Identifying Reticent Respondents: Assessing the Quality of Survey Data on Corruption and Values

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I. Introduction

Accurate measurement of corruption and values is of immense importance. Researchers use corruption measurements to examine the determinants of growth, investment, resource allocation, health, and education levels.[1] Data on values are crucial for studies linking culture, governance, and growth.[2] Aid providers and policy makers use corruption indicators to monitor governance quality, with consequences for the provision of aid.[3] Even the general public evinces keen interest in such measures, with journalists, politicians, and citizens comparing their own countries with others.[4]

In economics at least, methodological research aimed at improving accuracy of data on corruption and values has not kept pace with the burgeoning interest

[1] See Mauro (1995, 1998) on investment and resource allocation; Knack and Keefer (1995) on growth; and Gupta, Davoodi, and Tiongson (2001) on health and education.

[2] Knack and Keefer (1997) is a well-known contribution in economics. Barro and McCleary (2003) connect religious beliefs to growth.

[3] The Millennium Challenge Account will allocate billions of dollars using measures of governance.

[4] See "Corruption, Your Name Is Nigeria," *Time*, September 14, 2000; or, on values, "Living with a Superpower," *Economist*, January 2, 2003. For Romania, see "Spaga romaneasca bate bacsisul turcesc" [Romanian bribery surpasses Turkish], *Romania Libera*, March 17, 2005, 1.

in these new types of data.[5] This lacuna is of particular concern because inquiries on corruption and values often touch on sensitive matters, and it is well known that many respondents are not fully candid in answering sensitive questions. Synthesizing the results from a number of studies, Lensvelt-Mulders et al. (2005) find that survey responses underreport the commission of sensitive acts by 45% on average. Surveys on sensitive topics suffer from the reticence of respondents.

We define a reticent respondent as one who gives knowingly false answers with a nonzero probability when honest answers to a specific set of survey questions could lead to the inference that the respondent might have committed a sensitive act. This definition highlights several important aspects of reticence. First, reticence is defined with respect to a given set of survey questions, which are on a particular topic and which are phrased with a particular degree of sensitivity. Second, reticent respondents do not always give untruthful answers, but sometimes do. Third, reticent respondents are troubled even by inferences that suggest only a positive probability of guilt. Fourth, there is no presumption that the reticent are guilty of the sensitive act.

Among the techniques that have been used to mute reticence is randomized response, where the survey question leaves ambiguity about which facts underlie an individual's answer. In randomized response, respondents are asked to toss a coin and answer questions on the basis of the coin toss—answer yes if you cheated on your taxes or the coin came up heads. Thus, candor is encouraged by asking about the combination of sensitive and nonsensitive topics. This method has had limited success. Lensvelt-Mulders et al. (2005) find that randomized response reduces underreporting from 45% to 38%. Hence respondents are often reticent even when answering randomized response questions.

We leverage this finding to develop a method of identifying the reticent. Faced with a set of randomized response questions, the reticent might give a series of answers that would be extremely unlikely for a candid respondent— the coin came up tails too many times. We thus turn randomized response

on its head: instead of using it to encourage candor, we use it to identify those who give improbable answers, that is, the reticent.

Our argument is structured as follows. In Section II, we briefly describe the context of the practical application of our methodology, a survey of Romanian businesses. In Section III, we describe the methodology in detail. We identify some, but not all, of the reticent respondents and split the sample into two groups, those who are identified as reticent and the remainder.

The subsequent sections examine the validity of our methodology by investigating whether the division of the sample into these two groups provides any leverage in analyzing survey results. We present many results consistent with the hypothesis that those identified as reticent are actually reticent when responding to standard survey questions. Hence, survey-derived estimates of corruption are downward biased.

Section IV shows that reticent respondents are less likely to admit to making informal payments. Section V examines the perceptions of businesses on corruption among public officials. The reticent are less likely to say that public officials take part in illegal or semi-legal acts. Thus, asking about corruption perceptions, rather than experience, does not reduce the effect of reticence. Section VI focuses on questions concerning values. Reticent respondents report that they are of a higher moral standing than other respondents, ironically including on telling the truth. Section VII considers which respondents are more likely to be reticent, identifying age and region of respondent as two significant factors. The result on regions raises the possibility that biases due to reticence may vary across countries.

Section VIII considers how many reticent respondents there are in the sample and how much corruption might be underestimated due to reticence. Using information from a different survey of Romanian businesses and applying conservative assumptions when combining the results of the two surveys, we estimate that 35% of respondents are actually reticent. Even with these conservative assumptions, the estimate of the proportion of firms giving informal payments is increased by one-third after adjusting for reticence.

In Section IX, we consider alternatives to our conclusion that data on corruption and values are downward biased by the presence of reticence. We argue that alternative interpretations do not come close to providing a satisfactory explanation of the full gamut of our empirical findings. The conclusion that best matches our empirical results is the simplest one—that those identified as reticent are actually reticent about their corruption behavior and their moral virtues.

We conclude with suggestions on how our methodology might help to improve the accuracy of survey research. We are convinced that survey research

is a powerful tool of analysis and that its use has already contributed important findings in areas where economics had little to say only a decade or so ago. Governance, trust, corruption, and culture are all objects of economic research now, in good part because of the increasing use of surveys. Our study is not a criticism of that work but, rather, a suggestion of a route to greater precision.

II. Romania and the Survey: Background
Our methodology is practical—it is easily embodied in standard survey research—and it works—respondents identified as reticent respond differently from others. Therefore, we demonstrate it using a practical application. This section describes the setting of that application, a survey of Romanian business officials focusing on corruption in licensing and inspections.

A. Romania
Romania has a per capita income that is one of the lowest in Europe but higher than in most of the transition countries of the former Soviet Union (FSU). The first decade of transition worsened economic conditions, but strong growth appeared by the time we conducted our survey. Educational levels are high relative to incomes, meaning a sophisticated survey was easy to implement. Outside the Soviet Union, Romania had one of the more repressive communist regimes, suggesting that respondents could be particularly worried about answering intrusive survey questions.

