Improving Tax Compliance in Developing Economies: Evidence from Bangladesh[*]

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1 Overview

Improving tax revenue collection is an important priority for developing economies throughout the world. Not only do tax revenues tend to be low as a share of GDP in absolute terms in low income countries, they are also low as a share of GDP relative to higher income economies (Figure 1). Finding mechanisms to improve tax collection is challenging on at least two fronts: (1) lack of good data on tax compliance; and (2) difficulty in finding effective instruments for improving compliance given institutional constraints. This paper makes three main contributions. First, we present new evidence on compliance patterns from a unique primary dataset in Bangladesh that links administrative tax data with firm survey data. Second, we propose an innovative mechanism to improve compliance using the power of social recognition, and present survey evidence that supports the potential power of such mechanisms. Finally, we summarize the research design for a planned field experiment that will directly test the causal effects of various forms of social recognition on voluntary compliance.

Measuring tax compliance and evaluating its determinants is challenging in any context. Examining these issues in developing countries is particularly difficult due to the large size of the informal sector. Taxpayer surveys may be able to capture a representative sample of the population, but they rely on self-reports. Firms and individuals may be unwilling to report their registration and tax payment status accurately. Such self-reported survey data may be particularly problematic when used to evaluate the causal effects of interventions designed to improve compliance, especially if taxpayers have incentives to show that the program was "successful" (e.g., in the case of financial incentives). On the other hand, administrative data, even if good quality, is restricted since it will only capture individuals and firms that are already formal or in the tax net to some degree. Administrative data samples are therefore often highly censored given the narrowness of the tax base in many developing economies. This creates limitations in understanding tax formalization, an important compliance margin. With administrative data alone, for example, it may be difficult to determine whether a firm that appears in a registration database is a new firm or a previously informal firm becoming formalized. In addition, tax data generally contain a very restricted set of taxpayer characteristics relative to survey data.

Our project brings together four new data sources to create a merged firm dataset for Bangladesh that contains spatial data, detailed firm characteristics, attitudes toward tax compliance, social networks, and administrative data on registration, tax filing, and tax payment. Using this

dataset, we can measure tax compliance rates, the spatial distribution of compliance, and the relationship between firm characteristics and compliance. This dataset will also provide the baseline for evaluating the causal effects of the social recognition interventions discussed in Section 5.

A second major challenge in raising tax revenue, even conditional on understanding compliance patterns, is finding effective instruments to improve compliance. Traditional models of tax evasion (e.g. Allingham and Sandmo 1972) have focused on audit-based enforcement coupled with penalties. However, enforcement through audits is often very costly in practice. Studies of audits have generally focused on audit *threats*. While such threats may be effective in the short run, they must ultimately be followed by actual audits in order to generate improvements in compliance in the long run. A second problem with audit-based enforcement that is particularly relevant for developing economies is misalignment of incentives. For audits to be effective, tax officials must have incentives to put forth monitoring effort and behave honestly, but there are often failures on both fronts (e.g., Mookherjee 1997, Purohit 2007). Improving governance in the tax context is challenging. Using delegated monitoring may be ineffective, since evading taxpayers benefit from low effort by auditors and may even prefer corrupt officials, if corruption is collusive rather than extortionary. Improving the incentives of tax officials (Khan, Khwaja and Olken 2010) may be both difficult and costly.

An emerging literature has focused on the role of information (3rd party reporting and cross-checks) as being central in improving compliance (Kleven et al. 2011; Pomeranz 2012). It has become increasingly clear that digitization of records and the ability to verify information provided by the taxpayer are central factors in the ability of developed countries' governments to collect revenue. However, many developing economies are far from having the technical capacity to implement such systems on a large scale. For example, Figure 2 illustrates the current system of tax filing in two tax offices in Dhaka, Bangladesh.

An alternative strategy is to leverage the power of social recognition to encourage voluntary tax compliance. By publicizing information about the taxpaying behavior of firms and/or rewarding taxpayers based on the compliance of their neighbors, we can take advantage of existing social pressures exerted by a firm's peer group to induce each firm owner to behave more responsibly. Importantly, these types of recognition based reward programs work outside of the traditional governance structure and all its corruption and collusion laden imperfections. Direct interaction between firms and tax officials can be limited and recognition can be based on easily verifiable information (firms' actual tax payments, rather than their "true" tax liability), so the program is

relatively easy and inexpensive to implement. Other market-based strategies to induce firms to formalize, register and pay taxes have not proven to be cost-effective (de Mel, McKenzie and Woodruff 2010), and one key innovation of recognition is that it appeals to firm owners' desire for social recognition (which is cheap to provide) and leverages existing social pressures, both of which reduce the need for external financial resources.[1]

Results from our dataset support the promise of such social based recognition programs. Firms overwhelmingly report that they believe that paying tax is a civic duty, suggesting that compliant firms would be perceived as behaving in a desirable way. In addition, our social network data indicates that firms have quite accurate information about relevant characteristics of neighbor firms, such as turnover and number of employees. Firm perceptions of area turnover indicate that virtually all firms should be paying regular VAT (explained below). While the tax authority in Bangladesh may also believe that this is true, enforcing correct tax payment requires verifiability. In contrast, recognition based programs simply require that firms pay a social cost (or receive a social reward) based on their neighbors' perceptions of whether they are appropriately compliant. Finally, we find that taxpayers appear to have some information about true area tax compliance but that this information is much less precise than their information on other neighbor characteristics. This suggests that recognition based programs can in fact update the information available to firms on peer compliance.

