A Test of Narrow Framing and its Origin *

Luigi Guiso
European University Institute, EIEF & CEPR

First draft: March 6, 2008; this draft: October 1th, 2008

Abstract

I provide a test of narrow framing as an explanation for why individuals turn down small positive expected value lotteries. Participants in a large survey have been asked whether they would accept a small lottery of winning 180 euros with probability of 1/2 or loosing 100 euros with the same probability. To half of the sample, randomly selected, the lottery question was asked at the beginning of the interview; the other half made the decision immediately after they were asked to think about and report their subjective probability distribution of future earnings. Consistent with narrow framing, I find that individuals that were induced to bring to their mind their earnings risk *before* facing the small lottery decision are significantly less likely to turn down the lottery. Furthemore, only those who actually report to be uncertain about their incomes are less likely to reject the lottery. I show that attitudes towards regret and reliance on intuition rather than on reasoning when making decisions are likely to drive individuals tendency to frame choices narrowly.

JEL Classification: D1, D8

Keywords: Narrow framing, loss aversion, intuitive thinking, reasoning, regret

*I thank Unicredit for making the survey data available and for financial support.

1 Introduction

The way individuals make decisions under risk is central to economics and has originated an immense debate. It has recently been argued that "narrow framing" - a tendency of individuals to evaluate a risky prospect in isolation rather than mixing it with the other risks they face - may be a much more important feature for explaining individuals' decisions than has been thought so far. For instance, Barberis, Huang and Thaler (2006) argue that narrow framing can explain why individuals turn down small, independent gambles with a positive expected return, a feature that not only is at odds with standard expected utility preferences (Rabin, 2000), but would be hard to reconcile even with preferences characterized by loss aversion when, realistically, individuals face other risks as well. The reason why this is so is that, as noticed by Kahneman (2003), narrowly framed decisions depart far more from risk neutrality than decisions that are made in a more inclusive context. In fact, by focusing only on the one specific prospect, one ignores the risk insurance properties that the prospect may have when combined with other risks. This makes the specific prospect less appealing. In other words, narrow framing inhibits one to take advantage of diversification opportunities which by definition require a joint evaluation of risky prospects. As shown by Barberis and Huang (2006), narrow framing is a critical ingredient for the behavioral approach to the equity premium puzzle and Barberis, Huang and Thaler (2006) show that narrow framing can rationalize one important puzzle in finance - the fact that contrary to the standard portfolio model a substantial fraction of individuals do not invest in stocks ((Mankiw and Zeldes, 1991; Haliassos and Bertaut, 1995).

While the potential consequences of narrow framing are starting to be better understood and models that incorporate narrow framing into tractable preference specifications are beginning to appear (Barberis and Huang, 2007), empirical tests of narrow framing and even more so of its origin are still lacking. In this paper I provide a test of narrow framing in a large sample of individual investors interviewed in 2007 and offer some evidence of what can lead individuals to frame choices narrowly drawing on a few recent theories. The strategy of the test is simple and relies on the idea that the prevalence of narrowly framed decisions is an effect of "accessibility" (Kahneman, 2003) - is the ease with which mentally recorded information that may be relevant for the assessment of a risky prospect comes to mind (Higgins, 1996).

My strategy consists in facing individuals with a decision concerning a small investment (or lottery) with positive expected value while changing randomly the degree of accessibility faced by the participants in the survey. To achieve this, sample participants have been asked to think about and report the probability distribution of their future earnings. This provides information about the human capital risk that the individual faces and that he would probably find desirable to hedge. Half of the individuals in the sample, randomly chosen, were asked to make the choice concerning the small investment *before* the questions about labor income expectations were asked. The other half, instead, made the decision about the investment *immediately after* the probability distribution of

their future earnings was elicited. Hence, when deciding about the small investment, individuals in the second group have a *higher accessibility* to their human capital risk and thus their decision should be less affected by narrow framing. In fact, since the small investment is by construction independent of the human capital risk, it should provide insurance against the latter. Individuals with easier accessibility should recognize this benefit and thus be less likely to turn down the investment.

I find that in both groups most individuals turn down the small lottery, consistent with a substantial body of experimental evidence (Kahneman and Tversky,1979; Tversky and Kahneman,1981;1992). However, individuals that have easier access to their human capital risk when deciding about the lottery are significantly less likely to reject it: the difference in the rejection rate between the two groups is more than 8 percentage points, about 13 percent the sample rejection rate. This result is invariant to adding controls for individual demographic characteristics and attitudes such as their risk aversion.

In our sample, not all individuals report to face uncertain income, at least over the one year horizon they are asked to report the earnings probability distribution. Since the insurance benefits of the small independent lottery are greater for those who actually face an uncertain income, one should find that those facing earnings risk should be less likely to turn down the lottery, if they decide under partial narrow framing. I indeed find that those who face uncertain incomes are less likely to reject the small lottery. However, income uncertainty has no effect for those who were asked to decide about the lottery *before* reporting their human capital risk while it is negative and significant for those who have decided *after* their labor income risk was elicited. This result is consistent with the first group framing narrowly the decision about the lottery because when deciding they fail to bring to mind the other risks they face. The second group, instead, thanks to greater accessibility to the income uncertainty faced, can at least partially take advantage of the insurance possibilities offered by the lottery.

One important issue is what features of decision making trigger narrowly framed choices. Kahneman (2003) argues that narrowly framed decisions are a consequence of individuals relying on intuitive thinking - one of the two types of cognitive processes proposed by Stanovich and West (2000, 2002) - rather than on reasoning (the second type of process). Since intuitive thinking is immediate and highly dependent on the specific elements available in the context the decision is made (Stanovich and West (2000, 2002), Hammond (1996)), individuals who decide on intuition will rely more on the most accessible elements when making a decision. Hence, according to this view, an intuitive thinker will focus mostly on the specific features of the lottery and tend to assess its value in isolation from other risks whose relation to the lottery are not immediately accessible. To the contrary, individuals that rely on reasoning when making decisions will be more receptive to accessible information and be more likely to become aware of the diversification benefits offered by the small lottery. Thus their decision about the lottery should be more responsive to accessibility.

It has also been argued (Barberis and Huang, 2007) that narrow framing

could be the reflection of regret, the feeling of having made the wrong choice compared to a better alternative (Olson and Roese, 1995). Since regret emerges when comparing the consequences of a specific action with those of a verifiable alternative it leads people to focus on the outcomes of the action itself and ignore the contribution of the consequences of that action to overall wealth. Hence, regret-prone individuals should be more likely to frame the small lottery narrowly and turn it down.

The UCS survey collects information on whether individuals rely mostly on intuitive thinking or more on systematic reasoning when making decisions as well as on their propensity to regret. When I control for regret I find that regret-prone individuals are more likely to turn down the lottery. When I sort the sample according to thinking mode I find that the probability of turning down the lottery is lowest for those who rely mostly on reasoning *and* for whom the probability distribution of their future earnings is more accessible. For those who rely on reasoning, accessibility to their income risk lowers the probability of turning down the lottery by as much as 12 percentage points, about 20% of the sample rejection rate. Instead, making their human capital risk more accessible to individuals who rely on intuition has no detectable effect on the decision about the small lottery. This evidence is consistent with narrow framing being triggered by the decision mode and amplified by regret.

Several papers report evidence that is consistent with the existence of narrow framing in experimental settings, starting with the example provided by Tversky and Kahneman (1981), who show that individuals when offered to choose between two pairs of concurrent risky prospects decide by comparing single pairs, rather than the combined outcome of the decisions and end up choosing a dominated combination. Read, Loewenstein and Rabin (1999) survey this literature and provide various examples from different domains that are suggestive of narrow framing. Among them Sabini and Silver (1982), Camerer et. al. (1995), Thaler et. al. (1997), Thaler (2000). None of these papers, however, uses narrow framing to explain why people turn down small lotteries when they face other pre-existing risks. Most importantly, this contribution differs from previous ones because I use predictions from emerging theories to inquire into the cause of narrow framing, thus strengthening the interpretation.

This paper is also related to a recent strand of literature in economics that inquires into the determinants of departures from the predictions of standard expected utility models. In particular it is related to the work of Shane (2005), Benjamin et. al (2006), Kirby, Winston and Santiesteban (2005), Dohmen, et al. (2008) who focus on the role of cognitive ability in explaining aversion to small, beneficial risks and high discounting. Differently from them we focus on narrow framing and the role played by the prevalent cognitive process individuals rely upon.

At a more general level, the evidence I report that narrow framing can be traced back to individuals thinking mode is related to a new strand of literature that either empirically (e.g., McClure et al., 2004; Sirigu et. al (2004), Breiter et al, 2001; Guiso and Jappelli, 2008) or theoretically (e.g. Fudenberg and Levine, 2006; Brocas and Carillo, 2008a, 2008b) argues that fundamental preference

parameters usually taken as given can be traced back to the architecture of the brain and the interplay between emotion and reasoning.

The rest of the paper is organized as follows. Section 2 sets up a simple framework to illustrate how narrow framing can explain why people turn down small lotteries and show the role of thinking mode, regret and other factors that have been cited as explanation for narrow framing. Section 3 describes the data and the test design. Section 4 presents the main results of the test while Section 5 provides evidence on the role of theory-based determinants of narrow framing. Section 6 concludes..

2 Framework

To illustrate our test strategy and obtain testable implications I set up a simple framework. Let $\widetilde{x}$ be a small lottery granting a gain g with probability $1/2$ and a loss $-l$ with the the same probability. Assume individuals are loss averse and losses and gains are evaluated by a piecewise linear utility function with reference point at 0. The expected utility of this lottery if evaluated in isolation is $Ev(\widetilde{x}) = (1/2)g - \lambda(1/2)l$, where λ denotes the individual degree of loss aversion. Thus, if $g/l < \lambda$ individuals will reject this lottery. For instance, suppose $g = 180$ euros and $l = 100$ euros; most individuals should reject this lottery since, as shown by Tversky and Kahneman (1991, 1992) for the median individual the degree of loss aversion is around 2 or slightly larger. Hence, the expected utility from entering the lottery $Ev(\widetilde{x}) = (1/2)g - \lambda(1/2)l = (1/2)(180 - 2 \times 100) = -10$ which is lower than the utility from not taking it. . Thus, first order risk aversion would explain very easily why the majority of individuals (though not by all) reject small positive value risks when evaluated in isolation. This was the explanation put forward by Rabin and Thaler (2001), perhaps with an emphasis on loss aversion. However, in a recent article Barberis, Huang and Thaler (2006) notice that in the definitely more realistic case where individuals face some pre-existing risk - notably labor income risk - it should be hard for them to reject a small independent lottery *even* if individuals are loss averse. The reason is that the lottery offers some insurance against the pre-existing risk, making it hard to reject it at non-unreasonable levels of loss aversion. Of course, in order to benefit from the insurance that the small lottery offers, the individual must evaluate it by mixing the lottery $\widetilde{x}$ with the pre-existing risk, and evaluate what the lottery contributes to the distribution of overall wealth rather than the utility of the lottery itself.

To solve the puzzle that individuals do indeed reject small independent lotteries, Barberis, Huang and Thaler (2006) assume that individuals' utility is also directly affected by the lottery in addition to its effect when mixed with pre-existing risks. The extent of this direct effect depends on how narrowly individuals evaluate $\widetilde{x}$, that is on how exposed to narrow framing they are.