Two widely used indices of general corruption, produced by the World Bank and Transparency International, classify Romania as relatively corrupt given its location and level of development (Kaufmann, Kraay, and Mastruzzi 2004; Transparency International 2005). The topic of our survey was a natural one given that the burden of corruption on businesses is relatively high, with corruption in business licensing particularly a problem (World Bank 2002).

B. The Survey
The survey research examined the amount and nature of corruption in registering, licensing, and inspecting businesses. The questionnaire focused on two entities that businesses are likely to interact with: the One-Stop Shops, charged with administering business registration (and frequent reregistration), and the inspections and authorizations departments of the local branches of the health ministry. All firms have to deal with the One-Stop Shops. Health inspections and licensing constitute one of the most intrusive and administratively burdensome sets of requirements faced by Romanian businesses.

The research design reflected the focus on these two agencies. Every sampled firm was due to interact with the One-Stop Shops in the time period covered

by the questionnaire. New firms were oversampled, to focus on initial registration. Firms in activities subject to intrusive health regulations were also oversampled. The questionnaire reflected the rules and practices of the two agencies and asked about highly specific interactions between businesses and the agencies. In addition, the questionnaire elicited general impressions of corruption in the two agencies. Questions from the World Values Survey provided the basis for statements on values by respondents.

The sample comprised 514 businesses in 41 *judets* (counties).[6] *Judet* sample sizes varied between 12 and 17. Respondents were either heads or deputy heads of the businesses (89%) or other officials who were close to the head and had knowledge of pertinent activities (11%). There was considerable demographic diversity among the respondents: 59% were male and 41% female, ages ranged from 20 to 81 with a mean of 39. Face-to-face interviews took place during May and June 2004, with the interviewer playing the standard role of ensuring that questionnaire procedures were precisely followed and responses were recorded accurately.

III. Using Randomized Response Questions to Identify Reticent Respondents

In order to elicit candid answers, randomized response asks a sensitive question, but only probabilistically (Warner 1965). Respondents toss a coin and then say yes if either they tossed a head or they had committed a sensitive act. This technique is supposed to induce candor but generally has not been effective. Our method leverages this by noting that some respondents might report an implausibly large number of "no" responses to a series of randomized response questions, allowing us to identify them as reticent.

Our adaptation of the randomized response procedure was administered at the end of the questionnaire, so that negative reactions to this procedure could not affect the answers to questions on corruption and values. The details of the procedure are as follows. The interviewer administers a series of 10 randomized response questions, each with a different sensitive act and its own coin toss. Seven of the questions are in the range of sensitivity of the rest of the questionnaire. Answers on these seven questions provide the data to judge reticence. Interspersed among these seven are an additional three, less sensitive, questions. The presence of these three allows a reticent respondent to say yes occasionally, while still answering no to the seven truly sensitive questions.

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[6] *Judets* are the administrative level immediately below the national government. There are 41 *judets* plus the City of Bucharest. Practically, Bucharest is on a par with the 41 *judets*, and we classify it as such for convenience. A new and small *judet*, Ilfov, which surrounds the capital city, was not included in the study.

This counters sophisticated strategies by those who understand the improbability of tossing many tails in a row. Data on the three less sensitive questions are not used in the analysis.

The 10 questions appear in table 1, with the seven truly sensitive questions in bold. Aggregate survey responses are in the last column. Note that for six of the seven truly sensitive questions the percentages responding "yes . . . or . . ." are below 50%, implying that the application of standard randomized response would lead to negative estimates of the prevalence of these six acts. This indicates a significant degree of reticence.

Despite the minuscule probability of obtaining seven tails in seven tosses (1/128; table 2), 10% of respondents said no to all seven questions. We treat these as reticent.[7] Three of the 514 respondents refused to answer the randomized response questions. We also treat them as reticent.[8]

It is likely that many respondents who said yes only once or twice (25.8% of the sample) were reticent, in the sense that they responded no to some of the sensitive randomized questions when candor would have required a yes. But the proportion of reticent and candid respondents in the 1-yes and 2-yes groups is difficult to estimate, requiring assumptions on the prevalence of guilt in the sample.[9]

Thus, we split the sample into the 54 (10.5%) whom we classify as reticent and the 460 (89.5%) who were possibly candid. We cannot precisely estimate how many in the "possibly candid" subsample are actually candid, though we do provide a rough estimate in Section VIII. That estimate shows that the possibly candid grouping does contain many reticent respondents.

IV. Reticence and Responses on Informal Payments in Direct Interactions

To examine whether dividing the sample into reticent and possibly candid subgroups provides any leverage, we first examine responses to questions about informal payments in highly specific interactions with government agencies.

[7] Statistical patterns have previously been used to detect suspicious behavior (e.g., Jacob and Levitt 2003). We use statistical patterns to detect reticence rather than trying to detect antisocial behavior itself.

[8] An alternative would be dropping the three respondents who refused to answer the question on reticence. Dropping these three respondents does not make any significant difference to the results we present.

[9] Under the assumption that no one had done these acts and everyone answers all questions with candor, the proportion of respondents who say yes once or twice should be 5.5% and 16.4%, respectively. This is not substantially below the observed frequencies of 7.8% and 18%. If we make the more realistic assumption that some people have actually done some of these acts, then it is possible that the majority of respondents who said yes once or twice were reticent.

TABLE 1

THE SERIES OF RANDOMIZED RESPONSE QUESTIONS

Interviewer: Hand the respondent a coin. Say, "I will now read out the question. Please toss the coin and then say yes if either the coin came up heads or you have ever done this behavior; say no only if the coin came up tails and you have never done this behavior. Please do not let me see the coin."

