic areas with an average size of 4.5 sq. mts. (median of 3 sq mts). They are typically owned by one retailer each, with some exceptions in which one retailer owns more than one shop. The market offers a considerable variety of products and each shop specializes in some of them. The shops are quite homogenous with respect to customer base, size, supervision, tax base, rules, laws, ownership, marketing strategies,

[2]Given that the median household income in the sample used by Mani et al. (2013) was roughly US$ 70,000 and a lower bound of roughly US$ 20,000, all entrepreneurs in our sample would correspond to the poor population in Mani's et al. (2013) study.

[3]Appendix C shows some maps and images of the market

etc, which makes it a convenient sample for identification purposes and statistical power. At the same time, the shops are rather heterogenous with respect to revenues, profits and income variability, which makes these group suitable for our empirical approach.

We began our field study by contacting the head of the market who granted us permission to conduct the study and provided us with a map of the market, a booklet with the number of registered shops, their assortment and IDs.[4] Out of the 769 shops listed in the market, we randomly assigned 300 shops to two different treatments, 150 to a "hard" financial scenario and 150 to an "easy" financial scenario.[5] Randomization was done by computer. To reduce noise in the data, we used randomized block design, blocking the sample by shop size and type of product. To minimize possible communication between shop owners during the period in which the experiment was carried out, we divided the market into 10 areas, and ran the experiment in one area per day. In other words, we interviewed on the same day all the shops randomly selected within the geographic area. We also randomly assigned the 300 shops to six enumerators, stratifying by treatment.

Out of the 300 shops randomly assigned to the two treatments, 127 took part of our experiment. This was mainly due to the fact that the map obtained from the head of the market was outdated and many of the shops had closed or turned into storage places. We only learned this during our visits to the shops.

Table 1 (columns 1, 2 and 3) summarizes the characteristics of the shop owner who participated in our study and provides some descriptive statistics of their shops. The average shop owner in our sample is 47 years old and has been running his/her business for about 18 years. Most of them (93%) are female and 77% have no employees. Only 25% of shop owners have a bank account, about 91% own the premises of their shop and about 86% own a house. In average, they have monthly revenues (PPP equivalent) of US$ 6,347 (median US$ 2,757) and monthly profits of US$ 586, with an average profit margin of roughly 9%. Given that the median household income in the sample used by Mani et al. (2013) was roughly US$ 70,000 and a lower bound of roughly US$ 20,000, all entrepreneurs in our sample would correspond to the poor population in Mani's et al. (2013) study.[6] Our sample population, although poor, encompasses a diverse profits range, with the median shop profits at roughly US$ 367, a lower quartile of US$ 275 and an upper quartile of US$ 551.[7] The average entrepreneur in our sample has liabilities of about US$ 2,900 and the average market value of the businesses is estimated in US$18,905 (median of US$ 9,190). Moreover, the average entrepreneur does not seem to be liquidity constrained, at least to

[4] See Appendix C for the map and internal structure of the market.

[5] Section 2.2 describes these two treatments in detail.

[6] Mani et al. (2013) computed effective income by dividing household income by the square root of household size and defined "rich" and "poor" through a median split on this variable. Assuming that the average household size is 4 in the US, the effected income of the participant in the bottom of the income distribution of their sample is about US$ 10,000 and the median effective income is US$ 30,000.

[7] According to the World Bank national accounts data, the GDP per capita (current US$) of Vietnam between 2011-2015 is roughly US$ 2,052. Source: http://data.worldbank.org/country/vietnam).

finance working capital. For example, 90% of the entrepreneurs reported that they could borrow the amount of their monthly profits on a normal month in one week if they needed.

The last three columns of Table 1 compare the characteristics of the entrepreneurs and their firms assigned to the "hard" scenario with those assigned to the "easy" scenario. Firms were assigned to treatment randomly, so any differences between the treatment groups are purely due to chance. In general the randomization appears to have created groups that are comparable in terms of basic characteristics, with the only significant difference in means occurring for the years the firms were running, being the firms assigned to the easy treatment slightly younger than those assigned to the hard one. Our main specifications will include firm age as a control to improve precision and account for such chance differences between treatment groups.

2.2 The Experiment

We followed as close as possible the experimental protocol of the laboratory study in Mani et al. (2013) and in addition we collected detailed information on participants businesses, wealth and financial status.[8]