Following Barberis, Huang and Santos (2001), Barberis and Huang (2006) and Barberis, Huang and Thaler (2006), a preference specification that allows for variable degrees of narrow framing is :

$$V_t = U(C_t, \mu(\widetilde{V}_{t+1}/I_t) + bEv(\widetilde{x}_{t+1}))$$

where C_t denotes current period consumption, $\mu(\widetilde{V}_{t+1}/I_t)$ is the certainty equivalent of future utility conditional on the information, I_t, available at t, and $v(\widetilde{x}_{t+1})$ is the direct utility that the consumer obtains from assessing the prospect $\widetilde{x}_{t+1}$ in isolation. The function $v(\widetilde{x}_{t+1})$ is characterized by loss aversion - and, say, $v(x) = x$ if $x > 0$ and $v(x) = \lambda x$ if $x < 0$, with $\lambda > 1$. Uncertainty about $\widetilde{x}_{t+1}$ will be resolved between time t and t +1 when also uncertainty about some pre-existing risk is resolved; thus, since $\widetilde{x}_{t+1}$ is independent of the other risks it can offer insurance. In this specification the individual receives utility from the lottery in two ways: he obtains utility because the lottery offers insurance when merged with a pre-existing risk. But the individual's utility is also directly affected by the lottery. This effect is captured by the term $bv(\widetilde{x}_{t+1})$. The parameter b measures how important this second channel is and can be thought of as an index of narrow framing. Individuals who decide about the lottery narrowly will be characterized by a large value of b. Absence of narrow framing obtains when b is equal to zero. In this case the decision about the small lottery is taken on the basis of its contribution to the final wealth of the consumer, that is by comparing $V_t = U(C_t, \mu(\widetilde{V}_{t+1}))$ when the lottery $\widetilde{x}_{t+1}$ is accepted with its value when is not accepted. A central result of Barberis, Huang and Thaler (2006) (see their Proposition 1) is that the lottery is generally accepted even if the $U(\ )$ is characterized by first order risk aversion as in Gul (1991), provided individuals face some pre-existing risk. In this case it would be hard to rationalize the rejection of the lottery $\widetilde{x}$ for realistic values of the degree of loss aversion. In fact, individuals will not turn down the small lottery $\widetilde{x}$ because it provides insurance against the pre-existing risk. The term $bv(\widetilde{x}_{t+1})$ is meant to reconcile the preference specification with the observation that individuals do in fact turn down small lotteries with positive expected value. As shown above $Ev(\widetilde{x})$ is normally negative for values of the degree of loss aversion exceeding 2. Thus, allowing for narrow framing balances the insurance benefit of the lottery and can even revert it leading to its rejection if the degree of narrow framing is sufficiently large (see Barberis, et. al. (2006)).

This formalizes Kahneman and Lovallo's (1993) idea that narrow framing, by limiting the recognition of the benefits from pooling risks, leads to too timid decisions.

2.1 Narrow framing theory

But what drives the degree of narrow framing? Addressing this question is critical to devise more powerful tests of how plausible this approach is in explaining empirically why individuals seem to be reluctant to take on small favorable gambles. Since b is unobservable, understanding its origin can suggest how to identify a source of variation in the degree of narrow framing which can then be used to test the empirical validity of this approach. As Barberis et. al. (2006) notice, their approach "...does not prove that narrow framing is at work

in the case of monetary gambles.., but only that.." given the difficulties faced by standard preferences, ..the narrow framing view may need to be taken more seriously.. " (p. 1085). How seriously depends on its ability to empirically address the puzzle.

One explanation put forward by Kahneman (2003) in his Nobel lecture, argues that narrow framing occurs when decisions are made intuitively rather than through systematic reasoning. Following current research in psychology, Kahneman (2003) distinguishes two modes of thinking and making decisions. The first relies on effortful reasoning and systematic processing of information. By its very nature, this mode of thinking is analytic, controlled by the decision maker, relatively slow and little affected by the context where the decision is made. People that rely on this mode of thinking are less likely to frame decisions narrowly. In fact, effortful reasoning helps bring to mind all elements that may be relevant to the decision, such as features that would be difficult to retrieve in the particular circumstances where the decision is made unless one puts effort into the thinking process. For instance, in the context of the small lottery $\widetilde{x}$, if individuals rely on effortful reasoning they would be more likely to be aware of the other risks that they face, how they may interact with the lottery and thus be more likely to realize the diversification benefits that $\widetilde{x}$ offers. Hence, they would be less exposed to narrow framing and carry a lower b. According to the "dual process theory" (e.g. Sloman, 1996; Evans and Over, 1996; Hammond, 1996), the other way of making decisions is by intuitive thinking. While reasoning is done deliberately, intuitive thinking is by and large automatic, and intuitive decisions are driven by spontaneous reactions to the elements that first come to mind. Thus, intuitive decisions tend to be associative (that is driven by inference based on prior experiences in similar circumstances) and most importantly be highly affected by the elements of the context in which the decision is made. These elements dominate the mind of the decision maker, while other factors that may be relevant for the problem at hand are not retrieved. This implies that the elements that come to mind more easily in the particular context of the decision being made - e.g. because they are more visible - are likely to carry more weight in the choice the agent faces.

In Kahneman's language, when making intuitive decisions the relevant elements are the ones that are most easily "accessible". For the choice of a small lottery $\widetilde{x}$ an intuitive thinker may have easier access to the features of the lottery itself, such as its losses and gains, and thus tend to focus on them when deciding about the lottery, ignoring potentially relevant interactions the lottery may have with other components of his wealth. The latter may be left in the background and be ignored altogether in the choice of whether to accept or reject $\widetilde{x}$.

In other words, intuitive thoughts are, according to this view, more likely to give access only to the most visible attributes of the objects of choice (Kahneman, 2003). Intuitive thinkers can be characterized as having a high value of b. On the contrary, people who rely more on reasoning, will tend to decontextualize problems and abstract from the particular circumstances. These people will be characterized by a lower value of b.

In terms of the above preference representation, let b depend on accessibility, denoted by a, and reasoning, denoted by r. Let a be an index that takes values between 0 and 1 of the easiness with which the relevant elements of the decision are accessible. Accessibility will depend on how these elements are represented, the context where the decision is made, etc. A value of zero implies that these elements are impossible to visualize and thus to be used in a decision, as, for instance, when information is made available in an unknown language, or the context where the decision is made is such that it is very hard to bring to mind some relevant elements even through effortful reasoning. A value of 1 implies instead that all the elements are readily accessible. Thinking mode can also be thought as a continuous variable that varies between 0 and 1 with 0 denoting purely intuitive thinking and 1 purely reasoning-based decisions. One simple relationship that captures the dependence of the degree of narrow framing from accessibility and thinking mode is

$$b = b_0(1 - ar)$$

This formalization has a few interesting properties. First, for given r, dependence on narrow framing declines as accessibility increases. Second, more intuition-intense decisions - a lower r - implies, ceteris paribus, a higher degree of narrow framing. Third, the decline in narrow framing as accessibility increases, $\frac{\partial b}{\partial a} = -r$, is more pronounced when individuals base decisions more on reasoning than on intuition. This captures the idea that intuition-based decisions are less capable of benefiting from increased accessibility. The important point is that if one can induce variation in the degree of accessibility and possibly in the way decisions are made, one can obtain variation in the degree of narrow framing and thus be able to assess its empirical relevance. As I explain below, this is indeed the test strategy I follow in this paper.

Before illustrating how I devise the test, it is worth mentioning that there could be other sources of narrow framing besides accessibility and modes of thinking and making decisions.[1] For instance, Barberis and Huang (2006) argue that narrow framing may reflect non-consumption utility, such as regret. Regret is commonly defined to be the nagging feeling of having made the wrong choice compared to a better alternative (Roese and Olson, 1995). It is a prominent form of counterfactual thinking, the comparison between the "what might have been" alternative choice (the counterfactual) and the "what has effectively been" choice. Since regret is typically linked to the comparison of the consequences of a *specific* action - like the gain or loss when accepting a lottery - with those

[1] Redelmeir and Tversky (1992) and Read and Lowenstein argue that decision frames adopted by individuals are affected by the way the various alternatives are presented. namely, if decisions are presented to them one at time or simultaneously affects how they frame them. The concept of accessibility contains this possibility. When decisions are presented simultaneously their aggreate effects are more accessible than when they are presented sequentially and distant from each other. Out test strategy can be seen as one that manipulates the extent of the separation between the decision and other elements that are relevant to it.

of a verifiable alternative (such as not taking the lottery) the presence of regret leads quite naturally to focus on the outcomes of the action itself and ignore the contribution of the consequences of that action to overall wealth;but this is what narrow framing is about.

In our context, regret entails a larger value of b .To allow for this let

$$b = b_0(1 - ar) + z$$

where z is a vector of other determinants of the degree of narrow framing, such as regret.

3 Test design and data

3.1 Data

The central idea of the test in this paper is to expose different groups of individuals who are asked to decide about a small lottery with positive expected payoff to different degrees of accessibility to the income risk that they face. For this I have relied on the second wave of the Unicredit Clients' Survey (UCS) which between June and September 2007 interviewed a sample of 1,686 Italian customers of Unicredit, one of the largest European banking groups. The sample was stratified according to three criteria: geographical area, city size and financial wealth. To be included in the sample, clients need to have at least 10,000 euros of assets with Unicredit; the survey explicitly over-sampled wealthy clients. The survey is described in greater detail in the data appendix.

3.2 Test design

The test strategy consists of three steps. First, following Guiso, Jappelli and Pistaferri (2002) methodology, survey participants were asked about the probability distribution of earnings one year ahead of the interview. More specifically, they were asked:

> *Assuming that you will be working over the next 12 months, can you tell me:*
>
> *a) the minimum amount (y_m) that over the 12 months you expect to earn, net of taxes but including items like overtime, bonuses, etc.*
>
> *a) the maximum amount (y_M) that over the 12 months you expect to earn, net of taxes but including items like overtime, bonuses, etc.*
>
> *Can you now tell me the probability that you would assign to your income being greater than the value $X = (y_m + y_M)/2$ (the interviewer reads the value that appears on the monitor). That is if you were to assign a score between 0 and 100 to the event "your income over the next 12 months will be greater than X, what score would you assign?*

Under some assumptions about the shape of the distribution above and below the midpoint, this information allows for an estimate of different moments of the distribution of future earnings, including measures of uncertainty. The most simple one, which requires no distributional assumptions and that I will be using later on is the range $y_M - y_m$.which is positive if the individual faces some income uncertainty. This question was asked towards the middle part of the interview after several other sections covering information on demographics, education, attitudes and propensity to save and invest, financial information and banking relations, financial portfolios.

Second, individuals were asked whether they would be willing to accept a small lottery that with probability 1/2 allows to gain 180 euros but can give rise to a loss of 100 euros with probability 1/2. The exact wording of the proposed lottery is:

> *Suppose that over the next 12 months a small investment of 100 euros allows you to gain 180 euros with a probability 1/2 and to lose the 100 euros with probability 1/2. In either case you will know about the outcome of the investment (i.e. whether you will get 180 euros or you will have to pay 100 euros) 12 months from now. Would you accept to participate in this investment?*

Individuals can answer by saying "yes", "no" or "I do not know". The expected value of the lottery is 40 euros and, under the assumption of linearity in the assessment of losses and gains, a loss averse consumer with a loss aversion parameter of 1.8 who evaluates the lottery in isolation would be indifferent to rejecting and accepting it. I have chosen the 180 euro gain/100 euro loss lottery since a value of 1.8 for the loss aversion parameter is just below the typical estimate of 2-2.25 that seems to characterize the median respondent in experimental settings (Tversky and Kahneman, 1991, 1992).