	YES. Coin came up heads OR you've done this behavior.	NO. Coin came up tails AND you've never done this behavior.	Percentage answering "YES. Coin came up heads OR you've done this behavior."
1. **Have you ever paid less in personal taxes than you should have under the law?**			47.7
2. **Have you ever paid less in business taxes than you should have under the law?**			41.9
3. **Have you ever made a misstatement on a job application?**			39.5
4. Have you ever used the office telephone for personal business?			66.9
5. **Have you ever inappropriately promoted an employee for personal reasons?**			47.2
6. **Have you ever deliberately not given your suppliers or clients what was due to them?**			42.5
7. Have you ever lied in your own self-interest?			65.4
8. **Have you ever inappropriately hired a staff member for personal reasons?**			53.2
9. Have you ever been purposely late for work?			60.7
10. **Have you ever unfairly dismissed an employee for personal reasons?**			41.7

Note. This table (except for the last column) is the translation from Romanian of the set of randomized response questions as posed to respondents. The seven sensitive questions we use to identify reticent respondents are set in bold. They were not bolded in the Romanian-language surveys. In the administration of the survey, including our communications with the survey firm, we treated all 10 questions in the same way. Hence the interviewers would have had no reason to differentiate between questions.

TABLE 2
COMPARING THE THEORETICAL AND ACTUAL DISTRIBUTION OF NUMBERS OF YESES

Number of Yeses	Percent of Respondents Expected under the Angels Assumption	Percent of Respondents in Business Survey
0	.8	10.5
1	5.5	7.8
2	16.4	18.0
3	27.3	20.4
4	27.3	20.9
5	16.4	14.1
6	5.5	7.1
7	.8	1.8

Note. The angels assumption: nobody had ever done any of these acts and all give candid answers. (Under the assumptions that some respondents had actually done one of the seven sensitive acts but that they were candid, the expected percentage of 0s, 1s, and 2s would be lower.)

A. Whether the Respondent Answered a Question about Informal Payments

The questionnaire asked about two specific interactions with the One-Stop Shops—initial registration for new businesses or obtaining a new registration code for older ones—and about two interactions with the health inspectorate—obtaining licenses and being subject to inspections. For all four interactions we asked whether informal payments were voluntarily offered by the respondent and whether informal payments were demanded by officials. In all, we asked 11 questions about informal payments, by varying the context of the possible payment (initiator, quid pro quo, etc.).[10]

Thirty respondents chose not to answer the questions, in a variety of ways—not admitting to an interaction with the public official at all, refusing to answer, or saying "don't know." The most tight-lipped of responses is to refuse to acknowledge interacting with a public official in the tightly defined situations depicted in the survey. This is prima facie evidence of unwillingness to cooperate since we had designed the survey to ensure that all sampled businesses had at least one such interaction. Seven respondents chose this route, 7% (4/54) of the reticent and less than 1% (3/460) of the possibly candid ($t = 4.11$, $p = .00$). Table 3 contains a summary of the results of this and the following subsection.

[10] In addition, different respondents were asked about these four interactions in different ways, with some asked about their own business and some asked about "businesses like yours." The latter form has been used in corruption surveys in the hope of encouraging candidness. In fact there was virtually no difference between the corruption admission rates of the two groups. Furthermore, differences between the reticent and possibly candid were of a similar magnitude for those who were asked about themselves and those asked about others. The results suggest that asking about others does not decrease reticence. Because of this, we do not present separate results for these two sets of respondents.

TABLE 3
ADMISSION RATES ON INFORMAL PAYMENTS IN THE RETICENT AND POSSIBLY CANDID SUBSAMPLES

Response to Survey Questions on Interactions with Public Officials and Related Informal Payments	Sample of Respondents	Percentage of Reticent Subsample	Percentage of Possibly Candid Subsample	t-Statistic for Difference	p-Value
Don't admit to interactions	All	7.4	.6	4.11	.000
Don't give responses to questions about informal payments	Those acknowledging interactions	16.0	3.2	4.16	.000
Either don't admit to interactions or don't give responses on questions about informal payments	All	22.2	3.9	5.58	.000
Admit to a positive payment	Those saying payment is either zero or positive	4.7	16.0	1.96	.051
Admit to a positive payment	All	3.7	15.4	2.34	.019

Some respondents acknowledged at least one pertinent interaction with public officials but did not answer any of the questions on informal payments. Conditional on admitting to an interaction, the likelihood of a respondent not answering these questions is 16% for reticent respondents and 3% for the possibly candid, which is highly significant statistically ($t = 4.16$, $p = .00$). Pooling the foregoing results, among the reticent, 22% did not answer any of the questions on informal payments, while only 3.9% of the possibly candid did not answer ($t = 5.58$, $p = .00$).

B. Whether the Respondent Admitted Making an Informal Payment

If we restrict ourselves to those respondents providing an answer to at least one question about informal payments, we find that 4.7% of the reticent admitted to having made an informal payment, while 16% of the possibly candid did so. The difference is significant at the 6% level ($t = 1.96$, $p = .051$).

As the above makes clear, there are many ways respondents can avoid admitting to informal payments—denying being in a position to pay one, saying don't know, refusing to answer, or answering and saying no payment was made. The reticent take each of these routes. If we pool them all, we find 15.4% of the possibly candid admitting to payments, but only 3.7% of the reticent doing so, a highly significant difference ($t = 2.34$, $p = .019$).[11]

C. The Effect of Other Respondent Characteristics

The results summarized in table 3 establish that those who are identified as reticent acknowledge fewer misdeeds. The natural assumption is that the reticent have something to hide. Nevertheless, it is worth checking whether these results arise because of an omitted variable problem. Thus, we carried out several multivariate analyses to examine whether the differences in responses between reticent and possibly candid respondents remain significant when controlling for demographic and firm-related variables. For reasons of brevity, we summarize these results rather than reporting them more fully.[12]

We ran two sets of regressions, one with "no valid answer" as the dependent variable and another with "admitting to paying a bribe" as the dependent variable. Our reticence variable is a strong predictor of both dependent variables

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[11] There are 54 respondents identified as reticent by the randomized response technique. Of these, 15 did not answer questions about informal payments and 39 did. Two of these reticent respondents did in fact admit to making informal payments; this equals 3.7% (2/54) of the reticent respondents and 4.7% (2/39) of the reticent respondents who answered questions about informal payments.