As mentioned before, the intervention consisted on inducing retailers to think about scenarios describing a financial situation they might encounter in their daily lives. We constructed these scenarios by adapting the scenarios in Mani et al. (2013) to the realities of the population of retailers in our study. To that end, we performed pilot interviews with retailers from a neighbour market with very similar characteristics of Tam Bac Market. The aim of these interviews was to understand what would be a natural "hard" or "easy" financial situation for these retailers. With this information we constructed eight financial scenarios. Four "hard" ones, intended to create a hypothetical financial burden for the entrepreneur, which was hypothesized to temporarily impede cognitive load depending on their actual financial situation. The other four scenarios, the "easy" ones, described the same hypothetical situation as the "hard" scenarios, but the sums in the easy condition were "small", hence we expected this condition to evoke few of monetary concerns. For example, in the pilot interviews we learned that almost all retailers had a motorbike and also got an estimate of how much would cost to buy a new bike and how much would be a financially feasible and natural reparation of the motorbike when it breaks down. With this information, we constructed hypothetical Scenario 1, that recreates the case in which a motorbike breaks down and the cost of fixing it is either VND 1 million (approx. US$ 92) in the "easy" scenario or VND 10 millions (approx. US$ 920) in the "hard" scenario. In general, each scenario depicted analogous situations to those used by Anandi et al. (2013), but adapted to the realities of these entrepreneurs. Appendix D.3 introduces each of the eight scenarios.

The sequence of the experimental intervention was as follows. The entrepreneur was

[8] Further details about these data and their measurement can be found in Section 3.

first informed about the general aim of the project. After signing the informed consent form, the entrepreneur was asked a series of general questions about their business and subsequently presented with the two practice trials of Raven's and Stroop's tests.[9] Only when they responded correctly to both trials they could start the experiment. Then, they were presented the hypothetical financial scenarios ("hard" or "easy" depending on which treatment the entrepreneur-shop pair was assigned to), and after listening to each scenario, the entrepreneur was given some time to process the information, think about its consequences and how he/she would go about solving it. During this time, the enumerator would hand out a set of 5 Raven's matrices and 20 trials of Stroop's test subsequently. Once the four scenarios were over and all the Raven's and Stroop's trials were completed, the entrepreneur was asked some additional questions about the business. The whole intervention lasted approximately 40 minutes, after which the shop owner received VND 50.000 (approx. US$ 2.3) as participation fee plus the money of the investment game they played to measure risk preferences (between 0 and VND 90.000). The average shop owner earned about VND 100.00 (approx. US$ 4.6).

3 Measurement of Main Variables

Our main dependent variable was cognitive performance, measured as performance in a Raven's and a Stroop's test. These two tests were also used by Mani et al. (2013) to measure cognitive performance.[10] The Raven test is commonly used to measure fluid intelligence, logical thinking capacity and problem solving ability in unfamiliar situations, independent of ones previously acquired knowledge (Carpenter, Just and Shell, 1990). Specifically for this experiment, we used the Standard Progressive Raven Matrices test (Raven and Court, 1998), which has in total 60 matrices, each consisting of a 3 x 3 matrix with the bottom right figure missing. Participants are asked to choose the correct figure, from a set of 8 candidate figures, which fits the overall pattern of the matrix. The Stroop's test is a popular neuropsychological test that uses speed and accuracy of response to measure working-memory capacity such as selective attention and cognitive flexibility (Kane and Engle, 2003). We used a numeric version of the traditional Stroop task, which is appropriate for participants with low literacy rates.

Due to time constraints, we used 20 Raven matrices out of the 60 matrices of the full test. To select the 20 matrices, we took a sample of retailers from a neighbour market with similar characteristics and asked the shop owners to solve the matrices. The aim was to learn the accuracy rate for each of the 60 matrices in our population. Then, we selected the 20 matrices that had an accuracy rate between 40-60% during the pilot. In this way we ensured that the matrices were not too difficult or too easy. There was no time limit in this task.

[9] Section 3 describes these to tests in detail.

[10] An example of a Raven matrix and the instructions of the Stroop test can be found in Appendix D.3.

Each Stroop trial consisted of 20 rounds where the interviewee was presented with a sequence of identical numbers (between 1 and 4) and they had to indicate how many numbers were shown on the screen. The task requires participants to respond quickly and often against their habitual impulse. For example, in a typical trial, participants would see 4 4 4 and have to quickly respond 3, which is the number of 4s in the sequence, rather than 4 that comes to mind most naturally. Both response speed and error rates were recorded.

On top of measuring cognitive performance by means of these two tests, we also administered a survey to gather detailed information about the business, income and wealth of the entrepreneur. We elicited revenues and profits by directly asking the entrepreneur the following question: "In a normal month, what are your business total sales (respectively profits)?".[11] We chose to use reported profits for our analysis following de Mel et al. (2008), who argue that they are the best measure of firm profitability. We also asked questions about the entrepreneur's wealth. For instance, we asked how much the market value of their business was, whether they had assets (properties, motorbikes, etc.) and whether they received income from other sources. Out of the total respondents, 85% reported owning the property they live in and 75% receiving income from a family member like spouse. Likewise, 91% of the entrepreneurs in our sample owns their shop premises, and reported that the market value of their business is in average US$ 18,900 roughly. The great majority of the respondents owns a motorbike (85%) and only 3,6 % owns a car. Finally, 65% of the entrepreneurs were currently covered by some kind of personal insurance.

As a proxy for income variability, we elicited revenues in a bad and a good month and computed the spread normalized by the revenue in a normal month. To elicit the extremes of the revenue distribution, we asked: "Every business experiences good and bad times with sales being high in one week and low in another. Regarding your own business, when you think of a very good (respectively very bad) month you had, how high (respectively low) did your total sales get?".

