POLICY IMPLICATIONS OF SUBOPTIMAL CHOICE: THEORY AND EVIDENCE[‡]

Misperceptions about Tax Audits[†]

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For some entities, such as self-employed individuals reporting income taxes or firms reporting value-added taxes, the optimal evasion rate depends substantially on audit features like audit probabilities and penalty rates (Allingham and Sandmo 1972).

Whereas it is easy for firms to find other important information such as inflation rates or exchange rates, it is difficult to find information about the probability of being audited and penalty rates. Indeed, Bérgolo et al. (2017) show evidence that firms have large misperceptions about these audit features.[1] In this paper, we

expand their analysis to explore the sources of these misperceptions.

I. Data

See Bérgolo et al. (2017) for details about the survey design and implementation. In a nutshell, the anonymous online survey was conducted in collaboration with the Internal Revenue Service (IRS) from Uruguay. The invitations were sent by email on May 2016 to a sample of 6,181 firms with valid email addresses—whereas Bérgolo et al. (2017) focuses on firms participating in a field experiment, we extend the analysis to a broader sample. The average firm invited to the survey had 5.24 employees, had been in existence for 14 years, and paid $7,887 in value-added taxes and $5,265 in other taxes over the previous year.[2]

Of the 6,181 firms invited to the survey, 3,628 (59 percent) responded. By request of the IRS, responses to all survey questions were voluntary. Across all questions, the average share of missing responses is 52 percent.

One question elicited the perceived probability of being audited: "*In your opinion, what is the probability that the tax returns filed by a company like yours will be audited at least in one of the next three years (from 0% to 100%)?*"

[1]Previous studies have used surveys to measure misperceptions about audit probabilities (e.g., US Department of Treasury 1988; Hessing et al. 1992; Sheffrin and Triest 1992). The evidence from Bérgolo et al. (2017) has two main advantages. First, compared to previous surveys that use samples of the general population, Bérgolo et al. (2017) focus on a population whose stakes of misperceiving the auditing process can be substantial. Second, Bérgolo et al.

(2017) combine survey and internal administrative data from the tax agency, which provides a more straightforward comparison of perceptions and reality.

[2]All monetary amounts are expressed in USD, converted from the original Uruguayan pesos using the exchange rate from August 23, 2015. This sample draws heavily from small and medium firms. In the universe of firms, the average number of employees is 10.40, the average age is 13.45 years, and the payment is $19.800 in value-added taxes and $10,943 in other taxes.
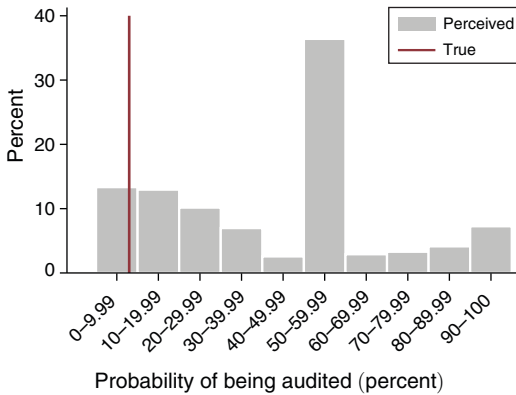
FIGURE 1. PERCEIVED AUDIT PROBABILITY

Notes: N = 1,791. The bars represent the distribution of survey responses. The vertical line is the actual probability of being audited.

FIGURE 2. PERCEIVED PENALTY RATE

Notes: N = 1,671. The bars represent the distribution of survey responses. The vertical line is the actual penalty rate.

We used a three-year period, because when selected for an audit, IRS investigates the firm's activity over the past three years. Another question elicited the perceived penalty rate: "*Let us imagine that a company like yours is audited and that tax evasion is detected. What, in your opinion, is the penalty (in %) as determined by law that the firm must pay in addition to the originally unpaid amount? For example, a fee of X% means that, for each $100 not paid, the firm would have to pay those original $100 plus $X in penalties.*" After each question, we elicited certainty in the response using a 1-to-5 scale, from "Not sure at all" to "Very sure."

To estimate the "actual" audit probability and penalty rate, we use administrative data from the IRS for the sample of firms invited to the survey. The actual audit probability is calculated as the percentage of firms that were audited at least once in 2011–2013. The average penalty rate is calculated among firms who were caught evading in 2011–2013.

II. Average Misperceptions

Figure 1 shows a histogram of the distribution of perceived audit probability among the survey respondents. The vertical line corresponds to the actual value of audit probability among the firms invited to the survey. Figure 1 suggests that most of the firms misperceive the audit probability. Moreover, there is a systematic
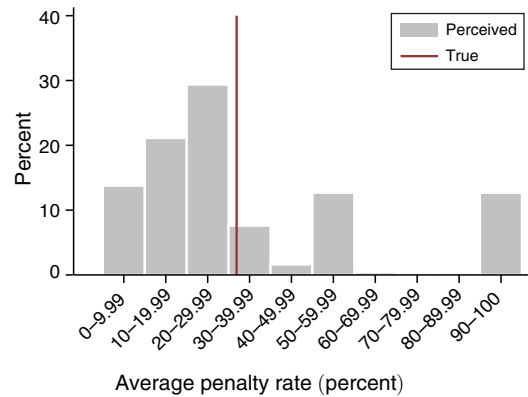
positive *Bias*: the average perceived probability (39.50 percent) is substantially higher than reality (7.98 percent), with a statistically significant difference ($p < 0.001$).