Tow features of this question are worth noticing. First, the lottery is presented as a small investment. This is done intentionally to minimize the possibility that people turn down the lottery because they are, perhaps morally, averse to gambling. Second, the uncertainty about the lottery is resolved over a 12-month horizon, that is, over the same time span individuals face their human capital uncertainty elicited in the previous question. This feature is important because as stressed by Barberis, Huang and Thaler (2006) the insurance value of the lottery for some preference representations may depend on whether the resolution of the lottery uncertainty is "immediate" or whether it is "delayed", as only the latter may provide insurance against the earnings risk that is resolved in the future.

The third step in the strategy of the test is to induce random variation in accessibility to pre-existing risks and thus implicitly in the degree of narrow framing. To obtain this, I randomize the location of the small lottery question in the questionnaire.

To half of the individuals interviewed, randomly chosen, the lottery question is asked well before the distribution of their future earnings is elicited. To make

sure that for this group accessibility is as limited as possible, the lottery question is asked in the second section of the questionnaire where questions about attitudes are asked, following the first section devoted to obtaining information about demographic characteristics such as gender, year of birth, family composition, education etc. In these sections no mention is made of earnings or income, neither current nor future, or of the respondent's assets which may be subject to uncertainty. To the second group instead, the lottery question is asked immediately after they answer the questions about their future earnings. Hence, since this group has greater access to the probability distribution of future earnings it should be easier for them to realize the potential insurance benefits that the lottery may provide. Thus, if narrow framing plays a role in the rejection of small, positive return lotteries, the rejection rate should be higher among the first group than among the second. In fact, the second group has a higher value of a and, accordingly to equation (2), a lower degree of narrow framing.

This is the logic of the test strategy and its main testable implication.

3.3 Variation in narrow framing: modes of thinking and regret

To sharpen the test of narrow framing I have also obtained information on how individuals typically approach decisions and on their sensitivity to regret. To obtain an indication of the mode of thinking when making decisions, they were asked to answer the following question:

> *Think now to when you make a decision. Generally speaking do you tend to decide rather quickly relying mostly on your intuition or rather do you tend to think accurately about all possible alternatives and consequences of your choice, taking as much time as needed before reaching a final decision?*

Respondents can answer in one of three ways: 1) "I decide very rapidly on the basis of my intuition"; 2) "I partly ponder and partly rely on intuition"; 3) "I ponder accurately, reasoning carefully on my choice". Answers to this question allow me to partition the sample in three groups that differ in the relevance of intuitive thinking in their decisions. The fraction of intuitive thinkers in the sample is 14.6% while an equal fraction rely on both or use mostly reasoning when making decisions (Table 1, panel D). For this indicator to be a valid measure of the thinking mode, two conditions must hold.

First, since it is based on self-reported information one must trust that people are consciously aware of how they approach decisions. One way to check this assumption is to notice that UCS participants were asked how they approach a decision to make a purchase that involves a substantial amount of money, such as buying a durable. The exact wording of the questions is: "*Before making a purchase involving a relatively large amount of money (such as a car, a washing machine or some furniture), some people tend to visit several shops or dealers in order to compare various prices and try to get at good balance in terms of*

price/quality ratio. How does this description fits your type?" [2] One would expect that the description fits better people who rely on reasoning. Indeed, the "purchase mode" variable is highly correlated with the thinking mode indicator: people who rely more on reasoning tend to visit more shops and make more comparisons than those who rely on intuition before making a decision. The correlation coefficient between the two variables is 0.21 and a regression of thinking mode on "purchase mode" results in a highly statistically significant coefficient (t-stat 8.67). A second way is to correlate thinking mode with an indicator of planning ability available in the UCS which asks participants: "*Generally speaking, when you choose to go on vacation do you decide where to go and do the booking: a) generally well in advance; b) on time; c) at the last minute.*" I recode this variable so that it is equal to 1 for those who decide at the last minute and 3 for those who decide well in advance. Research in neuroscience has shown that individuals with an hampered ability to feel emotions and to rely on intuitive thinking also lack planning capability (Damasio, Tranel and Damasio, 1990; Damasio, 1994). Hence, if individuals describe correctly their thinking mode one should find that those who rely more on intuition can manage planning more comfortably and thus need not decide the details of a vacation too much ahead. Consistent with this view I find that intuitive thinkers tend to commit to the details of the vacation later than those who rely on reasoning and a regression of thinking mode on the holiday planning indicator yields a highly statistically significant coefficient (p-value 0.001).

Second, since I rely on differences across individuals in how they make decisions, the underlying assumption is that even if all people clearly use both modes of thinking, in some individuals intuitive thinking is more prevalent than in others. That is reliance on intuition versus reasoning must be to some extent an individual trait. Stanovich and West (2000) provide evidence supportive of this assumption. They argue that the systematic differences in performance along a large variety of tasks observed in a sample of individuals can be traced to differences in the prevalence of one of the two systems of thinking: system 1 (based on intuition) and system 2 (based on reasoning) that lead to different responses to the same problem. Similarly, Klein (2003) offers numerous examples consistent with the idea that individuals differ systematically in their willingness to rely on intuition to make decisions.

Finally, to obtain an indicator of regret individuals were asked to answer the following pair of questions, the first aimed at measuring regret about incurred losses and the second regret about forgone gains.

> *Could you please tell me how you would react to the following situation in which you could find yourself? Two years ago a friend who is knowledgeable about finance recommended that you undertake an investment which, on the basis of the information available to him then, had good chances of success.*

[2] The possible answers are "Not at all", "very little, "Somewhat.", "Close enough", "Very much". We code these answers attaching numbers between 1 and 5.

A) You have chosen not to undertake the investment. Meanwhile, the value of this investment more than doubled and had you made it you could have made a big gain. In such a circumstances, today you would:

- *Regret a lot for not having undertaken the investment;*
- *Regret but would not be too upset;*
- *Would feel no regret.*

B) Now think of another situation. You invested a significant amount in the investment that was recommended. Meanwhile market conditions have deteriorated and your investment has lost half of its value. In such a circumstances, today you would:

- *Regret a lot for having undertaken the investment;*
- *Regret but would not be too upset;*
- *Would feel no regret.*

I have coded the variable regret for losses setting it equal to 1 if no regret is felt, 2 if reports some regret and 3 if the respondent regrets a lot. Regret for missed gains is coded similarly. The vast majority of individuals tend to regret a loss either a lot (37.6%) or to some extent (41.8); the remaining 20.6% would feel no regret. Regret for missed gains is instead less widespread as only 9% report to regret a lot while 42% show no regret to a missed gain (Table 1, panel D). Yet, the two measures of regret are positively correlated (correlation coefficient 0.37).

These variables can be used to test some of the implications of narrow framing theories directly.

3.4 Additional variables: risk aversion, trust and time discount

Besides eliciting the variables illustrated in the previous section and that constitute the core of our test, the survey obtains detailed information on financial and demographic variables. In this paper, demographic variables refer to the respondent to the small lottery and income expectations questions.

Several parts of the questionnaire are devoted to obtaining detailed information on individual's attitudes, including attitudes towards risk, time discount and generalized trust. Since variation across individuals in acceptance of the small lottery may reflect attitudes towards risk, lack of trust or differences in time discount, these questions can prove to be important controls in our regressions.

Risk aversion is measured using a qualitative indicator of risk tolerance patterned after the Survey of Consumer Finance: "*Which of the following statements comes closest to the amount of financial risk that you are willing to take when you make your financial investment: (1) a very high return, with a very high risk of loosing the money; (2) high return and high risk; (3) moderate return and moderate risk; or (4) "low return and no risk.*" Out of this question I construct four dummies that rank individuals from very low to very high risk

averse. Only 18.6% choose "low return and no risk", so most are willing to accept some risk if compensated by a higher return, but very few (1.8%) are ready to take very high risk and high return Table 1, panel C). A recent literature on eliciting preferences from survey data shows that qualitative questions on risk aversion are informative and have predictive power.[3] As a robustness check we have used a second indicator based on the answers to a number of choices that survey participants were faced between a risky prospect that pays 10,000 euros or zero with probability 1/2 and a sequence of nine certain amounts of money of increasing size ranging from 100 euros to 9,000 euros. Under the assumption that preferences are exponential, an interval for the degree of absolute risk aversion is identified for each individual in the sample when the respondent switches from the safe to the risky prospect.[4]

A measure of trust is obtained by asking people the generalized trust question that is asked in the World Values Survey: "*Generally speaking, would you say that most people can be trusted or that you can't be too careful in dealing with people*?". They answer in one of two ways, "Most people can be trusted" or " Can't be too careful"; I have coded responses equal to 1 for those who choose the first answer, and zero otherwise. About 25% report they trust (Table 1, panel C).

Finally, to obtain a measure of time discount individuals were asked to choose between $100,000$ euros one year from the interview and M immediately where $M < 100,000$. The initial value of M is set at $95,000$ euros; if the respondent accepts (turns down) the immediate sum then he is asked whether he would be willing to accept $90,000$ euros now (respectively $97,000$ euros); if he accepts $90,000$ euros (turns down $97,000$ euros) he is further asked whether he would accept $80,000$ euros now (respectively $98,000$ euros). If he turns down $8,0000$ euros his discount rate is above 20%; if he turns down $98,000$ euros the alternative is to wait one year and get $100,000$ euros. I classify individuals into 6 categories with increasing subjective discount where the smallest discount is between 0 and 2% and the largest is at least 20%. Individuals seem quite impatient with about 60% with a discount rate of at least 10%; but 24% are patient with discount rates below 2%. The data appendix reports the exact wording of the question and describes in greater detail how the index is computed**.**

Table 1 shows summary statistics for the relevant variables used in the paper.

[3] See, among others, Barsky et al (1997), Guiso and Paiella (2008) and Dohmen et al (2005).

[4] The two indicators of risk aversion are positively correlated; a regression of the qualitative measure carries a t-stat of 4.67. Both indicators do not distinguish between relative and absolute risk aversion. But since we can control for wealth, we can allow the risk aversion indicator to reflect differences in risk preferences that don't arise from differences in endowments.

4 Results

4.1 The basic test

As argued, the test is based on random differences in accessibility of participants in UCS to information about their pre-existing risk. Out of a total of 1,689 survey participants 799 (47.4%) where asked the small lottery question well before they answered the question about their human capital risk; to the remaining 877 (52.6%) it was asked immediately after. Since interviews were computer assisted, randomization was induced directly by the computer which randomly assigned one of the two locations to the lottery question once the interview started. The somewhat different size of the two groups from the theoretical equal split, is due to two factors. First, some interviewers received a list with an odd number of contacts, automatically giving rise to some imbalance; second, and most importantly because some interviews were not completed and drop-outs are more likely at the beginning than towards the end of the interview, which tends to inflate the observations in the second group. Nonetheless, the characteristics of the respondents do not seem to differ in any systematic way. Table 2 compares the two groups along five demographic characteristics (age, gender, education, whether married, dummies for residence in the North and the Center, and the financial assets category of the respondent). The two groups seem to be very similar as one would expect if individuals were randomly allocated to them. For all variables the difference in means between the two groups is very small (column 3) and, with one exception, none of them differs significantly from zero at usual significance levels (last column). The exception is age with differs between the two groups at the 10% level of significance. However, even for this variable the difference in means in small (1 year, 54.29 in the first group and 55.28 in the second); furthermore, also the second moment of the distributions is very similar in the two groups. This leads to conclude that accessibility to other risks is fairly randomly allocated among the respondents to the small lottery question.