4 Estimation of Experimental Treatment Effects

We began studying how cognitive performance of the retailers in our sample is affected by the two different financial scenarios. Given that these retailers are poor, and according to Mani et al. (2013) poverty on its own is supposed to impede cognitive load, we expected that retailers exposed to the context of a financially "hard" condition performed significantly worse than those exposed to the scenario that generated relatively trivial financial concerns. We tested this hypothesis by estimating the following simple regression model:

$$Y_i = \alpha + \beta_1 \mathbf{T}_i + \delta' \mathbf{X}_i + \epsilon_i \tag{1}$$

[11] We explained that "by profits we mean the gains from business that remain after paying all business expenses, including salaries, rents, taxes, utilities, supplies, transportation, telephone charges, insurance etc."

where Y_i is a measure of individual performance in the Raven's or Stroop's test, $\mathbf{T}_i$ is a treatment dummy taking the value 1 for entrepreneurs assigned to the "hard" scenario and zero for those assigned to the "easy" scenario and $\mathbf{X}_i$ is a vector of individual characteristics (age and gender of the entrepreneur and the years he/she is in charge of the business). For each cognitive measure, we estimated equation 1 both with and without the individual controls. We included these controls because the two treatment groups are not balanced in those dimensions.

Estimates of equation 1 are presented in Table 2. Contrarily to what was expected, the (poor) retailers in our sample performed similarly in both scenarios, across all the three measures of cognitive performance. This is at odds with the results found by Mani et al. (2013) within the relatively poor population in New Jersey's mall. Their sample of "poor" did perform significantly worse in the "hard" condition than in the "easy" condition. The cognitive response of our sample was equivalent to that of the rich in Mani's et al. (2013) sample, i.e., the participants were uninfluenced by the scenarios.

One way to reconcile both results is to consider that the poor in the US have more preoccupations with pressing budgetary concerns than the poor retailers in Vietnam. Although the retailers are poorer in absolute monetary terms, they could have less monetary preoccupations than the poor shoppers in the US mall, who presumably are highly indebted and have higher material ambitions. Although Mani et al. (2013, p. 976) empirically define a poor person as someone with income below the median of their sample income distribution, they argue that their hypothesis is about how monetary concerns tax the cognitive system, so they define poverty broadly as the gap between ones needs and the resources available to fulfill them. This is based on subjective needs, so it is plausible that the monetary concerns of the low-income individuals in the developing world are lower than that of low-income individuals in the developed world and our sample is not then poor enough in this subjective sense.

To understand this further, we looked at the poorest of our retailers, to whom material preoccupations are more likely to bind regardless the culture, level of financial indebtedness or subjective needs. To that end, we split our sample of retailers in two sub-groups, the "poorest" and the "richest" within the retailers. The conjecture was that poorest retailers would perform equally well than the richest in the "easy" scenario, but worse in the "hard" scenario.

We defined the "poorest" and the "richest" by a median split on different dimensions, all proxies of wealth: size of the shop, revenues, profits and business market value. Tables 3, 4 and 5 show the cognitive performance for each of these groups across treatments and report the difference in performance and its corresponding p-value. Notably, we don't observe that the "poorest" retailers perform significantly worse in the hard condition than the "richest" retailers. This is true irrespectively of the dimension used to classify the poorest as sub-group (i.e. wealth, revenues, profits, etc) and regardless of the cognitive

measure we use (i.e. Raven's, Stroop time and Stroop mistakes). We do observe, however, that owners of big shops perform significantly better than owners of small shops in the Raven's test, particularly when they are exposed to the hard scenario. When we divide the sample according to monthly revenues, we see that owners of businesses with higher revenues perform better in the Raven's test than those with lower revenues in both scenarios, but this difference is only statistically significant in the "easy" condition. For the rest of the comparisons, we don't observe significant differences across groups or treatments in performance in the Stroop's test, except that owners of shops with low market value spend higher response time in the Stroop test, in particular in the "easy" scenario.

All in all, we could not replicate Mani's et al. (2013) results with our sample of small retailers in Vietnam, even when we used different ways of characterizing their income and wealth. One potential explanation can be that there is not enough income dispersion in our sample, not at least as high as it was in the sample of participants in the New Jersey shopping mall.[12] This argument could in principle explain the lack of treatment differences between the poorest and the richest in our sample, but yet it would not explain the lack of treatment differences within the whole sample. If poverty on its own impedes cognitive load, we should find that our sample of poor retailers perform worse under the "hard" than under the "easy" condition, as indeed happened within the poorest sub-sample of shoppers in New Jersey.

This takes us to the main hypothesis of this paper. We argue that it may not be poverty per se alone that affects cognitive load, but it is rather the variability of revenues that creates such load. While revenue variability may affect the poor more than the rich, it is neither a necessary nor a sufficient condition of poverty.