One potential explanation for this overestimation of audit probability is given by the availability heuristic model (Kahneman and Tversky 1974): audits are arguably salient events and thus seem more frequent than they are.

Figure 2 provides the same analysis as Figure 1, using perceived penalty rates instead of perceived audit probabilities. Again, most firms misperceive the average penalty rate. However, there is no systematic *Bias* in perceived penalty rates. The average perceived penalty (31.37 percent) is close to the actual average (31.91 percent), with a statistically insignificant difference ($p = 0.462$).

III. Heterogeneity Analysis

In this section, we present some heterogeneity analyses to explore the sources of these misperceptions. Table 1 summarizes the misperceptions using two measures. Panel A shows the results for the entire sample. *Bias* corresponds to the average difference between perceptions and reality. *MAE*, which stands for mean absolute error, corresponds to the average absolute difference between perceptions and reality.

First, we explore whether these misperceptions are driven primarily by less sophisticated

TABLE 1—RESULTS BY SUBGROUPS OF RESPONDENTS

	Audit probability			Penalty		
	Bias	MAE	N	Bias	MAE	N
Panel A. All						
	31.53	33.26	1,791	−0.54	23.59	1,671
	(0.643)	(0.592)		(0.736)	(0.457)	
Panel B. By occupation of respondent						
Accountants	33.80	35.13	331	−0.56	22.50	314
	(1.531)	(1.437)		(1.631)	(1.022)	
Non-accountants	31.05	32.80	1,370	−0.39	23.88	1,278
	(0.729)	(0.670)		(0.851)	(0.527)	
Panel C. By size						
>1 employee	32.95	35.27	605	0.89	22.79	565
	(1.066)	(0.935)		(1.252)	(0.804)	
≤1 employee	34.34	35.05	527	−4.36	24.15	483
	(1.207)	(1.167)		(1.317)	(0.752)	
Panel D. By age of the firm						
>= 12 years	30.50	32.22	807	−1.37	22.99	755
	(0.918)	(0.842)		(1.068)	(0.664)	
< 12 years	32.78	34.52	716	−0.168	23.92	668
	(1.051)	(0.970)		(1.181)	(0.733)	
Panel E. By history of audits						
Audited 11–13	46.43	47.06	209	3.24	24.74	188
	(1.773)	(1.691)		(2.364)	(1.539)	
Not-audited 11–13	29.10	31.02	1,397	−1.27	23.34	1,307
	(0.706)	(0.645)		(0.819)	(0.504)	
Panel F. By Tax morale						
High tax morale	32.72	34.38	1,010	1.80	25.02	965
	(0.849)	(0.782)		(1.027)	(0.639)	
Low tax morale	28.39	30.12	583	−4.17	20.67	554
	(1.089)	(1.006)		(1.102)	(0.688)	
Panel G. By degree of confidence in response						
High confidence	31.96	34.88	760	0.49	25.12	879
	(1.118)	(1.075)		(1.081)	(0.671)	
Low confidence	31.06	31.91	1,016	−1.58	21.92	787
	(0.694)	(0.655)		(0.991)	(0.611)	
Panel H. By responses equal or different from 50						
Exactly 50	42.03	42.03	652	18.09	18.09	212
	(0.00)	(0.00)		(0.00)	(0.00)	
Not exactly 50	25.52	28.24	1,139	−3.25	24.39	1,459
	(0.967)	(0.592)		(0.820)	(0.521)	

Notes: Bias is the average difference between perception. *MAE* is the average absolute difference between perception and reality. *N* is the total number of non-missing responses. For all panels but C and H, we compare the survey responses to the same estimates of actual probability (7.97 percent) and average penalty rate (31.91 percent). In panels C and H, the actual values of the parameters are computed by subgroups. In panel C, small firms have an actual probability of being audited of 3.47 percent and an average penalty rate of 34.12 percent; large firms have an actual probability of being audited of 11.92 percent and an average penalty rate of 31.33 percent. In panel H, older firms have an actual probability of being audited of 8.93 percent and an average penalty of 31.99 percent; newer firms have an actual audit probability of 6.97 percent and an average penalty of 31.80 percent.

Source: Author calculations based on survey and administrative data.

agents, who either do not have access to the relevant information or have no interest in accessing it. To explore this hypothesis, we exploit survey data on the self-identification of respondents.

Panel B of Table 1 breaks down the results by accountants (supposed experts on the topic) and non-accountants. Although some differences are statistically significant, the differences in misperceptions (as measured by *Bias* or *MAE*) are economically small across accountants and non-accountants, and the direction of these differences is not robust. This evidence refutes the hypothesis that less sophisticated agents drive most misperceptions.