In the overall sample the vast majority (61 per cent), turn the small lottery down while 28% are willing to accept it. Since individuals were also given the option of answering "I do not know", 11% chose it (Table 3, first column). Depending on whether those answering "I do not know" are included or not in the control group the rejection rate is 61% or 68%. These figures are fully consistent with those obtained in experiments (e.g. Tversky and Kahneman, 1992) where it is found that the majority of participants reject small lotteries of the sort offered in the UCS survey. Comparing the rejection rate in the group with lower accessibility (second column) with that in the group with greater accessibility (third column), it is higher in the first than in the second. Depending on whether those who choose "I do not know" to answer the lottery question are included or not in the control group, the rejection rate among those with low accessibility to their endowment uncertainty is 65.2% or 72.5%. In the high-accessibility group it is about 8 percentage points lower no matter how the control group is defined (column 4). This difference is highly statistically signif-

icant (p-values ≤ 0.002, last column) lending support to the idea that narrow framing is indeed affecting the high propensity to turn down small beneficial lotteries. The result in fact suggests that when other risks that the individual is facing are made more accessible to him, he comes to realize the benefits of mixing the small lottery with these risks, softening the degree of narrow framing and inducing what appear as less timid decisions (Kahneman and Lovallo,1993). However, since among this group too a large fraction still turn down the lottery the result seems also to imply that even bringing these risks to an individuals' mind, while helping, is not enough to eliminate narrow framing of specific risks.

4.2 Controlled regressions

Table 4 digs deeper into the test by showing controlled regressions. In the first panel the left-hand side is equal to 1 if the lottery was turned down and zero otherwise; that is those answering "I do not know" to the small lottery question are included in the control group. The first column reproduces what was shown in Table 3. The second column adds a number of demographic controls such as age, a dummy for males, level of education attained (overall number of years of school and college attendance), a dummy for those who are married, two location dummies for the regions in the North and the Center (the South being the excluded category), an indicator of city size and an indicator of the individual family wealth. Interestingly, neither wealth nor location affect the chances of rejecting a small lottery suggesting that individual propensity to turn down a small positive value lottery does not vanish with wealth. However, age, gender and education all have a significant effect on the propensity to turn down the lottery. Married and older individuals are more likely to reject it while men and the more educated are less likely to turn it down.

The latter result is consistent Read et al. who conjecture that narrow framing can be a consequence of cognitive capacity limitations. Limited cognitive capacity can give rise to narrow framing because combining risks together, particular when they are many, is more difficult than assessing them one by one and requires more cognitive capacity, memory etc. It is also consistent with evidence in Frederick (2005) and Benjamin, Brown and Shapiro (2006) who show that cognitive ability lowers the propensity to turn down small lotteries.[5] But what is important is that the effect of accessibility is unaffected by these controls: the coefficient in column (2) is essentially unchanged with respect to that obtained without controls. Of course, this is to be expected given the randomness in the accessibility to individual pre-existing risks.

For a given degree of narrow framing, variation in risk attitudes may, as one would expect, explain variation in the willingness to accept the lottery. This conjecture receives support in the third column where I add three dummies for

[5] We have added as an extra control a direct measure of cognitive ability - the self-reported ranking in performance in middle-school. This measure is highly correlated with the number of years of education. Hence when we add it as an explanatory power the effect of education becomes smaller but retains its significance while the cognituve ability measure is not statistically significant.

individual risk aversion obtained from the qualitative indicator, excluding the group with very low risk aversion (those who prefer very high but very risky returns). Those with a preference for conservative financial decisions are also more likely to turn down the lottery compared to those who are more prepared to take financial risk and effects are remarkable. For instance, the most risk averse have a 25 percentage points higher probability to turn down the small lottery than the least risk averse - an effect equal to 57% of the average rejection rate in the sample. A similar result is obtained if I use the alternative measure of risk aversion.

As I have illustrated uncertainty about the small lottery is resolved after one year and thus the gain or the loss is incurred in one year from the interview. One may argue that delayed lotteries (relatively to immediate ones) may be unappealing because people may not trust that promised gains are paid out, rather than because they frame decisions narrowly and are averse to losses. Alternatively, differences across individuals in willingness to turn down the small lottery may reflect differences in subjective discount rates if loss-sensitive individuals discount losses and gains differently. Though our test should not be affected by individual heterogeneity along these dimensions since it is based on random exposure to accessibility, I can take these possibilities into account by controlling for the indicator of generalized trust and the individual measure of subjective discount. When I add these regressors to the specification (see column 4), I find that generalized trust has a strong negative and significant effect on the probability of turning down the lottery: those who trust have a 10 percentage points lower probability of turning down the lottery (17% of the sample mean), a results consistent with the findings of Guiso et. al. (2007) who show that low trust people are less likely to invest in stocks. On the other hand, the indicator for subjective discount has no statistically significant effect, as it should be if individuals discount gains and losses at the same rate. Most importantly, all these controls leave the effect of accessibility to pre-existing risks unaffected.

The second panel repeats the estimates this time dropping all those who answered "I do not know" to the small lottery question. Results are essentially invariant to this sample definition.

4.3 Robustness

One could argue that the lower rejection rate among those who answer the lottery question after reporting their income risks may not reflect greater accessibility but some other effect that varies systematically with the location of the small lottery question. For instance, it may be argued that people may be less prone to turn down lotteries when are they more tired, which is more likely to happen towards the end of the interview than at the beginning. An alternative, and perhaps more compelling objection, could be that the lower rejection rate among those with greater accessibility may be a reflection of the trust that interviewers are able to build as the interview proceeds, which may make participants more willing to accept the lottery when the interviewer offers it. Though I control for trust, one may still object that this is a measure of gen-

eralized trust not of the personalized trust that the interviewed develops during the interviewer, which may be is what actually matters (even if unconsciously since payment of the small lottery is not a promise of the interviewer).

I address these issues in two ways. First, in this section I show that the lower rejection rate in the second group is unlikely to reflect some unmeasured feature of the interview that happens to affect the lottery decision. Second, in the next section I show that the effect of accessibility varies in ways that are fully consistent what narrow framing theories would predict.

One way to address the first objection - accessibility is proxying for the tiredness of the interviewer - is to control for the length of the interview. If tiredness matters one should find that longer interviews trigger different answers. If the indicator of accessibility reflects tiredness it should lose significance. I account for this in Table 5, column 1, where I add to the specification the interview length (in minutes) as an additional control. I do find that the length of the interview affects the lottery decision, but it makes it more, not less likely to turn it down: a one standard deviation increase in interview length (20 minutes) raises the probability of turning down the lottery by 2 percentage points. In any case, the effect of accessibility is unchanged.

To address the second issue - trust generated during the interview - I run a linear probability model with fixed effects for the interviewer to capture their trustworthiness. Results are shown in column 2; interestingly the length of the interview is no longer significant suggesting that it reflects differences in efficiency across interviewers. Again the effect of accessibility is unaffected. As an alternative check in the third column I report a regression were I control for an index of the overall climate of the interview: this is a judgement reported on a scale between 1 (poor climate) and 10 (very good climate) by the interviewer at the of the interview. Interviewed mistrust and reluctance to answer should be reflected in this index. As the estimates in column 3 show interview climate has no effect on the decision to turn down the lottery and including it leaves the effect of the indicator of accessibility unchanged. Adding similarly obtained measures of whether the survey participants understood the questions and whether they found it easy to answer them (as we do in columns 2 and 3) has no effect on the estimates.

4.4 The effect of pre-existing risk

To further test whether accessibility is capturing variation in the degree of narrow framing and not some other effect I can also exploit variation in perceived uncertainty. In the UCS sample several face no income risk in the sense that they report that the minimum and maximum earnings one year ahead coincide. For the retired this is obvious as they receive a pension from social security which is known in advance. For the others, about 30% report no uncertainty with a smaller proportion among the self employed than among the employees, particularly those in the public sector.

If facing a pre-existing risk is what makes the small lottery more attractive, then one should find that: a) those facing income risk should be less likely to

turn the lottery down; b) income risk should matter more (be more negative) for those who have greater accessibility to it and are thus more able to visualize the insurance benefits of mixing the lottery with the pre-existing risk.[6] I thus define an indicator that is equal to 1 if the range of the subjective probability distribution of one year ahead earnings is different from zero and then use this indicator and its interaction with the identifier for accessibility as explanatory variables in the probability of turning down the lottery.

Table 6 shows the results of the estimates. When I insert the income risk indicator alone (column 1) it has a negative effect on the probability of turning down the lottery as it should if individuals mix at least partially the small lottery with the pre-existing labor income risk. Obviously, since earnings risk is correlated with other attributes of the individual that may discourage participation in the small lottery directly, in this case it is particularly important to control for them.[7] Those facing an uncertain income have a 5.7 percentage points lower probability of turning down the small lottery. This is the average effect for the whole sample. However, when I add also the interaction between the uncertainty indicator and the accessibility indicator (column 2), I find that pre-existing risk only matters for the group of individuals that have access to it - that is those who answer the lottery question after the subjective earnings question. For this group facing an uncertain income lowers the probability of turning down the lottery by 10 percentage points while labor income risk has no effect for those with limited accessibility, implying that they ignore it altogether when deciding about the small lottery. Columns 3 and 4 report the estimates when instead of interacting uncertainty with accessibility I run separate (and thus more flexible) regressions for high and low accessibility; these estimates confirm that income uncertainty only matters when individuals are given access to it.

This result is consistent with the first group framing the small lottery decision completely in isolation; on the contrary, those with greater accessibility seem to be at least partially mixing it with the pre-existing risk and thus enjoying the insurance benefits that the small lottery entails. But again, even among those facing uncertainty and being made aware of it, several continue to turn down the lottery and behave as those who have no access to pre-existing risks. One possibility is that this is a reflection of individuals mode of thinking which forges their tendency to frame decisions in isolation. I now turn to this issue.

5 What does determine narrow framing?

As argued in Section 2.1 narrow framing can be the reflection of individuals being subject to regret. Since regret is a feeling referred to a specific action/choice, it

[6] If some perceive no income risk this could partially explain why evoking their pre-existing risks many have a limited impact on the probability of turning the small lottery down. Exposing this people to their income uncertainty does not make the small lottery more attractive.

[7] Notably, more risk averse individuals are more likely to choose safer jobs and hence are less likely to face uncertain labor income. Income risk may thus capture risk aversion if the latter is omitted from the regression or is mis-measured.

naturally leads to focus on the consequences that are most immediately linked to the action, giving rise to narrowly framed decisions. Hence, a regret-based explanation predicts that regret-prone individuals are more likely to turn down the lottery if they regret losses or to accept it if they regret missed gains.

Alternatively, narrow framing could be the reflection of reliance on intuition when deciding whether to accept or not an uncertain prospect. According to dual decision models intuitive thinking tends to focus on the specific elements that characterize the prospect itself, such as its return and variance or its losses and gains and ignore possible interactions it may have with other components of the individual wealth. In our context the most visible (accessible) features of the lottery are the size of the gain, the loss involved and their probabilities. Its lack of correlation with the pre-existing risks (and thus its potential insurance benefits) remains in the background and may be ignored by intuitive thinkers. Intuitive decisions are in fact heavily affected by the most superficial and accessible elements of the lottery (Kahneman, 2003). On the other hand, individuals who rely mostly on reasoning can see beyond the veil of the superficial features of the lottery and would be able to put it in perspective, capturing its relation with other components of wealth.