[12] Results are available from the authors on request.

in all variations of the analyses.[13] Firm size, gender, and length of job tenure do not add anything to the reticence variable in predicting nonanswers or nonadmission. Older respondents tend to be less likely to admit to bribe payments, an effect that is marginally significant. In some specifications, firms in better financial condition appear to be less likely to give valid answers. There is significant interregional variation in the propensity not to answer questions on informal payments. Nevertheless, none of these variables reduces the power of reticence in predicting whether respondents admit making informal payments.[14]

V. Reticence and Responses on More General Questions on Corruption

Among scholars seeking to measure corruption, there is debate on whether to ask about experiences or perceptions. Asking about experiences allows a focus on a concrete situation and produces easily interpretable data. But as the previous results attest, reticence has a real effect on responses to direct questions.[15] We now examine whether this is also the case for perceptions, analyzing how businessmen responded when asked about the prevalence of corrupt behaviors without any direct reference to the respondent. The focus is still on the One-Stop Shops and the local branches of the health ministry.

We asked respondents about eight behaviors ranging from the tenuously corrupt "Favoring personal acquaintances" to the clearly criminal "Personally keeping part of the official fees taken from a business." A summary of the responses appears in table 4, which focuses on differences between the possibly candid and the reticent.

The differences in responses between the reticent and the possibly candid are not significant for the two most common behaviors, closer to statistical significance for the next three, and highly significant for the three least prevalent behaviors.[16] Hence, asking about perceptions rather than experiences does not eliminate the effect of reticence. Moreover, the magnitudes of the differences are meaningful. For the two least prevalent behaviors, for example, the

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[13] We varied the set of variables added to the regressions and the statistical technique (OLS versus probit) used, and did the analyses with and without regional fixed effects.

[14] The regressions also included a dummy for whether respondents were asked about their own company or companies like their own. The coefficients on this variable were always insignificant. Moreover, the regressions also included an interaction term of a dummy for our reticence variable and a dummy for "asked about own company." The coefficients on this interaction term were also always insignificant.

[15] Moreover, as discussed briefly in the previous section, respondents do not appear to be more comfortable when the question is camouflaged by asking about "businesses like yours."

[16] We are assuming that the behaviors reported the least are the most sensitive. Very similar results appear in tests that use standard errors adjusted to take into account clustering at the *judet* level.

TABLE 4
PERCEPTIONS OF PREVALENCE OF CORRUPTION

	One-Stop Shops			Health Departments		
	% of Possibly Candid	% of Reticent	Prob. Level of Difference in %s	% of Possibly Candid	% of Reticent	Prob. Level of Difference in %s
Favoring personal acquaintances in the process of registering businesses	86	88	.623	86	90	.428
Accepting a gift or informal monetary payment voluntarily offered by a company official	84	81	.554	88	83	.241
Insisting that a business use a specific private intermediary to handle its interactions with this institution	66	58	.283	69	58	.116
Demanding an informal payment from a company official in order to speed up the process of registration and authorization	64	55	.175	70	60	.141
Accepting informal payments from an existing company in return for delaying the registration/authorization of a competitor	53	43	.173	55	45	.173
Refusing to register or authorize a business unless being given an informal payment	50	33	.018	55	37	.014
Accepts bribes in return for reducing fees for particular companies	48	25	.002	48	23	.001
Personally keeping part of the official fees taken from a business	33	17	.022	36	21	.039

Note. Percentage of individuals giving a nonzero answer to the following question: "How prevalent is the activity listed in the row? Please answer on a scale of 0–10, where 0 means 'nobody does it' and 10 means 'everybody does it'." The number of observations for the questions varied from 457 to 492. Note that the results retain the same features if those not answering the question are classified as 0s, that is, not willing to give an answer acknowledging the existence of corrupt behavior. Note that the results retain the same features if respondents' answers on the 0–10 scale are used as the dependent variable.

TABLE 5
ACCEPTABILITY OF RULE VIOLATIONS BASED ON QUESTIONS FROM WORLD VALUES SURVEY

	Percentage of Respondents Stating That Behavior Is Never Justified (i.e., Answering with a 0)		
	Possibly Candid	Reticent	Prob. Level
1. Claiming government benefits which you are not entitled to	79	92	.009
2. Avoiding a fare on public transport	69	91	.000
3. Evading taxes if you have the chance	53	77	.000
4. Buying something you knew was stolen	77	92	.005
5. Keeping money that you have found	58	74	.015
6. Lying in your own interest	45	70	.000
7. Someone accepting an informal payment in the course of their duties	71	91	.001
8. Failing to report damage you've done accidentally to a parked vehicle	78	84	.116
9. Throwing away litter in a public place	86	92	.103

Note. Respondents were read the following general element of the question and then asked to answer individually for each of the nine items in the table: "Please rate the following actions in terms of the extent to which they can be viewed as justified. Rate on a scale of 0–10, where 0 means never justified under any circumstances and 10 means they are perfectly reasonable behaviors." The number of observations varies from 508 to 510. Note that the results retain the same features if the respondents' answers on the 0–10 scale are used as the dependent variable.

reticent report a frequency approximately one-half of that of the possibly candid. As we show in Section VIII, such magnitudes translate into substantial effects on estimated rates of corruption, once it is recognized that the possibly candid sample contains unidentified reticent respondents.