To test our conjecture that income variability matters for cognitive performance in the poor population, we split the sample of retailers by the median of our measure of revenue variability.[13] Table 6 shows the average performance of these two groups in the two different scenarios. As it can be seen, the owner of businesses with high variability of revenues performed significantly better in the "hard" scenario than in the "easy" scenario, and significantly better in the "hard" scenario than the owners of businesses with low variability of revenues. This result is in principle at odds with our initial expectations, as we would have expected that income variability would impose a cognitive load, rather than the opposite. In order to understand better this apparent puzzle, we estimated the following regression equation for each treatment group and each cognitive measure:

$$Y_i = \alpha + \beta_1 \mathbf{V}_i + \beta_2 \mathbf{V}_i^2 + \delta' \mathbf{X}_i + \epsilon_i \tag{2}$$

[12] Another alternative explanation could be that the scenarios were not effective enough. We performed pilot interviews precisely to avoid this. Moreover, an analysis of the responses to the scenarios suggests that that the hard condition indeed represented a realistic financial load, in contrast to the easy condition which seemed to be very inconsequential financially. We get back to this in the Section 5

[13] Recall that revenue variability is defined as the spread of revenues in a bad and a good month normalized by the revenue in a normal month.

where the regressor of interest $\mathbf{V}_i$ is the measure of revenue variability and $\mathbf{V}_i^2$ is the squared of the revenue variability. We estimated equation 2 for each scenario separately, both with and without entrepreneur-firm controls such as age of the business, market value of the business, size of the shop and monthly revenues in a normal month. By adding the squared term we relaxed the linear restriction implicitly assumed in the previous result. By controlling for the entrepreneur-firm characteristics, we minimized the omitted variable bias possibly present in the above means comparison results.

Results from regression equation 2 are reported in Table 7. Column 1 and 2 show the coefficient estimates and standard errors for the sub-sample assigned to the "easy" scenario, with and without controls respectively. None of the coefficient estimates are statistically distinguished from zero, suggesting that revenue variability does not play a role in explaining Raven's performance of the entrepreneurs assigned to the "easy" scenario. In contrast, as shown in columns 3 and 4, revenue variability plays an important significant role in explaining Raven's performance of the entrepreneurs assigned to the "hard" financial scenario. For the sub-sample assigned to the "hard" scenario, the coefficient of the linear term β_1 is positive and significant and the coefficient of the squared term, β_2, is negative and significant, indicating an inverted U-shaped relationship between revenue variability and Raven's performance in this group. The total effect of income variability on performance is $\beta_1 + 2\beta_2 V$ which of course depends on the level of revenue variability. Making $\beta_1 + 2\beta_2 V = 0$ and solving for V we find that the level at which the relationship has its turning point is $V^* = 1.28$, which can be interpreted as the optimal level of revenue variability in terms of cognitive functioning as measured by the Raven's test. Figures 1 and 2 illustrate this result.

5 Conclusion

Previous literature suggests that poverty *per se* reduces cognitive capacity. We experimentally investigate this relationship further in a sample of small low-income retailers in Vietnam whose businesses are exposed to all sort of vulnerabilities typical from the developing world.

We found that cognitive performance in financial stressful situations is not affected by absolute poverty as measured by wealth or income, but it has an inverted U-shaped relationship with income variability. Lack of monetary resources per se does not necessarily impose a cognitive load. However, being poor and being exposed to very low or very high income variability can be detrimental for cognitive capacity. There seems to be an optimal amount of income variability which potentiates the cognitive capacity of the retailers when they face financial stressful situations.

Our results, coupled with the results from previous literature, suggest that lack of material resources per se do not necessarily impede cognitive functioning. Instead, what seems to create the cognitive load is the subjective feeling of poverty together with the variability

of income. This is in line with Mullainathan and Shafir's (2013) approach, who argue that it is scarcity, defined as "having less than you feel you need" (p. 4), which impedes cognitive functioning. This can explain why low-income shoppers at the New Jersey mall in Mani et al. (2013) are cognitive loaded, while low-income retailers in Vietnam are not. Further research is needed to better understand the role of material and non-material aspirations on the way poverty affects cognitive load.