Interestingly, these two theories of narrow framing, are likely to rest on different mechanisms. In particular, since regret is a prominent form of counterfactual thinking whereby the decision maker, at time of deciding, compares the "what might have been" alternative choice (the counterfactual) with the "what has effectively been" choice, one may argue that it involves very sophisticated and effortful reasoning rather than intuition, though reasoning is captured by the particular object of choice. In fact in our sample regret indicators are positively correlated with reliance (total or partial) on reasoning as the typical mode of thinking when making decisions.

5.1 The role of regret

Table 7 examines the role of regret. When the indicators of regret about losses and gains are added to the specifications shown in Table 4, they are both significant. Regret about incurred losses makes it more likely to turn down the small lottery (column 1); all else constant, those who very much regret a loss compared to those who say they feel no regret are 10 percentage points more likely to turn down the lottery. On the other hand regret about missed gains has a negative and significant effect on the probability of turning down the small lottery and the effect is more than twice as large as that of regret about losses. Compared to those who do not regret a missed gain, those who regret it very much are 23.5 percentage points less likely to turn down the small lottery (more than one third the unconditional rejection rate). On the other hand adding regret as a control leaves the effect of accessibility to pre-existing risks unaffected.

In the second column I add a battery of demographic controls and attitudes towards risk. Interestingly, the effect of regret is unchanged when I control for the individual risk aversion and for other demographics while the effect of accessibility is unaffected. In the third column I add the indicator of generalized

trust, as one may argue that mistrust may be a reflection of regret. Even in this case the effect of regret is unaffected, while trust retains it effect, both economically and statistically, suggesting that regret, trust and risk aversion affect willingness to participate in small beneficial lotteries through different channels. In particular, the results are consistent with regret being an important sources of narrow framing.

5.2 The role of intuition and reasoning

Table 8 investigates the second possible source of narrow framing: reliance on intuitive thinking rather than reasoning. The implication of this theory of narrow framing is that the effect of accessibility to pre-existing risk on the willingness to accept the lottery should be stronger the more the individual relies on reasoning rather than on intuition. To test this prediction I identify three groups: those who rely mostly on intuition; those who rely both on intuition and reasoning and those who rely mostly on reasoning. Under the null that this theory of narrow framing is true, one should find that for the latter group the effect of accessibility to pre-existing risk on the probability of accepting the lottery is the largest.

For comparison, the first column shows the results for the whole sample. The second column runs the regression on the subsample of those who rely mostly on intuition: interestingly, for this group having a facilitated access to pre-existing risk has no effect on the willingness to accept the small lottery. On the contrary, those who partially rely on intuition and partially on reasoning (column three) respond to accessibility significantly by lowering the rejection rate by 7.6 percentage points. This effect is lower than that for the whole sample but much larger (in absolute value) than that for the sample of those who only rely on intuition (first column). The effect of accessibility is even larger for the group that relies mostly on reasoning when making decisions: for this group, accessibility to pre-existing risks lowers the probability of turning down the small lottery by 12.1 percentage points - an effect that is 60% larger than that for those who mix intuition and reasoning. These findings lend support to the idea that relying on reasoning helps to de-contextualize the decision about a risky prospect and allows to appreciate its benefits when the prospect is seen in relation to other risks the person faces.

One may suspect that thinking mode is proxying for cognitive ability and that people with higher cognitive capacity can rely more on reasoning and are thus be able to realize the diversification opportunities entailed by the small lottery. This is not actually the case. First, the indicator of thinking mode is poorly correlated both with education and with the self-reported measure of relative performance in secondary school; not only correlation is low but, if anything is negative with both indicators, that is those who rely on reasoning are less educated and did relatively worse at secondary school. Second, If we split the sample by level of education (below and above secondary high school) and run the regression in Table 8, the coefficient of accessibility is statistically significant in both groups; though very similar it is, if anything higher in the low

education (-0.096 and -0.090, respectively). A similar result obtains if we use the self-reported measure of relative performance in secondary school: dividing the sample between those who were above average or among the top students in secondary school and those who were average or below, I find that accessibility has a slightly larger effect on the probability of turning down the lottery in low ability than in the high ability group (-0.089 and -0.080 respectively) but effects are in both cases similar.

In Table 9 I expand the evidence by reporting regressions of the probability of turning down the lottery on income risk. If what shapes narrow framing is the extent to which individuals rely on reasoning or intuition, one should expect the effect of income risk to be strongest (that is more negative) among those who have been given access to it *and* rely on reasoning, and to be weakest for those who base decisions on intuition even if they have been given access to their pre-existing risks. To test this I run regressions splitting each thinking mode group between those who were exposed to their earnings risk and those who were not. When I distinguish between high and low accessibility among those who rely on intuition I find that income uncertainty has no significant impact on the decision to turn down the lottery, not only for those who are not exposed to their income risk before deciding about the lottery but also for those who are first exposed to it (columns 1 and 2). The same holds true for the group that typically decides both on intuition as well as on reasoning (columns 3 and 4). However, when I look at the third group - those who mostly decide on the basis of reasoning - I find that facing income risk when they are given access to it, reduces the probability of turning down the lottery by as much as 19.2 percentage points (column 5), about 1/3 the unconditional probability of turning down the lottery, and the effect is highly statistically significant ($p - value = 0.002$). On the other hand, income risk has no effect on those with no accessibility, even if they base their decision on reasoning (column 6). This suggests that unless the pre-existing risk is evoked at the time when a decision is made, it may be overlooked even by people who decide on the basis of effortful thinking, implying that reasoning alone may not be sufficient to eliminate narrow framing.

6 Conclusions

I have provided a new test of models that rely on narrow framing to explain why individuals, even at high levels of wealth, turn down small beneficial lotteries that would be appealing in a framework where they maximize the expected utility of final wealth. The evidence I have provided is consistent with the idea that people focus on the most visible properties of the lottery and tend to ignore its interaction with other components of wealth. When individuals are encouraged to first evoke pre-existing risks and only after are asked to decide about the small lottery, I find that they are significantly less likely to turn it down, as if they become aware of its insurance benefits once the other risks they can hedge with the lottery become visible. I find that this is particularly true for individuals that actually face income risk, precisely those who can effectively

benefit from the insurance advantages of the small lottery.

A second contribution of this paper is to be the first, as far as I know, to provide evidence on the origin of narrow framing. I show that regret about losses and gains strongly affects the decision to turn down or accept the small lottery while the way individuals make decisions seems critical in explaining variation across individuals in the degree of narrow framing. Consistent with narrow framing theories I find that those who benefit the most from exposure to pre-existing risks are individuals who base decisions on reasoning; those who decide on intuition are instead unresponsive to accessibility to pre-existing risks and seem only to act on the specific properties of the lottery.

While the evidence presented suggests that narrow framing may be a relevant property of individual preferences, one needs to be aware of the setting where this evidence is obtained. It may be legitimately objected that hypothetical lotteries are not the best choices to assess individuals dependence on narrow framing and that when faced with real life decisions - like their portfolio allocation into stocks - individuals have strong incentives to depart from the specific features of the stocks they could buy and figure out how they relate to the various components of their (uncertain) wealth. Though in order to partly account for this problem we have been careful in framing the lottery as a small investment, wording may not be enough. The only way to overcome this skepticism is to design a field experiment where for instance, one studies individual willingness to invest in stocks by comparing the choices of a treatment group to whom a broker has evoked their pre-existing risks with that of a non treated group. This is the next step in my research agenda.

References

[1] Barberis, Nicholas and Huang, Ming (2006). "The Loss Aversion/Narrow Framing Approach to the Equity Premium Puzzle," in Rajnish Mehra,ed., Handbook of investments: Equity premium. Amsterdam: Elsevier Science, North-Holland.

[2] Barberis, Nicholas, Huang, Ming and Richard Thaler (2006). "Individual Preferences, Monetary Gambles and Stock Market Participation (2006), American Economic Review,96 (4), 1069-1090.

[3] Barberis, Nicholas; Huang, Ming and Santos,Tano (2001). "Prospect Theory and Asset Prices." Quarterly Journal of Economics, 2001,116(1), pp. 1–53.

[4] Barsky, R. B., T. Juster, M.S. Kimball, and M.D. Shapiro (1997), "Preference Parameters and Behavioral Heterogeneity: An Experimental Approach in the Health and Retirement Survey," *Quarterly Journal of Economics* 112, 537-80.

[5] Benjamin, Daniel, Sebastian M. Brown and Jesse Shapiro (2006), "Who is "Behavioral"? Cognitive Ability and Anomalous Preferences", University of Chicago, mimeo.

[6] Breiter, Hans C., Itzhak Aharon, Daniel Kahneman, Anders Dale, and Peter Shizgal (2001), "Functional Imaging of Neural Responses to Expectancy and Experience of Monetary Gains and Losses", Neuron, 30:619—639.

[7] Brocas, Isabelle and Juan D. Carrillo (2008a) "Theories of the Mind", American Economic Review Papers & Proceedings, 98:2, 175-180.

[8] Brocas, Isabelle and Juan D. Carrillo (2008b) "The Brain as a Hierarchical Organization", American Economic Review, 98:4, 1312–1346.

[9] Camerer, Colin, L. Babcock, George Lowenstein and Richard Thaler (1995), "Labor Supply of New York City cab Drivers: One Day at a Time", The Quarterly Journal of Economics, 112, 407-441.

[10] Damasio, Antonio R. , Daniel Tranel and Hanna Damasio (1990), "Individuals with Sociopathic Behavior Caused by Frontal Damage Fail to Respond Autonomically To Social Stimuli" Behavioural Brain Research, Volume 41, Issue 2, Pages 81-166 pp: 81-94

[11] Damasio Antonio (1994) "Descartes' Error: Emotion, Reason and the Human Brain", G.P. Putnam' Sons, New York.

[12] Dohmen, Thomas, Armin Falk, David Huffman, Uwe Sunde, Jürgen Schupp and Gert G. Wagner (2005), "Individual Risk Attitudes: new Evidence from a Large, Representative, Experimentally validated Survey" German Institute for Economic Research Discussion Paper 511.

[13] Dohmen,Thomas J., Armin Falk, David Huffman and Uwe Sunde (2008), "Are Risk Aversion and Impatience Related to Cognituve Ability?, CEPR DP. No. 6852.

[14] Evans, J. St. B. T., Over, D. E. & Manktelow, K. (1993) "Reasoning, Decision Making and Rationality". Cognition 49:165–87.

[15] Frederick, Shane (2005), "Cognitive Reflection and Decision-Making," Journal of Economic Perspectives. 19, (4), 24-42

[16] Fudenberg, Drew, and David K. Levine. 2006. "A Dual Self Model of Impulse Control." American Economic Review, 96(5): 1449–76.

[17] Guiso, Luigi and M. Paiella (2008), "Risk Aversion, Wealth and Background Risk," Journal of the European Economic Association, forthcoming

[18] Guiso, Luigi, Luigi Pistaferri and Tullio Japelli (2002), "An Empirical Analysis of Earnings and Employment Risk." Journal of Business & Economics Statistics, Volume: 20 Number: 2, Page: 241 – 253.