VI. Statements on Values

The World Values Survey is one of the best known surveys in the social sciences, covering such topics as trust, organizational membership, sexuality, family life, religious belief, and civic obedience. The survey has been implemented in over 80 countries, and in many of these at a number of different times. Many scholarly articles and books have used these data to produce groundbreaking results.

We included nine questions on values taken from the World Values Survey (2000); table 5 contains the questions and results. These questions are all of the same form, asking the respondents to rate whether certain behaviors can

be justified on a scale of 0 to 10.[17] The behaviors include lying, littering, evading taxes, accepting bribes, and so forth. The variable we use for our analysis is whether the respondent answers 0 or not, with 0 corresponding to a behavior judged to be never justifiable. The proportion of respondents who consider acts never justifiable ranges from 46% (for lying) to 86% (for littering).

Reticent respondents are far more likely to say that the acts are never justifiable. The differences between the responses of the reticent and the possibly candid are generally large and significant—six of nine are significant at 1%. The differences remain significant and of the same magnitude when we use regressions to control for age, gender, and region.[18] Ironically, the largest and most significant difference is on whether telling a lie is ever justifiable. Forty-four percent of the possibly candid say it is never justifiable to lie, in contrast to 68% of the reticent ($p = .00$).

In sum, we have found that reticent respondents answered questions about civic values in substantially different ways than the possibly candid. One implication of this is that comparisons of values across regions or countries could be misleading if reticence varies significantly across jurisdictions. To obtain insight on this issue, we now examine who the reticent are.

VII. Who Is Reticent?

We relate reticence to demographic, economic, and geographic variables. This is a limited exercise because it was not envisaged in the original survey design and therefore relies on variables collected for other purposes. Table 6 presents definitions and summary statistics for the variables. The dependent variable is whether the respondent was identified as reticent. We use probit and report marginal effects, which appear in table 7.

Age is a strong predictor of reticence. Every decade of life makes a respondent 2% more likely to be reticent, a large effect in view of the average reticence of 10%. Age proxies the proportion of working years spent under a particularly repressive communist regime, which no doubt led to ingrained suspicion of strangers asking sensitive questions. If years under communist rule is the reason for the age effect, survey methods would produce unduly pessimistic results on the effects of anticorruption efforts in postcommunist countries. As the experience of communist rule declines, candor would increase, leading to

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[17] The World Values Survey uses a scale of 1 to 10, but we used 0 to 10. Our scale allows respondents to choose a whole number mid-point. In the World Values Survey there is a spike at 5 for many questions, possibly as a result of respondents thinking that the mid-point of 1 and 10 is 5!

[18] Age and region, but not gender, are significant predictors of values.

TABLE 6
SUMMARY STATISTICS FOR VARIABLES EXPLAINING RETICENCE

Variable	Definition	No. of Observations	Mean	SD	Min.	Max.
Reticent	Dummy for reticence (said no to all seven randomized response questions)	514	.105	.307	0	1
Gender	Dummy if male	514	.589	.492	0	1
Age	In years	514	38.632	10.823	20	81
Education	Index of education (1 = primary to 6 = postgraduate)	514	4.152	1.045	1	6
Economic conditions	Index of financial condition of enterprise (based on information on salaries, profits, bonuses, arrears, temporary layoffs)	514	.721	.167	.056	1
Tenure	Number of years in firm	514	4.632	4.519	0	27
Log(firm size)	Log of number of employees	505	1.591	1.312	0	6.908
Muntenia	In historical region of Muntenia	514	.381	.486	0	1
Moldova	In historical region of Moldova	514	.235	.425	0	1
Judet reticence	Proportion of respondents in the *judet* who are reticent (calculated excluding reticence data from the respondent corresponding to the observation)	514	.105	.136	0	.545

TABLE 7
WHO IS RETICENT? MARGINAL EFFECTS FROM PROBIT
REGRESSIONS, WITH DEPENDENT VARIABLE INDICATING WHETHER
THE RESPONDENT IS IDENTIFIED AS RETICENT

	(1)	(2)
Gender	−.002	−.009
	(.06)	(.34)
Age	.003	.003
	(2.47)**	(2.76)***
Education	.007	.008
	(.48)	(.67)
Economic condition	−.031	−.023
	(.51)	(.42)
Log(firm size)	.007	.006
	(.52)	(.44)
Tenure	−.001	−.001
	(.34)	(.21)
Muntenia	.103	.042
	(2.46)**	(1.94)*
Moldova	.062	.007
	(.95)	(.21)
Judet reticence		.413
		(7.27)***
Observations	505	505

Note. *Judet* reticence is the proportion of respondents in the *judet* who are reticent, calculated excluding data from the respondent corresponding to the observation (to prevent mechanical endogeneity). Transylvania is the omitted regional dummy. Absolute value of *t*-statistics in parentheses, using standard errors calculated assuming clustering at the *judet* level.
* Significant at 10%.
** Significant at 5%.
*** Significant at 1%.

reports of higher corruption than previously. The other demographic and firm-specific variables—gender, education, tenure, firm size, and the economic condition of the firm—are not significant.

Romanians distinguish three historical regions, Moldova, Muntenia, and Transylvania, with the last regarded as most distinctive, having been a colony of Austro-Hungary from the seventeenth to the twentieth centuries, while the other two were under Ottoman suzerainty for over three centuries. We included dummies for Moldova and Muntenia in the regression. The Muntenia dummy is significant, with a coefficient implying that its base probability of reticence is more than twice that of Transylvania. Four decades of a highly centralized and repressive communist regime did not succeed in eradicating regional differences.

The cross-regional results have wider significance because variation in reticence across countries is likely to be as strong as variation between Romania's regions. There is now widespread use of aggregate indicators that rely on the

types of survey questions examined here. The Millennium Challenge Account is allocating billions of U.S. aid dollars on the basis of indicator scores that partially reflect reports on informal payments by businesses.[19] This section's results show that such allocation might, ironically, be penalizing countries whose citizens are more candid.