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Appendix

A Tables

Table 1: Descriptive Statistics and Verification of Randomization

Sample Characteristics	Number of observations	Full Sample		Means by treatment		Diff: Easy−Hard *p-value*
		Mean	SD	Hard Scenario	Easy Scenario	
Gender of entrepreneur (1=male)[b]	127	0.07	0.25	0.10	0.03	.12
Age of entrepreneur	127	47.23	10.07	46.56	47.96	.43
Age of firm (years)	127	18.14	8.09	16.77	19.66	.04
Size of shop (sq mts)	126	4.49	3.90	4.25	4.76	.46
Number of employees	127	0.33	0.78	0.39	0.28	.45
Proportion of firms that are registered	127	0.99	0.08	1	.98	.29
Revenues on a normal month (US$ PPP)[a]	127	6,347	21,271	8,916	3,479	.15
Profits on a normal month (US$ PPP)[a]	117	586.35	716.44	677.51	472.40	.12
Own the shop premises (1=Yes)[b]	126	0.91	0.28	0.94	0.88	.24
Market value of the shop (US$ PPP)[a]	108	18,905	28,035	20,696	16,581	.45
Income from other sources (1=Yes)[b]	124	0.75	0.42	0.76	0.75	.93
Own a house (1=Yes)[b]	126	0.86	0.06	0.89	0.81	.40
Has a bank account (1=Yes)[b]	126	0.26	0.44	0.25	0.27	.82
Current Loans (US$ PPP)[a]	125	2,892	10,085	3,810	1,832	.27
Liquidity in short notice	123	0.90	0.29	0.89	0.91	.77

Notes: Definition of variables: **Market value of the shop**:If you sold your shop today, how much it would be worth? **Income from other sources**: Do you and your family have an income besides that from your business? **Current Loans**: Total amount of loans currently holding. **Liquidity is not a problem**: Is it possible for you to borrow the amount of your profits on a normal month in one week (Yes=1, No=0)? [a] PPP conversion factor = 10,879.11 (source UNdata). [b] test of difference in means using χ (Pearson-Chi2) test because variable is dichotomous. The rest of the mean differences are checked using the `t-test`. *** significant at 1%, ** significant at 5%, * significant at 10%.

Table 2: Overall effect of financial burden on cognitive performance

Dependent Variable:	Ordinary Least Squares					
	Raven's test performance		Stroop test: time		Stroop test: mistakes	
	(1)	(2)	(3)	(4)	(5)	(6)
Scenario (Hard=1)	6.16	3.93	-0.604	0.457	-0.556	-0.428
	(4.316)	(4.32)	(1.315)	(1.306)	(0.410)	(0.372)
Constant	41.87***	50.27***	27.62***	22.53***	1.245***	0.531
	(3.108)	(6.253)	(0.875)	(1.851)	(0.388)	(0.467)
Firm and shop owner controls		✓		✓		✓
Observations	127	126	126	126	126	126
R-squared	0.01	0.05	0.001	0.109	0.01	0.03

Notes: Robust standard errors in parentheses. Columns (2), (4) and (6) include the following control variables gender, age of the business and size of the shop. *** significant at 1%, ** significant at 5%, * significant at 10%.

Table 3: Heterogeneous effects of the scenarios on cognitive functioning - Raven Test

Income and wealth dimensions		Raven's performance		Diff: Easy−Hard
		Hard Scenario	Easy Scenario	
Size of shop (sq mts)	Big	50.62	38.10	0.04**
	Small	44.21	47.09	0.62
	Diff: Big−Small	0.29	0.15	
Revenues on a normal month (US$ PPP)	High	50.00	43.35	0.25
	Low	45.62	40.17	0.40
	Diff: High−Low	0.47	0.61	
Profits on a normal month (US$ PPP)	High	51.95	50.96	0.88
	Low	43.75	34.37	0.10
	Diff: High−Low	0.18	0.01**	
Market value of the shop (US$ PPP)	High	51.50	47.44	0.58
	Low	45.31	41.25	0.51
	Diff: High−Low	0.32	0.39	

Notes: *** significant at 1%, ** significant at 5%, * significant at 10%.

Table 4: Heterogeneous effects of the scenarios on cognitive functioning - Stroop Test time

Income and wealth dimensions		Stroop's performance		Diff: Easy−Hard
		Hard Scenario	Easy Scenario	
Size of shop (sq mts)	Big	26.11	26.62	0.76
	Small	28.32	28.48	0.93
	Diff: Big−Small	0.27	0.29	
Revenues on a normal month (US$ PPP)	High	27.02	27.14	0.94
	Low	27.01	28.16	0.40
	Diff: High−Low	0.99	0.52	
Profits on a normal month (US$ PPP)	High	25.45	26.73	0.51
	Low	28.52	29.00	0.81
	Diff: High−Low	0.12	0.23	
Market value of the shop (US$ PPP)	High	26.44	25.47	0.68
	Low	27.59	29.07	0.41
	Diff: High−Low	0.59	0.06*	

Notes: *** significant at 1%, ** significant at 5%, * significant at 10%.

Table 5: Heterogeneous effects of the scenarios on cognitive functioning - Stroop Test mistakes

Income and wealth dimensions		Stroop's performance		Diff: Easy−Hard
		Hard Scenario	Easy Scenario	
Size of shop (sq mts)	Big	.80	1.45	0.30
	Small	.51	1.02	0.25
	Diff: Big−Small	0.28	0.59	
Revenues on a normal month (US$ PPP)	High	.66	1.24	0.31
	Low	.72	1.25	0.33
	Diff: High−Low	0.81	0.99	
Profits on a normal month (US$ PPP)	High	.58	1.44	0.20
	Low	.78	1.35	0.29
	Diff: High−Low	0.46	0.92	
Market value of the firm (US$ PPP)	High	.68	.97	0.61
	Low	.72	.83	0.77
	Diff: High−Low	0.90	0.61	

Notes: *** significant at 1%, ** significant at 5%, * significant at 10%.