[19] Guiso, Luigi, Paola Sapienza and Luigi Zingales, (2007) "Trusting the Stock Market", The Journal of Finance, forthcoming.

[20] Guiso, Luigi and Tullio Japelli (2008), "The Role of Intuition and Reasoning in Driving Aversion to Risk, Aversion to Ambiguity and Regret, mimeo, European University Institute.

[21] Gul, Faruk (1991), "A Theory of Disappointment Aversion", Econometrica, 59(3), pp. 667–86.

[22] Haliassos, Michael and Bertaut, Carol C. (1995) "Why Do So Few Hold Stocks?" Economic Journal, 1995, 105(432), pp. 1110–29.

[23] Hammond, K. R. (1996), "Human Judgment and Social Policy", Oxford University Press, Oxford.

[24] Higgins, E. Tory (1996), "Knowledge Activation: Accessibility, Applicability, and Salience," in E. Tory Higgins and Arie W. Kruglanski, eds., Social Psychology: Handbook of Basic Principles. New York: Guilford Press, 1996, pp. 133–68.

[25] Kahneman, Daniel. "Maps of Bounded Rationality: Psychology for Behavioral Economics." American Economic Review, 2003, 93(5), pp.1449–75.

[26] Kahneman, Daniel and Lovallo, Dan (1993), "Timid Choices and Bold Forecasts: A Cognitive Perspective on Risk Taking." Management Science, 39(1), pp. 17–31.

[27] Kahneman, Daniel and Tversky, Amos. "The Psychology of Preferences." Scientific American,1982, 246(1), pp. 160–73.

[28] Kirby, Kris N., Gordon C. Winston and Mariana Sentiesteban, (2005), "Impatience and Grades: Delay-Discount Rates Correlate Negatively with College GPA". Learning and Individual Differences, 15(3), 213-222..

[29] Klein, Gary (2003), "Intuition at Work: Why Developing your Gut Instincts Will Make you Better at what you Do". New York: Doubleday.

[30] Kumar, Alok and Lim, Sonya S. (2008),"How Do Decision Frames Influence the Stock Investment Choices of Individual Investors?", Management Science, 54(6): 1052-1064.

[31] Libet, Benjamin (xx) "Mind Time",

[32] Mankiw, N. Gregory and Zeldes, Stephen P. (1991) "The Consumption of Stockholders and Nonstockholders." Journal of Financial Economics, 29(1), pp. 97–112.

[33] McClure, Samuel M., David I. Laibson, George Loewenstein, and Jonathan D. Cohen (2004)" Separate Neural Systems Value Immediate and Delayed Monetary Rewards", Science, October, 306:503—507.

[34] Polkovnichenko, Valery. "Household Portfolio Diversification: A Case for Rank-Dependent Preferences." Review of Financial Studies, 2005, 18(4), pp. 1467–1502.

[35] Rabin, Matthew. "Risk Aversion and Expected-Utility Theory: A Calibration Theorem", Econometrica, 2000, 68(5), pp. 1281–92.

[36] Rabin, Matthew and Richard Thaler (2001), "Anomalies:Risk Aversion." Journal of Economic Perspectives", 15(1), pp. 219–32.

[37] Read, D., G. Loewenstein (1995), "Diversification Bias: Explaining the Discrepancy in Variety Seeking Between Combined and Separated Choices", Journal of Experimental Psychological Applications", 1, 34–49.

[38] Read, Daniel; Loewenstein, George and Rabin, Matthew (1999), "Choice Bracketing." Journal of

Risk and Uncertainty, 19(1–3), pp. 171–97.

[39] Redelmeier, Donald A. and Tversky, Amos (1992). "On the Framing of Multiple Prospects." Psychological Science, 3(3), pp. 191–93.

[40] Roese, N.J. and J.M. Olson (Eds) (1995) What Might Have Been: The Social Psychology of Counterfactual Thinking Mahwah, N.J: Erlbaum

[41] Sloman, S. A. (1996) The empirical case for two systems of reasoning. Psychological Bulletin 119:3–22. .

[42] Stanovich, Keith E. and West, Richard F. (2000) "Individual Differences in Reasoning: Implications for the Rationality Debate?" Behavioral and Brain Sciences, 23(5), pp. 645–65.

[43] Stanovich, Keith E. and West, Richard F. (2002). “Individual Differences in Reasoning: Implications for the Rationality Debate?” in Thomas Gilovich, Dale GrifŽ n, and Daniel Kahneman, eds., Heuristics and biases: The psychology of intuitive thought. New York: Cambridge University Press, 2002, pp. 421–40.

[44] Read, Daniel; Loewenstein, George and Rabin, Matthew. “Choice Bracketing.” Journal of Risk and Uncertainty, 1999, 19(1–3), pp. 171–97.

[45] Sabini, J. and M. Silver (1982), "Moralities of Everyday life", Oxford University Press, Oxford.

[46] Sirigu, A., Coricelli, G., Sallet J., Camille, N. and J.R. Duhamel (2004), “The Involvement of the Orbitofrontal Cortex in the Experience of Regret,” Science 304.

[47] Thaler, Richard (2000), "Mental Accounting Matters", in Daniel Kahneman and Amos Tversky (eds), "Choices, Values and Frames", Cambridge University Press, Cambridge UK.

[48] Thaler, Richard H., Amos Tversky, Daniel Kahneman, and Alan Schwartz. “The Effect of Myopia and Loss Aversion on Risk Taking: An Experimental Test.” Quarterly Journal of Economics, 1997, 112(2), pp. 647–61.

[49] Tversky, Amos and Kahneman, Daniel. “The Framing of Decisions and the Psychology of Choice.” Science, 1981, 211(4481), pp. 453–58.

[50] Tversky, Amos and Daniel Kahneman. (1991). "Loss Aversion in Riskless Choice: A Reference Dependent Model," Quarterly Journal of Economics 107(4), 1039-1061.

[51] Tversky, Amos and Kahneman, Daniel. “Advances in Prospect Theory: Cumulative Representation of Uncertainty.” Journal of Risk and Uncertainty, 1992, 5(4), pp. 297–323.

7 Data appendix

7.1 The UCS survey

The data used in this paper draw on a sample of Italian clients of the Unicredit Group. The Unicredit Clients' Survey (UCS) was conducted between June and September 2007 and elicits detailed financial and demographic information on a sample of 1,686 individuals with a checking account in one of the banks of the UniCredit Group. The sample is stratified according to three criteria: geographical area, city size, financial wealth, and it is explicitly over-samples rich clients. In particular, only clients with at least 10,000 euro of financial wealth at Unicredit at the end of 2006. The survey is CAPI.

An important feature of the survey is that the sample selection is based on individual clients of Unicredit. The survey, however, contains detailed information on the spouse, if present. Financial variables are elicited for both respondents and households. In the paper, demographic variables refer to the household head (even if different from the respondent), and economic variables (real and financial assets) to the household, not to the individual investor. The survey contains detailed information on ownership of real and financial assets, and amount invested. For real assets, UCS reports separate data on primary residence, investment real estate, land, business wealth, and debt (distinguished between mortgage and other debt). Real asset amounts are elicited without use of bracketing.

7.2 Definition of variables constructed from survey responses

Income . Value of the personal income of the survey respondent (thousand of euros). This figures is obtained from then answers to the survey.

Financial wealth. Value of financial assets of the respondent (thousands of euros). Obtained from the administrative records of Unicredit. For privacy reasons the value of financial has been randomized: assets were sorted in increasing order and the value of the assets of individual j was replaced by a three terms moving average using the two adiacent observations. The correlation between the true and randomized value if 0.99.

Income risk. Based on question about the probability distribution of one-year ahead earnings as reported in the text. This question is answered by all active workers. For non-active, retired workers we set earnings uncertainty equal to zero. We code it equal to 1 if the range of the probability distribution is positive and zero otherwise.

Education. Number of years of schooling, including primary, secondary, college and post-college education.

Cognitive ability. Obtained from the following questions: "Think of when you attended secondary school. How did you compare relatively to your class mates? 1) Among the top 5; 2) well above average; 3) about average; 4) somewhat below average." The variable is coded between 1 and 4, with larger values

denoting higher ability.

*Demographics*demographics such as age, gender,marital status, geographic location, city size are obtained from answers to the questionnaire.

Risk aversion. We use two indicators. The first is based on the question: "Which of the following statements comes closest to the amount of financial risk that you are willing to take when you make your financial investment?: (1) a very high return, with a very high risk of loosing the money; (2) high return and high risk; (3) moderate return and moderate risk; (4) low return and no risk." As an alternative indicator we use: "With which of the following statements do you agree most? (1) Risk is an uncertain event from which one can extract a profit; (2) Risk is an uncertain event from which one should seek protection." We define four dummy variables one for each level of risk aversion. The second indicator relies on the following question: "Think of being in a room and to get out you can choose between two doors: if you choose the right door you win a 10.000 euro prize; if you choose the wrong door you win nothing. You have also the give up the possibility of choosing between one of the two doors and exit from a back door, in which case you get a known certain amount of money.

If I offer you X euros would you give up the possibility of choosing between the two doors and leave from the back door?"

X takes values of increasing amounts starting from 100 euros to 9000 euros. If the 100 Euros for sure are preferred to the choice of one of the two doors, the process stops. Otherwise another larger value of X is offered until the safe bet is chosen. This value is then used to identify the degree of risk aversion. The indicator is coded as the first sure value at which the person switches. Clearly, larger values denote lower risk aversion

Generalized trust. Response to question: "Generally speaking, would you say that most people can be trusted or that you can't be too careful in dealing with people?". Coded a" 0=can't be too careful; 1: most people can be trusted.

Interview length. Minutes the interview lasted. This information is automatically recorded by the computer.

Interview climate, understanding and easiness in answering. Qualitative indicators reported at the end of the interview by the interviewers. The judgement is on scale between 1 and 10, with 1 standing for poor climate (understanding, easiness in answering questions) and 10 excellent climate (understanding, easiness in answering questions).

Table I: Descriptive statistics

This table shows summary statistic for the variables that are used in the estimates. Panel *A* shows summary statistics for the fraction that rejecting a small lottery [180,-100; ½, ½] and an indicator of accessibility to pre-existing risks. Accessibility is an indicator equal to 1 if the individual has answered the small lottery question after elicitation of the probability distribution of income one year-ahead; zero if he answered at the beginning of the questionnaire. Panel *B* contains summary statistics about demographics, income and wealth. Education is the number of years of schooling an college. Financial wealth is the value of financial assets held with Unicredit from administrative record, in thousands of euros. Income is in thousand of euros. Panel *C* shows summary statistics for risk attitudes, generalized trust and subjective discount. Low risk aversion is a dummy=1 if the individual prefers a relatively high return together with a relatively high risk (zero otherwise) when making portfolio decisions; Medium risk aversion is a dummy=1 if he prefers a satisfactory return with some moderate risk; High risk aversion is a dummy=1 if he prefers a very low return with no risk (zero otherwise). The quantitative risk aversion indicator is the value in euros makes the individual indifferent between accepting that money for sure and a lottery here he wins 10,000 euros with probability ½ and 0 with probability ½. Generalized trust is a dummy equal to one if the individual thinks that most people can be trusted. Subjective discount is a categorical variable between 1 and 6 with 1 corresponding to low discount (between 0 and 2%) and 6 corresponding to high discount (20% or more). In Panel D regret losses in an indicator variable between 1 and 3 with one corresponding to no regret when an avoidable loss is incurred, 2 some regret and 3 regret a lot. Regret missed gains is similarly defined. "Rely on intuition" is a dummy equal to 1 if people say they mostly rely on intuition when making decisions;" Rely both on intuition and reasoning" and "Rely mostly on reasoning" are similarly defined. In Panel E length of interview is minutes the interview lasted; the remaining three variables are qualitative indicators with scores between 1 and 10 reported by the interviewer at the end of the interview. Understanding is meant to measure how well questions were understood, easiness how difficult was to answer them and climate a general measure of how well the interview was received.