Because we have been able to identify only a small subset of those actually reticent and because we have data on only one country, we are limited in investigating how strong this effect might be. Removing those identified as reticent from the sample did not have appreciable effects on the ranking of *judets* on the various measures investigated in Sections IV, V, and VI. However, the split between Transylvania and the rest of Romania is closest to a cross-country comparison in our data. With aggregation into these two regions, there were some effects of removing the reticent—a change in the ranking of the two regions for the measures reported on the third line of table 3, the second and seventh lines of table 4, and the first and fifth lines of table 5.

The second regression of table 7 adds a variable capturing the degree of reticence in the respondent's *judet*. This is measured using the proportion of respondents in the *judet* who are reticent, calculated omitting the respondent who is the subject of the observation in order to preclude mechanical endogeneity.[20] This variable is very highly significant. The effect is substantively large, implying a threefold increase in the probability of reticence when comparing respondents in *judets* with the most reticence to those in *judets* with the least reticence. Reticence strongly clusters.

VIII. How Many Reticent Are There Really? Implications for Corruption Levels

We divided our sample into two groups, the 10% called reticent and the remaining 90% labeled "possibly candid" to remind the reader that there are more reticent in the sample than those who said no seven times in a row. While this division was useful for investigating the validity of our method, it does obscure the full effects of reticence. An assessment of these full effects requires an estimate of how many reticent there truly are. This is not a question that we can presently answer with rigor. The discussion below offers a guesstimate of the total amount of reticence and the possible implications of the guesstimate for the actual level of informal payments.

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[19] The Millennium Challenge Account uses the Kaufmann et al. (2004) aggregation of many different indicators. Their control of corruption measure gives roughly a 20% weight to survey data. The other 80% is attached to expert opinions, many of which are influenced by survey data.
[20] To emphasize, *judet* reticence is calculated separately for each observation, excluding any data from the respondent.

If one had an estimate of the proportion of Romanian businesses guilty of any of the behaviors listed in table 1, then one could estimate the proportion that were reticent. Using the conservative assumption that reticence and guilt are uncorrelated, the proportion answering "it's heads or I'm guilty" on a randomized response question, e, is given by $e = (.5 + .5 \times g_{cb}) \times (1 - r)$, where r is the proportion who are reticent and g_{cb} is the proportion who are guilty of the particular behavior. Hence, $r = 1 - [2e/(1 + g_{cb})]$. Readers possessing data or estimates of the prevalence of the behaviors in table 1 could use this formula, their own data, and the results in table 1 to estimate the proportion of our sample who are actually reticent.

Obviously, for the very reasons we are analyzing the effects of reticence, data on the prevalence of the behaviors in table 1 are hard to come by. But we do have some related information relevant to "not giving one's suppliers or clients what is due to them" (abbreviated to "cheat" below). In a survey described in Murrell (2003), 58% of a sample of Romanian businesses had been defendants in commercial court in the previous year. Of course, not everyone who cheats is sued and not everyone who is taken to court has actually cheated. Nevertheless, if 58% have been sued in the last year, then half of that is surely an underestimate of the proportion of Romanian businesses that have ever cheated someone. While this estimate is obtained from a survey that is potentially affected by reticence, reticence would presumably lead to underreporting of businesses appearing as defendants in court, and hence a fortiori 29% remains an underestimate of cheating.

With the 29% assumption for g_{cb} (guilty of cheating) and 42% for e (row 6 of table 1), r is estimated at 35%. If instead, we assume that 58% of Romanian businessmen cheated at some time, then the estimate of reticence would be 47%. For the benefit of readers who have alternative estimates of the proportion of Romanian businesses guilty of cheating, figure 1 shows the relationship between the proportion guilty of cheating and the implied proportion reticent for our e of 42%.

As a check on our rough estimate, we asked three highly trusted Romanian informants to estimate the proportions of Romanian businessmen guilty of each of the seven behaviors and used the means of their responses in the above formula. The seven resultant estimates of reticence range from 23.5% to 47.8% and have a mean of 38.5%, close to the previous estimate. Therefore, 35% is a reasonable conservative estimate of the number of reticent in our sample.

Using this 35% figure, it is possible to estimate how much estimates of corruption are affected by reticence. Our sample comprises three groups, the 10% correctly labeled as reticent, another 25% who are reticent but incorrectly labeled as candid, and the remaining 65% correctly labeled candid. Focusing
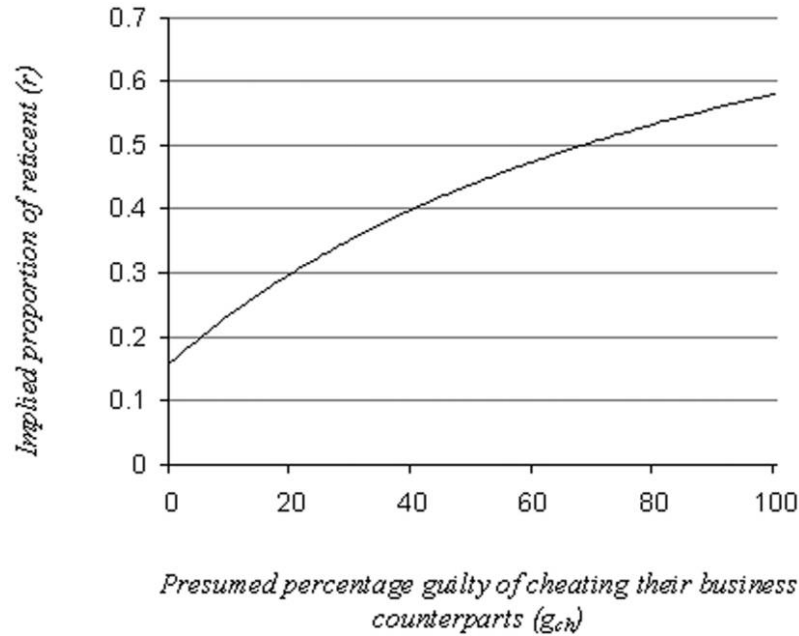
Figure 1. Relationship between reticence and guilty of cheating

on admission of informal payments (the bottom row of table 3), if rates of corruption had been calculated without acknowledging the problem of reticence, the estimate would be 14.9%. However, given 35% reticent and 3.7% and 15.4% for the percentages admitting positive payments by the reticent and possibly candid, the estimate of corruption produced using only reports from the candid respondents is 19.9%.[21]