Table 6: Effect of income variability on the impact of the scenarios on cognitive functioning - Raven's performance

Revenues dispersion		Raven's performance		Diff: Easy−Hard
		Hard Scenario	Easy Scenario	
Revenues Good - Revenues Bad]/Revenues Normal	Stable	42.23	43.75	0.80
	Unstable	53.67	39.58	0.01**
	Diff: Stable −Unstable	0.05*	0.50	

Notes: *** significant at 1%, ** significant at 5%, * significant at 10%.

Table 7: Effect of revenue variability on the impact of financial burden on Raven's performance

Ordinary Least Squares Dependent Variable: Raven's test performance				
	Easy Scenario		Hard Scenario	
	(1)	(2)	(3)	(4)
Revenue variability	2.17	11.46	72.10***	67.65***
	(20.22)	(24.97)	(20.83)	(21.57)
$(Revenue\ variability)^2$	-3.09	25.94	-27.31***	-26.32***
	(6.83)	(8.08)	(7.58)	(7.90)
Age of the firm (years)		-0.132		-0.28
		(0.46)		(0.47)
Market value of the firm		0.00		0.00*
		(0.00)		(0.00)
Size of shop		-.66		1.33
		(0.89)		(0.94)
Revenues on a normal month		0.00		-0.00
		(0.00)		(0.00)
Constant	39.73***	37.97	11.74	10.31
	(13.06)	(22.77)	(11.45)	(16.54)
Observations	60	46	67	61
R-squared	0.005	0.07	0.12	0.26

Notes: Robust standard errors in parentheses. *** significant at 1%, ** significant at 5%, * significant at 10%.

B Figures

B.1 Quadratic prediction plots

Figure 1: Hard Scenario

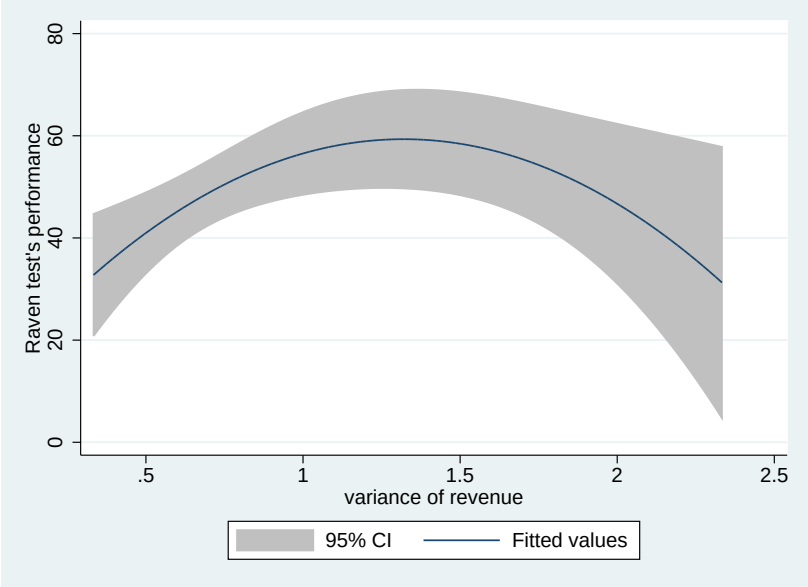
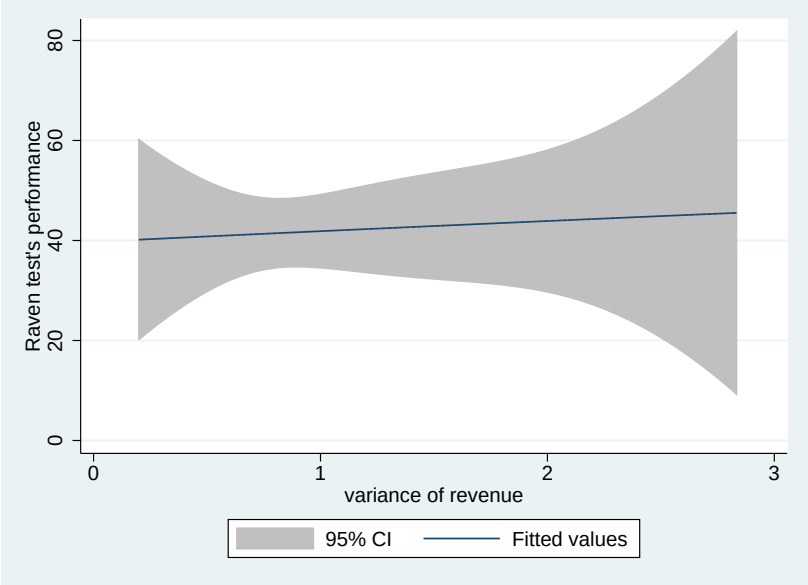