A. Small lottery and accessibility

	(1) Mean	(2) Median	(3) Standard deviation
Fraction turning down the lottery: *total sample*	0.608	1	0.488
Fraction turning down the lottery: *dropping the "I do not know" answers*	0.685	1	0.465
Accessibility to pre-existing risks	0.53	1	0.50

B. Demographics, income and wealth

Variable	(1) Mean	(2) Median	(3) Standard deviation
Age	54.81	57	12.27
Fraction male	0.70	1	0.46
Education (n. of years)	12.73	13	4.25
Fraction married	0.68	1	0.46
Resident in the North	0.51	1	0.50
Resident in the Center	0.24	0	0.43
City size indicator	0.01	0	0.11
Financial wealth (thousand euros)	208.60	120	408.01
Income (thousand euros)	50.17	31	67.84
Face earnings uncertainty (whole sample)	0.40	0	0.49
Face earnings uncertainty (among those in the labor force)	0.67	1	0.47

C. Attitudes

Variable	(1) Mean	(2) Median	(3) Standard deviation
Low risk aversion	0.28	0	0.45
Medium risk aversion	0.52	1	0.50
High risk aversion	0.19	0	0.39
Risk aversion: quantitative (euros)	4,210.50	4,000	3,333.60
Generalized trust	0.26	0	0.44
Subjective discount	3.58	4	1.78

D. Regret, intuition and reasoning

	(1) Mean	(2) Median	(3) Standard deviation
Regret losses	2.20	2	0.74
- no regret	0.21	0	0.41
- some regret	0.42	0	0.49
- regret a lot	0.38	0	0.48
Regret gains	1.67	2	0.63
- no regret	0.42	0	0.49
- some regret	0.49	0	0.50
- regret a lot	0.09	0	0.29
Rely mostly on intuition	0.15	1	0.35
Rely both on intuition and reasoning	0.43	1	0.49
Rely mostly on reasoning	0.42	1	0.49

E. Interview controls

	Mean	Median	Standard deviation
Length of interview (minutes)	62.27	60	20.22
Understanding of questions	7.60	8	1.90
Easiness in answering questions	7.40	8	1.95
Overall interview climate	8.12	8	1.85

Table II: Moments of demographic characteristics for high and low accessibility survey participants

This table shows means and standard deviation (in brackets) of various characteristics for the total sample and for survey participants with low and high accessibility to pre-existing risk. High accessibility refers to individuals that have answered the small lottery question after elicitation of the probability distribution of income one year-ahead; low accessibility if answered at the beginning of the questionnaire. Column (3) shows the difference in means between the two groups and column (4) the p-value for the null that the means are equal in the two samples.

	(1)	(2)	(3)	(4)
Variable	Low accessibility to pre-existing risk	High accessibility to pre-existing risk	Difference in means	*p*-value
Age	54.297	55.282	0.985	0.100
	(12.375)	(12.154)		
Fraction male	0.698	0.700	0.002	0.938
	(0.459)	(0.458)		
Educations (n. of years)	12.720	12.742	0.022	0.915
	(4.100)	(4.388)		
Fraction married	0.698	0.672	-0.026	0.244
	(0.459)	(0.470)		
Resident in the North	0.503	0.522	0.019	0.440
	(0.500)	(0500)		
Resident in the Center	0.252	0.234	-0.017	0.415
	(0.434)	(0.424)		
City size indicator	0.019	0.009	-0.010	0.085
	(0.136)	(0.0946)		
Financial wealth	194.646	221.223	26.576	0.182
	(1.468)	(474.434)		
Income	51.537	49.978	-1.559	0.638
	(73.991)	(61.826)		
Number of observations	799	887		

Table III: The basic test. Rejection rates of the small lottery for high and low accessibility to pre-existing risk

The table shows mean rejection rates of the small lottery for different groups of respondents (columns 1, 2 and 3) and tests of the difference in rejection rates between high and low accessibility individuals. High accessibility identifies the respondents who have been asked the small lottery question after they report the distribution of their future income; low accessibility identifies respondents that answered the lottery question before the future income question. Column 5 reports the *p*-value for the null hypothesis that the rejection rate is the same in the high and low accessibility groups (or that the fraction answering "I do not know" is the same, last column).

Variable	(1) Total sample	(2) Low accessibility to pre-existing risk	(3) High accessibility to pre-existing group	(4) Difference between high and low accessibility	(5) *p*-value
Including the "I do not know" responses (obs. 1,686)	0.608 (0.488)	0.652 (0.477)	0.568 (0.496)	-0.084	0.000
Dropping the "I do not know" responses (obs. 1,496)	0.685 (0.465)	0.725 (0.447)	0.649 (0.478)	-0.076	0.002
Fraction of "I do not know" responses	0.113	0.101	0.124	-.036	0.221

Table IV: Accessibility to pre-existing risks and rejection of a small beneficial lottery

This table shows marginal values of probit estimates of the probability of rejection of the small lottery. In panel A the left hand side is a dummy equal to 1 if the small lottery has been turned down; it is equal to zero if either had been accepted or the individual has answered "I do not know". In Panel B the left hand side is defined in the same way but those answering "I do not know are dropped from the sample. Accessibility is a variable equal to 1 if the lottery question was asked just after elicitation of the probability distribution of income one year-ahead and zero if asked at the beginning of the questionnaire. Coefficients are marginal effects of probit regressions. *p*-values are reported in parenthesis; *** significant at 1% or less, ** significant at 5%, * significant at 10%.

Panel A. The control groups includes the "I do not know"

	(1) no controls	(2) demographics	(3) demographics & attitudes	(4) demographics & attitudes
Accessibility	-0.084***	-0.088***	-0.088***	-0.089***
	(0.000)	(0.000)	(0.000)	(0.000)
Age		0.003***	0.002**	0.002**
		(0.009)	(0.019)	(0.017)
Male		-0.042	-0.028	-0.030
		(0.125)	(0.301)	(0.283)
Education		-0.006**	-0.005	-0.004
		(0.044)	(0.137)	(0.210)
Married		0.072***	0.074***	0.074***
		(0.007)	(0.006)	(0.006)
North		-0.025	-0.023	-0.015
		(0.402)	(0.453)	(0.625)
Centre		-0.054	-0.054	-0.042
		(0.118)	(0.118)	(0.230)
City size		-0.109	-0.099	-0.098
		(0.300)	(0.342)	(0.353)
Financial wealth		0.020	0.027	0.018
		(0.502)	(0.381)	(0.554)
Income		-0.298	-0.265	-0.239
		(0.102)	(0.149)	(0.195)
Low risk aversion			0.124	0.132
			(0.169)	(0.143)
Medium risk aversion			0.160*	0.167*
			(0.079)	(0.066)
High risk aversion			0.237***	0.243***
			(0.006)	(0.004)
Generalized trust				-0.102***
				(0.000)
Subjective discount				-0.006
				(0.361)
Observations	1,686	1,683	1,683	1,683

Panel B: The "I do not know" are dropped from the sample

	(1) no controls	(2) demographics	(3) demographics & attitudes	(4) demographics & attitudes
Accessibility	-0.076***	-0.081***	-0.080***	-0.082***
	(0.002)	(0.001)	(0.001)	(0.001)
Age		0.004***	0.003***	0.003***
		(0.000)	(0.001)	(0.001)
Male		-0.088***	-0.078***	-0.078***
		(0.001)	(0.005)	(0.005)
Education		-0.008**	-0.006**	-0.006*
		(0.011)	(0.041)	(0.076)
Married		0.054**	0.056**	0.056**
		(0.049)	(0.043)	(0.043)
North		-0.028	-0.026	-0.019
		(0.356)	(0.393)	(0.546)
Centre		-0.065*	-0.067*	-0.056
		(0.064)	(0.060)	(0.116)
City size		0.030	0.040	0.029
		(0.800)	(0.730)	(0.803)
Financial wealth		0.002	0.007	0.001
		(0.951)	(0.799)	(0.981)
Income		-0.342*	-0.323*	-0.296*
		(0.053)	(0.069)	(0.096)
Low risk aversion			0.119	0.129
			(0.185)	(0.148)
Medium risk aversion			0.144	0.152*
			(0.121)	(0.100)
High risk aversion			0.210**	0.216***
			(0.012)	(0.009)
Generalized trust				-0.092***
				(0.001)
Subjective discount				0.000
				(0.990)
Observations	1,496	1,494	1,494	1,494

Table V: Robustness

This table shows marginal values of probit estimates (columns 1, 2 and 4) and linear probability estimates (column 3) of the probability of rejection of the small lottery. The left hand side is a dummy equal to 1 if the small lottery has been turned down; it is equal to zero if either had been accepted or the individual has answered "I do not know". Accessibility is a variable equal to 1 if the lottery question was asked just after elicitation of the probability distribution of income one year-ahead and zero if asked at the beginning of the questionnaire. The last three variables are assessments of the interview as reported by the interviewer at the end of the interview. Coefficients are marginal effects of probit regressions. *p*-values are reported in parenthesis; *** significant at 1% or less, ** significant at 5%, * significant at 10%.

	(1)	(2)	(3)
	Probit	Fixed effect	Probit
Accessibility	-0.089***	-0.080***	-0.087***
	(0.000)	(0.000)	(0.000)
Age	0.002**	0.003***	0.002**
	(0.024)	(0.003)	(0.031)
Male	-0.031	-0.057**	-0.034
	(0.265)	(0.032)	(0.218)
Education	-0.004	-0.002	-0.005
	(0.225)	(0.553)	(0.141)
Married	0.073***	0.019	0.070***
	(0.007)	(0.465)	(0.009)
North	-0.023	0.001	-0.025
	(0.456)	(0.423)	(0.414)
Centre	-0.047	-0.040	-0.048
	(0.182)	(0.181)	(0.169)
City size	-0.099	-0.966	-0.100
	(0.349)	(0.120)	(0.343)
Financial wealth	-0.217	-0.311*	-0.215
	(0.241)	(0.093)	(0.246)
Income	0.017	0.010	0.015
	(0.586)	(0.744)	(0.614)
Low risk aversion	0.136	0.265***	0.146
	(0.130)	(0.003)	(0.103)
Medium risk aversion	0.170*	0.262***	0.180**
	(0.061)	(0.003)	(0.048)
High risk aversion	0.250***	0.333***	0.260***
	(0.003)	(0.000)	(0.002)
Generalized trust	-0.104***	-0.052*	-0.105***
	(0.000)	(0.067)	(0.000)
Subjective discount	-0.006	-0.004	-0.006
	(0.342)	(0.583)	(0.398)
Length of interview	0.001**	-0.000	0.001**
	(0.028)	(0.899)	(0.041)
Understading of questions		-0.011	0.004
		(0.385)	(0.772)
Easiness in answering questions		0.003	-0.002
		(0.815)	(0.888)
Overall interview climate			0.011
			(0.244)
Observations	1,683	1,683	1,683

Table VI: Pre-existing income risk and the rejection of a small beneficial lottery

This table shows marginal values of probit estimates of the effect of income risk on the probability of rejection of the small lottery. The left hand side is a dummy equal to 1 if the small lottery has been turned down; it is equal to zero if either had been accepted or the individual has answered "I do not know". Income uncertainty is a dummy equal to 1 if the expected maximum income one year ahead exceeds the minimum and zero if the two coincide. Accessibility is a variable equal to 1 if the lottery question was asked just after elicitation of the probability distribution of income one year-ahead and zero if asked at the beginning of the questionnaire. Coefficients are marginal effects of probit regressions. *p*-values are reported in parenthesis; *** significant at 1% or less, ** significant at 5%, * significant at 10%.