The initial estimate of businesses giving informal payments should be increased by one-third. But this increase is based on a number of conservative assumptions. We have assumed that guilt and reticence are uncorrelated. We have assumed that there is the same propensity to be reticent in randomized response questions as in direct ones, whereas candor is usually higher in the former than the latter (Lensvelt-Mulders et al. 2005). We have used a low estimate of the percentage guilty of cheating. Yet even under these highly conservative assumptions, the estimate of the prevalence of informal payments is increased by one-third. This adjustment in estimates is significantly greater than when randomized response has been applied in the traditional manner (Lensvelt-Mulders et al. 2005).

[21] Actual corruption $= (P - xQ)/(1 - x)$, where P is the estimate from the possibly candid group, Q is the estimate from the reticent group, and x is the proportion of the possibly candid who are actually reticent.

IX. Alternative Interpretations: The Virtuous Fearing Inference and Confusion

We interpret the results as showing that those identified as reticent give biased answers to survey questions. This interpretation relies on the assumption that the reticent are no less corrupt and no more virtuous than the average respondent. Some readers of an earlier draft of this paper disagree with this assumption. They argue that the reticent might be less corrupt and more virtuous than average, even though the reticent are those who give a set of implausible answers on the randomized response questions. The implausible answers result, presumably, from some fear of overzealous prosecutors (in league with survey administrators) or of moral opprobrium (of the Bayesian interviewers). This is logically possible. But we now argue that it is inconsistent with so many features of our empirical results that it is highly improbable. Those readers who find our interpretation unobjectionable can skip this section without loss of continuity.

Consider the results on values in Section VI. These results cannot be explained by fear of legal repercussion. Hence, those objecting to our interpretation would need to argue that respondents of great moral virtue (at least, according to their answers on the values questions) are distressed by the Bayesian inferences that might follow from an answer that is dictated by tossing heads. They therefore lie. This is implausible, especially since 70% of those identified as reticent claim that lying is never justified (table 5).

The reticent are less likely to acknowledge the presence of corruption in their *judets* (table 4). A theory interpreting these results by invoking the assumption that the reticent are less corrupt than average would need to explain why the uncorrupt who are reticent would be unwilling to indict the corrupt. This would be especially difficult because the largest difference between the answers for the reticent and the possibly candid are on "Officials keeping fees," on which the respondent is least implicated.

Perhaps Section V's results follow because the reticent really live in less corrupt regions. To examine this possibility, we matched regional data on reticence with data from a World Bank household survey on perceptions of corruption (World Bank 2001). This survey asks about corruption in the trade registry, the predecessor of the One-Stop Shop. Under the hypothesis that the reticent are honest about corruption and are typical residents of less corrupt regions—the hypothesis counter to ours—there should be a negative correlation between business reticence and household reports of corruption.[22]

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[22] The use of household surveys rather than business surveys reduces the probability of incorrectly accepting this hypothesis. Estimates of business-related corruption derived from household reports

The cross-regional correlation between household reports of corruption in the trade registry and the reticence of businessmen is in fact positive (0.41) and statistically significant (1.1% level).[23] We thus reject the hypothesis that the reticent are honest and live in less corrupt regions. This leaves our favored interpretation, that the reticent are at least as guilty as other respondents and that they see at least as much corruption in their regions as other respondents. What is distinctive about the reticent is that they do not readily admit to these facts.

In assessing the effect of reticence on reports of informal payments in Section VIII, we assumed that guilt and reticence are uncorrelated. The results combining our data and the World Bank data indicate a positive correlation, a finding that we do not find surprising. With a positive correlation, our estimated effect of reticence is downward biased, implying that reticence lowers the estimates of informal corruption by more than the one-third estimated in Section VIII.

Readers of early versions of this paper also commented that we might be classifying as reticent some respondents who are merely confused. To estimate the maximum number of confused respondents among the 54 identified as reticent, suppose that confused respondents have the same probability (0.15 from Sec. IV) as nonconfused respondents of admitting to a bribe on a non-randomized response question and assume that no nonconfused, reticent respondent admitted to paying a bribe. This means that the two respondents identified as reticent who said yes to paying a bribe were actually confused, leading to an estimate of the maximum number of confused respondents in the reticent group as $(2/0.15) \approx 13$. Alternatively if one assumes that one of those two "reticent" respondents who admitted to paying a bribe was not confused, the estimate of the number of confused becomes $1/0.15 \approx 7$.

Interestingly, by allowing for confused respondents, estimates of the bias from reticence are increased. If, as above, one assumes that confused respondents have the same propensity to admit to paying a bribe as nonreticent respondents, then this implies that fewer reticent respondents admit to paying a bribe than assumed in the calculations of Section VIII. Any reduction in the degree of honesty of the identifiably reticent respondents implies an increase in the

should be less biased by reticence than estimates derived from business reports. Households are less likely to be deeply enmeshed in the organization of corruption than are businesses. Hence the reticence of households would be on different issues than the reticence of business respondents.

[23] These results are backed by results on nine governmental organizations covered by the World Bank survey, which are less relevant to business regulation. There are eight (of nine) positive correlation coefficients between regional levels of reticence and regional reports of corruption by households. One is significant at the 1% level, another is significant at the 5% level, and a further two are significant at the 20% level.

estimate of the amount of bribe paying in the population.[24] Therefore, allowing for the possibility of confusion among the "identifiably reticent" implies a larger underestimate of bribery due to reticence.