Figure 2: Easy Scenario



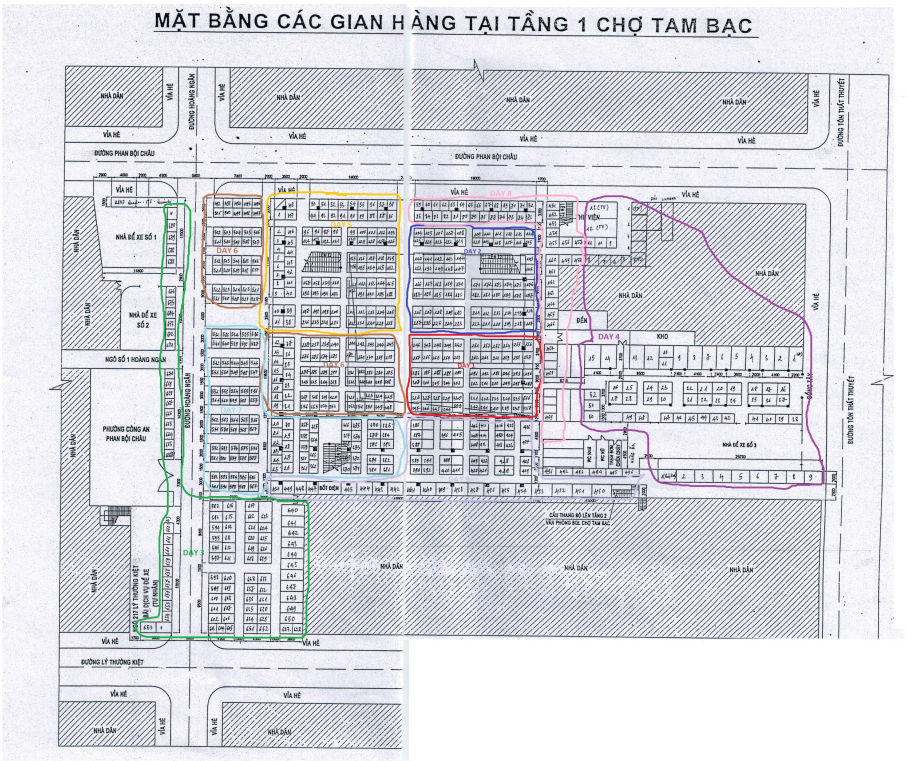
C The Tam Bac Market

C.1 Location

Figure 3: Hai Phong, Vietnam

C.2 Interior

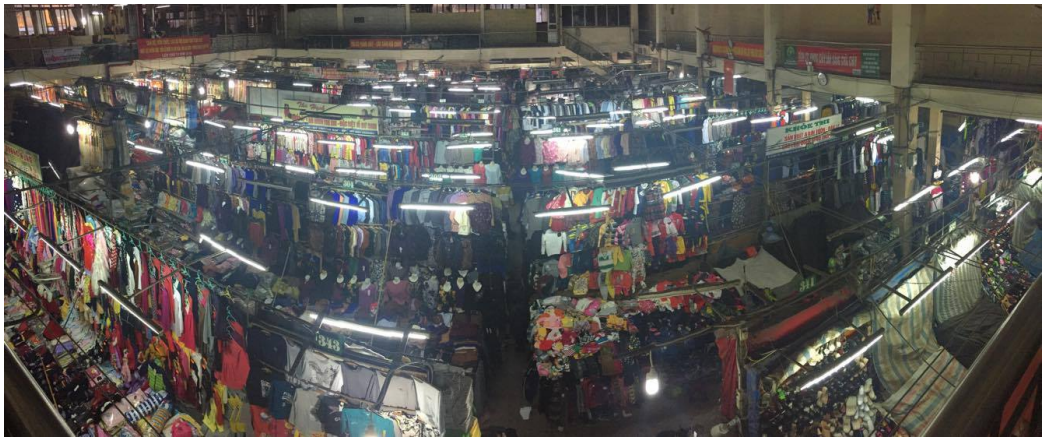
Figure 4: Map of the Market divided by areas