	(1)	(2)	(3)	(4)
	Whole sample	Whole sample	High accessibility	Low accessibility
Income uncertainty	-0.057**	0.004	-0.070*	-0.039
	(0.041)	(0.909)	(0.074)	(0.326)
Uncertainty × accessibility		-0.107***		
		(0.006)		
Age	0.001	0.001	0.002	0.001
	(0.257)	(0.201)	(0.215)	(0.589)
Male	-0.025	-0.028	0.003	-0.057
	(0.362)	(0.320)	(0.930)	(0.151)
Education	-0.004	-0.003	-0.001	-0.006
	(0.252)	(0.326)	(0.759)	(0.191)
Married	0.078***	0.078***	0.082**	0.070*
	(0.004)	(0.004)	(0.029)	(0.073)
North	-0.015	-0.013	-0.036	0.018
	(0.612)	(0.661)	(0.397)	(0.683)
Centre	-0.039	-0.041	-0.103**	0.029
	(0.269)	(0.239)	(0.037)	(0.558)
City size	-0.076	-0.084	0.042	-0.173
	(0.466)	(0.424)	(0.813)	(0.185)
Financial wealth	0.015	0.016	0.041	-0.030
	(0.631)	(0.593)	(0.290)	(0.569)
Income	-0.217	-0.222	-0.322	-0.138
	(0.240)	(0.228)	(0.269)	(0.563)
Low risk aversion	0.127	0.131	0.294**	-0.028
	(0.154)	(0.143)	(0.028)	(0.824)
Medium risk aversion	0.164*	0.166*	0.340**	0.017
	(0.070)	(0.066)	(0.013)	(0.890)
High risk aversion	0.241***	0.243***	0.357***	0.147
	(0.005)	(0.004)	(0.004)	(0.222)
Generalized trust	-0.100***	-0.101***	-0.087**	-0.108***
	(0.000)	(0.000)	(0.027)	(0.006)
Subjective discount	-0.006	-0.006	0.005	-0.019**
	(0.345)	(0.395)	(0.601)	(0.049)
Observations	1,683	1,683	885	798

Table VII: Assessing the role of regret

This table shows marginal values of probit estimates of the effect of regret on the decision to turn the small lottery down. Regret losses is an indicator comprised between 1 and 3 of the intensity an individual regrets an incurred loss that could have been avoided, where 1 stands for no regret, 2 for some regret and 3 for a "regret a lot"; the variable Regret missed gain has a similar interpretation but with respect to a gain that could have been obtained but has been missed. Accessibility is a variable equal to 1 if the lottery question was asked just after elicitation of the probability distribution of income one year-ahead. Coefficients are marginal effects of probit regressions. *p*-values are reported in parenthesis; *** significant at 1% or less, ** significant at 5%, * significant at 10%.

	(1)	(2)	(3)
Accessibility to pre-existing risk	-0.078***	-0.083***	-0.084***
	(0.001)	(0.001)	(0.001)
Regret losses	0.051***	0.046**	0.043**
	(0.003)	(0.010)	(0.016)
Regret missed gain	-0.117***	-0.102***	-0.101***
	(0.000)	(0.000)	(0.000)
Age		0.002*	0.002*
		(0.072)	(0.074)
Male		-0.031	-0.031
		(0.269)	(0.269)
Education		-0.006*	-0.005
		(0.069)	(0.125)
Married		0.068**	0.068**
		(0.012)	(0.012)
North		-0.026	-0.018
		(0.394)	(0.558)
Centre		-0.058*	-0.047
		(0.098)	(0.184)
City size		-0.100	-0.097
		(0.345)	(0.358)
Financial wealth category		0.028	0.020
		(0.362)	(0.510)
Income		-0.242	-0.215
		(0.190)	(0.247)
Low risk aversion		0.106	0.113
		(0.246)	(0.212)
Medium risk aversion		0.121	0.127
		(0.190)	(0.166)
High risk aversion		0.203**	0.209**
		(0.022)	(0.017)
Generalized trust			-0.099***
			(0.000)
Observations	1,686	1,683	1,683

Table VIII: Intuitive thinking, reasoning and the effect on narrow framing

This table shows marginal values of probit estimates of the effect of accessibility to pre-existing risks on the probability of rejection of the small lottery for individuals that differ in the reliance on intuition and reasoning when making decisions. The left hand side is a dummy equal to 1 if the small lottery has been turned down; it is equal to zero if either had been accepted or the individual has answered "I do not know". Accessibility is a variable equal to 1 if the lottery question was asked just after elicitation of the probability distribution of income one year-ahead and zero if asked at the beginning of the questionnaire. Coefficients are marginal effects of probit regressions. *p*-values are reported in parenthesis; *** significant at 1% or less, ** significant at 5%, * significant at 10%.

	(1)	(2)	(3)	(4)
	Total sample	Rely only on intuition	Both intuition and reasoning	Mostly on reasoning
Accessibility to pre-existing risk	-0.084***	0.043	-0.077**	-0.121***
	(0.001)	(0.504)	(0.042)	(0.001)
Regret losses	0.043**	-0.042	0.053*	0.058**
	(0.016)	(0.383)	(0.071)	(0.028)
Regret missed gain	-0.101***	-0.040	-0.096***	-0.108***
	(0.000)	(0.512)	(0.006)	(0.000)
Age	0.002*	0.000	0.003*	0.002
	(0.074)	(0.893)	(0.090)	(0.174)
Male	-0.031	0.002	-0.026	-0.046
	(0.269)	(0.983)	(0.546)	(0.284)
Education	-0.005	-0.008	-0.009*	0.002
	(0.125)	(0.327)	(0.075)	(0.721)
Married	0.068**	0.051	0.106***	0.016
	(0.012)	(0.490)	(0.010)	(0.699)
North	-0.018	-0.064	-0.056	0.022
	(0.558)	(0.470)	(0.253)	(0.622)
Centre	-0.047	-0.046	-0.052	-0.067
	(0.184)	(0.658)	(0.341)	(0.206)
City size	-0.097		-0.052	-0.159
	(0.358)		(0.694)	(0.403)
Financial wealth	0.020	0.020	0.004	0.039
	(0.510)	(0.761)	(0.930)	(0.541)
Income	-0.215	-0.899*	-0.147	0.101
	(0.247)	(0.084)	(0.581)	(0.770)
Low risk aversion	0.113	0.200	0.108	0.130
	(0.212)	(0.243)	(0.442)	(0.434)
Medium risk aversion	0.127	0.112	0.166	0.141
	(0.166)	(0.523)	(0.241)	(0.413)
High risk aversion	0.209**	0.155	0.246*	0.223
	(0.017)	(0.375)	(0.067)	(0.165)
Generalized trust	-0.099***	-0.183**	-0.108***	-0.049
	(0.000)	(0.011)	(0.009)	(0.309)
Observations	1,683	245	720	718

Table IX: The role of intuitive thinking and reasoning.

This table shows marginal values of probit estimates of the effect of pre-existing risks on the probability of rejection of the small lottery for individuals that differ both in accessibility to pre-existing risks and in the reliance on intuition and reasoning when making decisions. The left hand side is a dummy equal to 1 if the small lottery has been turned down; it is equal to zero if either had been accepted or the individual has answered "I do not know". Income uncertainty is a dummy equal to 1 if the expected maximum income one year ahead exceeds the minimum and zero if the two coincide. High accessibility refers to individuals that have answered the small lottery question after elicitation of the probability distribution of income one year-ahead; low accessibility if answered at the beginning of the questionnaire. Coefficients are marginal effects of probit regressions. *p*-values are reported in parenthesis; *** significant at 1% or less, ** significant at 5%, * significant at 10%.

	(1)	(2)	(3)	(4)	(5)	(6)
	Rely on intuition		Intuition and reasoning		Rely on reasoning	
	High accessibility	*Low accessibility*	*High accessibility*	*Low accessibility*	*High accessibility*	*Low accessibility*
Uncertainty	0.048	-0.089	0.050	-0.086	-0.194***	0.041
	(0.685)	(0.432)	(0.409)	(0.167)	(0.002)	(0.511)
Regret losses	-0.112	-0.014	0.061	0.062	0.074*	0.048
	(0.119)	(0.848)	(0.140)	(0.154)	(0.058)	(0.187)
Regret missed gains	0.046	-0.110	-0.114**	-0.107**	-0.121***	-0.083*
	(0.587)	(0.248)	(0.017)	(0.046)	(0.006)	(0.052)
Age	0.002	-0.001	0.004*	0.000	-0.000	0.002
	(0.713)	(0.742)	(0.086)	(0.922)	(0.939)	(0.494)
Male	0.093	-0.053	0.029	-0.068	-0.042	-0.032
	(0.416)	(0.646)	(0.617)	(0.279)	(0.508)	(0.595)
Education	-0.021*	-0.001	-0.007	-0.011	0.007	0.001
	(0.096)	(0.921)	(0.283)	(0.133)	(0.287)	(0.916)
Married	0.074	0.124	0.117**	0.100	0.047	-0.003
	(0.471)	(0.290)	(0.039)	(0.100)	(0.457)	(0.958)
North	-0.067	-0.064	-0.118*	0.005	-0.018	0.078
	(0.590)	(0.631)	(0.086)	(0.940)	(0.775)	(0.221)
Centre	-0.060	-0.088	-0.159**	0.073	-0.112	-0.022
	(0.711)	(0.552)	(0.042)	(0.346)	(0.140)	(0.764)
Financial wealth	0.372*	-0.245*	0.002	0.036	0.048	-0.081
	(0.052)	(0.093)	(0.979)	(0.592)	(0.548)	(0.566)
Income	-1.429*	-0.931	-0.579	0.113	0.182	0.035
	(0.070)	(0.256)	(0.217)	(0.736)	(0.699)	(0.948)
Low risk aversion	0.557**	-0.108	0.198	0.014	0.279	-0.071
	(0.020)	(0.659)	(0.351)	(0.945)	(0.234)	(0.794)
Medium risk aversion	0.480*	-0.182	0.282	0.060	0.319	-0.085
	(0.090)	(0.456)	(0.184)	(0.758)	(0.194)	(0.746)
High risk aversion	0.369	0.030	0.291	0.206	0.372*	0.041
	(0.114)	(0.909)	(0.156)	(0.267)	(0.094)	(0.876)
Generalized trust	-0.239**	-0.182*	-0.030	-0.196***	-0.118	0.012
	(0.025)	(0.098)	(0.605)	(0.001)	(0.110)	(0.847)
City size			-0.015	-0.075		-0.283
			(0.943)	(0.673)		(0.175)
Observations	119	126	382	338	383	334