The presence of misperceptions does not necessarily imply that firms are irrational. If the cost of searching for information is high enough, rational inattention models would predict some misperceptions. Given that this is a high-stakes environment where the average firm in the sample pays about $13,152 in taxes per year, rational inattention does not seem like a plausible explanation.

To provide more direct evidence on the rational inattention channel, panel C of Table 1 breaks down the results by number of employees. Firms with fewer than two employees pay an average of $8,921 in taxes per year, whereas firms with two or more employees pay an average of $16,855. According to the rational inattention model, larger firms should have smaller misperceptions, because their stakes are higher. Although some differences are statistically significant, the differences in misperceptions are small across smaller and larger firms. For example, the *MAE* in perceived probability is 35.27 for larger firms and 35.05 for smaller firms ($p = 0.885$). Thus, we find no suggestive evidence of rational inattention.

If a firm does not have access to other information sources, it may have to rely on its own history of audits as the main source of information. Panel D provides one test of this hypothesis by breaking down the results by firm age. Intuitively, older firms have more time than newer ones to gather information about the auditing process. Again, although some differences are statistically significant, the differences in misperceptions between older and younger firms are economically small. This evidence indicates that misperceptions can persist for decades.

Panel E provides related evidence by comparing firms that were audited at least once in

the previous three years and firms that were not. Consistent with the hypothesis that firms use their own audit histories as their main data sources, firms recently audited have higher perceived audit probabilities. This effect results in a higher *Bias* for firms with recent audit history (46.43 versus 29.10, $p < 0.001$) and a higher *MAE* (47.06 versus 31.02, $p < 0.001$). The results for the perceived penalty rate go in the same direction, but the differences are economically and statistically less significant. This finding suggests that this channel at least partially explains how direct contact with audits plays an important role in misperceptions about audit probabilities.

Some firms might pay their taxes because they think it is the right thing to do. For these firms, audits are irrelevant to their decision-making, and thus they have no incentive to be informed about the auditing process. According to this view, misperceptions may be driven exclusively by firms with high tax morale. To test this hypothesis, we use responses to a survey question that measures tax morale: *"On a Scale of 1 to 5, where 1 is 'Not justifiable at all' and 5 is 'Completely justifiable,' how much do you think it is justifiable to evade taxes?"* Panel F breaks down the results by high morale (value 1 in the score) and low morale (values 2 to 5). Consistent with this hypothesis, firms with higher tax morale have higher *Bias* and higher *MAE* than firms with lower tax morale. However, although these differences are statistically significant, they are moderate in magnitude. For example, the difference in *MAE* regarding audit probability is 34.38 versus 30.12 ($p < 0.001$).

We also explore whether firms are self-aware of their misperceptions by looking at the self-reported confidence in responses. When asked about audit probabilities, 42.60 percent of subjects reported to be sure or very sure about their answers, whereas 57.40 percent of subjects reported to be a little sure or not sure at all. The distribution of confidence is similar for the perceived audit penalty. In other words, firms are aware of their misperceptions from a collective perspective.

To further explore this question, panel G of Table 1 splits the results by firms that reported high-versus-low confidence in their responses. We find that, despite some statistically significant differences in misperceptions, these differences are economically small and point in the opposite direction than predicted.

Last, we address a confounding factor. It is possible that misperceptions are spuriously driven by firms that responded exactly 50 percent as a way of expressing that they are uncertain (Bruine de Bruin and Carman 2012).[3]

Since misperceptions are similar between firms that are certain and firms that are uncertain, this confounding factor seems unlikely to account for the findings. As additional evidence, panel H breaks down the results by firms that responded exactly 50 percent and firms that did not. By construction, the *Bias* and *MAE* are higher for firms reporting 50 percent. However, the misperceptions are still substantial even after dropping responses of 50 percent. In other words, although this issue with the survey responses may inflate the degree of misperceptions, it is far from explaining the whole puzzle.

IV. Conclusions

We present measures of perceptions about the auditing process in a sample of 6,181 firms from Uruguay. We find large misperceptions about audit probabilities and penalty rates. We also find a systematic overestimation of audit probabilities but no such overestimation for penalty rates. Of all the channels that we explore, recent contact with audits best explains differences in misperceptions.

These findings have direct policy implications. The high level of misperceptions may be attributed to the lack of publicly available and easily accessible information about the auditing process. Our results suggest that if tax authorities were more transparent about the auditing process, perceived audit probabilities would decrease, which could in turn reduce tax compliance. Thus, it may be in the best interest of tax agencies to reduce transparency. Indeed, this may be why tax authorities do not share this information.

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[3]For instance, among firms that report an audit probability of 50 percent, the fraction that report "Not sure" or "A bit sure" is 50.92 percent; in comparison, among firms that report an audit probability different from 50 percent, the fraction that reports "Not sure" or "A bit sure" is 29.06 percent. This difference is statistically significant ($p < 0.001$).

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