Indeed, confusion is less of a problem with our method than with standard randomized response. In the standard use of randomized response, the respondent has to understand that randomization shields the guilty who are truthful. This is not a requirement of our procedure. Indeed the opposite is the case: a respondent who does not understand that our procedure shields the guilty is more likely to answer in a way that reveals reticence than a respondent who fully comprehends the protection afforded by randomized response.

X. Conclusions and Extensions

We have implemented a novel methodology for identifying those respondents who are reticent in answering survey questions on sensitive topics. In Romania, respondents identified as reticent respond differently from others on standard (nonrandomized) questions. The reticent characterize themselves as relatively virtuous. They acknowledge the existence of less corruption, not only on experience questions that directly implicate the respondent, but also on perception questions that, at most, suggest familiarity with corruption. As a result, estimates of corruption derived from surveys are considerably downward biased.

Our ultimate goal, however, is not to cast doubt on existing uses of survey research but, rather, to suggest possibilities for improvement. Survey research is a powerful tool of analysis, and its use in economics has brought about profound changes in the topics on which economists deliberate, making phenomena such as governance, trust, corruption, and values central in economic discourse. Therefore, we close with some remarks on the application of our methodology in improving the accuracy of survey data. These remarks are conjectural: our purpose has been to show a working methodology that identifies the reticent not to lay out plans on how to integrate this methodology into survey research.

A first step in improving accuracy would be to delete the responses of those identified as reticent. A second step, whose properties should be investigated more deeply, is to adjust estimates of corruption with a procedure similar to that used in Section VIII. Indeed, future implementations of our methodology would include randomized-response questions (like those in table 1) for which

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[24] The reduction in the estimate of the degree of honesty more than compensates for the recategorization of some reticent respondents as merely confused.

population averages for guilty behaviors are known. Then, estimates of the overall propensity for reticence do not have to be based on assumptions about the prevalence of guilt.

This approach can easily be combined with existing methods aimed at reducing reticence when asking sensitive questions. Sudman (1980) and Tourangeau and Smith (1996) describe a number of such methods. These include changes in wording that aim to make the respondent more comfortable and self-administered or computer-assisted surveys that remove or reduce the role of the interviewer. The increase in reporting of sensitive behaviors using these methods is of approximately the same magnitude as we have found for informal payments in Section VIII (Tourangeau and Smith 1996). Combining our method with these other ones could possibly reduce the effects of reticence even further.

Others have addressed the bias due to reticence in surveys by relying on cross-checks with alternative data sources, such as actual data on physical inputs into projects (e.g., Olken 2007). Our method provides a substitute when collecting actual data is impractical. An interesting idea for future work would be collecting actual data together with survey data that includes our reticence module. This would allow us to cross-check the reticence adjustment and the accuracy of the nonsurvey data.

More elaborate methodologies could also be implemented. One extension might be labeled two-stage randomized response. Suppose the seven questions in table 1 contained one of great interest. Then, split the sample according to whether the respondent said no to all the other six randomized response questions, the probability of which is 1/64 for a nonguilty, candid respondent. Thus, even using six questions, it is highly likely that the all-no's are reticent. These respondents would then be deleted from the sample and randomized response applied in the standard way to the question of special interest. This two-stage methodology increases accuracy in two ways, by deleting the reticent and by using standard randomized response. In applying it to the "hiring someone for an inappropriate personal reason" subquestion, we found that the point estimate of the prevalence of these practices increases from 6% when using randomized response in the standard way to 18% when using two-stage randomized response.[25]

Given that our methodology is the first, to our knowledge, that actually can identify the reticent, it can be used as a building block of a research program that searches for simpler techniques of identifying the reticent. For

[25] This subquestion was chosen because it was the only one for which the use of standard randomized response led to a positive estimated rate of prevalence.

example, it would be useful to find simple questions whose answers correlate with reticence, to be used subsequently on their own. In our survey, we posed a number of additional questions with this purpose in mind. We found only one with strong results: "In any aspect of your life, how often do you do something that is (formally?) illegal? Please answer on a scale of 0–10 where 0 means never and 10 means daily." Of those identified as reticent, 58.5% answer 0, while 27.45% of the possibly candid choose 0, a highly significant difference (t-statistic $= 4.73$, $p = .00$).

If one assumes that everyone has done something formally illegal—a very mild assumption—and that the candid are truthful, then answers to this question would allow us to classify a further 24.6% of the whole sample as reticent—those in the possibly candid grouping answering 0. Further, if as in our sample the reticent have a probability of 0.585 of answering 0 on the above question, then these data imply that 42% ($= 24.6/0.585$) of the sample are reticent but incorrectly classified as possibly candid. Hence, 52% of the sample are in fact reticent, an estimate underscoring our claim that the 35% derived in Section VIII is a conservative estimate. Future methodological research might produce a stock of such questions, which can reliably identify the reticent. For now, we have at least identified a methodology that can reliably determine whether such questions work as intended.

The measurement of corruption and other indicators of governance is not only a goal in itself, but also a building block of research and policy analysis, the cross-country aspects of which are of immense importance. We have shown that reticence will likely vary across countries. Therefore, future methodological research might aim at examining the characteristics of individuals and countries that lead to greater or lesser reticence. Do particular regions have greater reticence, as our Romanian results suggest? Does demographic structure correlate with reticence, as our results on the age of respondents indicate? Future research in these areas would improve intercountry comparisons of measures of corruption and governance, aiding both econometric work focusing on the determinants of the wealth of nations and policy analysis that focuses on increasing that wealth.

Finally, our methodology has broader applications than the questions examined in this article. Studies of tax evasion, the informal sector, drug abuse, sexual behavior, HIV/AIDS, and other sensitive issues could all benefit from being able to identify reticent respondents.

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