C.3 The Market in images

Figure 5: Entrance

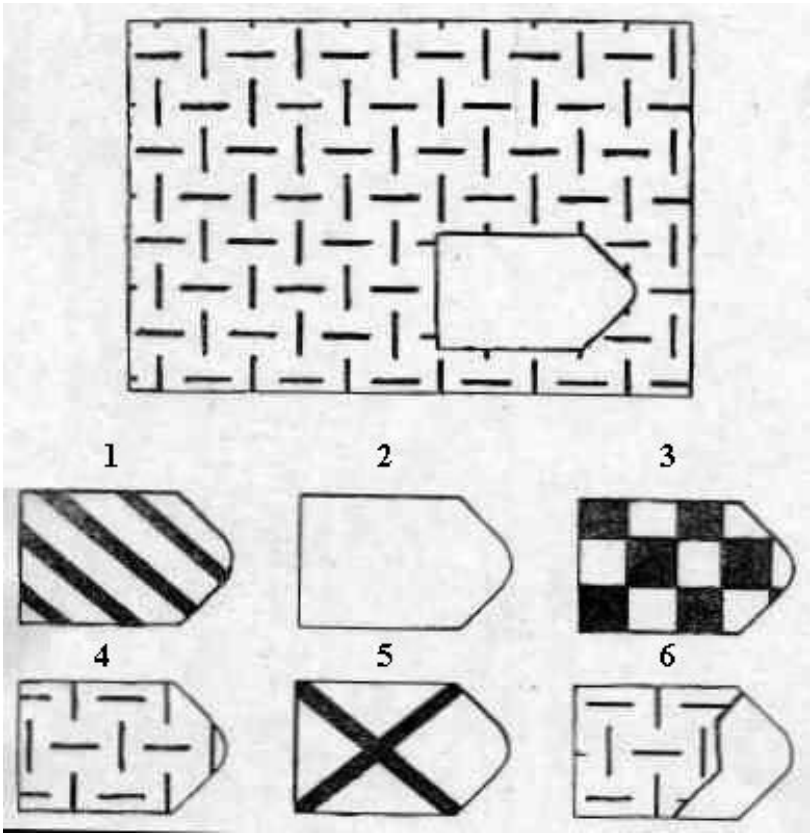
Figure 6: Inside



D Experimental Material

D.1 Raven Test

Figure 7: Example of a Raven trial



D.2 Stroop Test

The test was introduced as follows: *A random number with many digits will be displayed on the screen 20 times. Your task is to count the number of digits in each number press the number accordingly. The correct answer is the total number of digits you see on the screen and not the value of the digit. Note: the answer buttons are at the bottom of the screen.*

D.3 Hypothetical Scenarios

To adapt the financial scenarios used in Mani et al. (2013) to our sample population, we interviewed shop owners in a market similar to that were we carried out the experiment. The aim was to learn the type and extent of financial worries of the retailers. We took as benchmark the four scenarios used by Mani et al (2013) and ask the following questions: (1a) Can you think of any reason for decreasing in your store's sales that goes beyond your control?; (1b) What would be a bad shock to your business that would affect your lifestyle?; (2a) Imagine there is an unforeseen event that requires cash on hand, what would that be?; (2b) What would be the amount/percentage that would be difficult for you to borrow in such a short notice? (in vietnam dong); (2c) What would be the amount within your financial ability to borrow? (in vietnam dong); (3a) Do you have a motorbike? (3b) If yes, if it is broken, is it expensive to fix? (3c) would you pay in instalment or cash? (4a) Can you think of other capital you own that if it breaks down, it would cause you financial hardship/ worry? (4b) What is the most common capital that everyone use in their houses? (4c) How much would it cost to buy a new one if it breaks down?

Based on the answers to these piloting interviews, we constructed the following four financial scenarios. The numbers in parentheses were used in the easy condition, and those not in parentheses were in the hard condition.

Scenario 1: Exogenous negative shock affecting sales permanently The economy is going through difficult times; there are less people going to shop at the market and thus demand for your product decreases. Imagine a scenario in which you received a 50% (5%) cut in your sale. Given your situation, would you be able to maintain roughly your same lifestyle under those new circumstances? If not, what changes would you need to make? Would it impact your leisure, housing, or travel plans?

Scenario 2: An unforseen event requires cash in hand Imagine that the following unforeseen event happens to you: someone in your family gets seriously sick or get into troubles. It requires you to spend immediately VND 15m (1.5m) to solve this health problem. Are there ways in which you may be able to come up with that amount of money on a very short notice? How would you go about it? Would it cause you long-lasting financial hardship? Would it require you to make sacrifices that have long-term consequences? If so, what kind of sacrifices?

Scenario 3: Car Problem Imagine that your motorbike is heavily destroyed. and requires a VND 10m (Dong 1m) service. Unfortunately, your auto insurance will cover only 10% of this cost. You now need to decide the following: (1) Pay the full amount in cash. Would this require liquidating savings? How would you go about it? (2) Take out a loan, which you can pay back in monthly installments. A typical such loan may require monthly

payments of roughly VND 1 tr5 (150k) a month for 12 months, which would amount to about VND 18m (1.8m) total. (3) Take a chance, forego the service, and hope that the car lasts for a while longer. Of course, this leaves open the possibility of breakdown, or even greater expenses in the long run. Easy case (3) take the chance and live w/o the bike, can you still maintain the same lifestyle w/o the bike for the hard situation.

Scenario 4: Old refrigerator breaking down Suppose you have reached the point where you must replace your old refrigerator. The model you plan to buy offers two alternative financing options: (1) You can pay the full amount in cash, which will cost you VND 7m (3m). (2) You can pay in 12 monthly payments, of VND 1.1m (110k) each, which would amount to a total of VND 14m (6m). Which financing option would you opt for? Would you have the necessary cash on hand? Would the interest be worth paying in this case?