In collaboration with the government of Bangladesh, we have designed a tax collection program targeted at small businesses in Dhaka that seeks to increase tax revenue from the VAT using such social incentives in the context of a large scale randomized-control trial. Bangladesh has a tax/GDP ratio of 9%, which is substantially lower than its neighbor countries. In the context of VAT, many firms remain unregistered. Firms below a certain turnover threshold can pay "package VAT," essentially a flat annual payment. Above this threshold, firms are supposed to pay regular monthly VAT. However, even among registered firms, only 16% firms actually file monthly VAT returns and there is likely substantial evasion among these filers.[2] A number of developing countries including Bangladesh have introduced small-scale taxpayer recognition programs for top tax-payers, but to the best of our knowledge the impact of these programs has not been evaluated. The

[1] Peer pressure from social networks is thought to have increased loan repayment in Grameen Bank style group lending schemes (Ghatak and Guinnane 1999), and is widely perceived to be a cost-effective way to address moral hazard in credit markets; it is not clear whether this reflects features of joint liability lending specifically or other characteristics of the group structure (Gine and Karlan, 2007).

[2] Figures from the Bangladesh National Board of Revenue.

experiment will be implemented in the field shortly; in this paper, we present an overview of the research design.

The remainder of the paper proceeds as follows. Section 2 describes the various datasets we have collected and brought together for the project. Section 3 presents compliance statistics and Section 4 presents suggestive evidence supporting the promise of recognition interventions. Section 5 provides an overview of a planned field experiment to test the causal effects of recognition on compliance, and Section 6 concludes.

2 Data

The research team worked with the Dhaka South Commissionerate of the Bangladesh National Board of Revenue (NBR) to define market areas that fall under the jurisdiction of a set of pre-selected "circle offices" that firms must visit to pay VAT. Dhaka contains 28 Circle Offices that serve as VAT collection points, and 6 of these fall under the jurisdiction of the Dhaka-South Commissioner. We are working in three of these circle offices. The jurisdiction of each circle office is defined spatially. The project brings together novel data from four sources.

2.1 A Spatial Census of Firms

First, we conducted a spatial survey of *all* firms in our circle areas (~30,000 firms). Given the high density of firms and haphazard patterns of firm construction and location in many of these areas, this involved the development of detailed data collection protocols and extensive training to ensure that the complete universe of firms was captured in the most efficient way.

Enumerators recorded the GPS coordinates of each firm and recorded a number of variables (type of firm and business activity, address and other geographic markers, building materials, etc.) that could be collected without an interview with the firm owner. Enumerator-provided information was checked carefully using mapping software to ensure that no areas were missed in the spatial survey. Hand drawn maps were used to note the precise arrangement of firms located within shopping centers.

The GPS information from the spatial survey is used to cluster firms into contiguous units that we define as "clusters." Heterogeneity in the layout of firms across market areas makes it impossible to impose a uniform definition of clusters based on a single factor such as distance. We therefore devised a set of guidelines for defining clusters based primarily on spatial proximity (taking

into account the geography of and natural barriers present in the area). These groupings allow us to examine the spatial distribution of compliance and will also serve as our units of randomization, as discussed in Section 5 below.

2.2 Baseline Firm Survey

Second, we conducted a detailed in-person baseline survey for all firms in the spatial survey that were fixed establishments. For example, we excluded "firms" recorded in the spatial survey such as mobile tea stalls, which are often a single individual simply sitting on the sidewalk preparing glasses of tea for passersby. The resulting sample for the baseline survey is 20,000 firms.

This survey contained extensive modules on the firm business activities, history, and owner; social networks; and perceptions about taxation. In the majority of cases, a firm's social network falls within our survey areas. We can therefore match a firm's reports about their network firms to the information reported by these network firms.

We asked general questions about compliance behavior (discussed in more detail below), but we did not ask specific questions about whether the *surveyed* firm was registered or paying taxes nor did we collect registration numbers or BIN (taxpayer VAT ID numbers). This was to ensure that respondents felt comfortable answering the questions and to maintain independence of the survey from NBR.

2.3 Administrative Registration Database

Third, we obtained the registration database from NBR, which records all firms that are registered for VAT. This database has basic information about the firm (primary business activity and address) as well as an indicator for whether the firm registered voluntarily or was "force registered" by a tax inspector.

2.4 Administrative Tax Filing and Payment Data

Fourth, we digitized all tax records for these circle offices beginning in July 2012 for all areas, including historical data for some areas. This had never been done in Bangladesh before, except for large taxpaying units. Digitization thus involved manual entry of tax data from ledger books as well as loose tax forms of the type seen in Figure 2. We installed new computers, developed original software in the relevant tax offices and entered the data using our own data entry operators.

2.5 Construction of the Linked Survey-Administrative Dataset

Finally, we matched all four data sources. Since we deliberately did not collect tax ID numbers during the census survey, this involved algorithmic (string and phonetic) and hand matching of firm names and addresses between the spatial/baseline surveys and the registration database. The registration database can be matched fairly easily to the tax database since both contain firm BINs. Since firm name and addresses are often recorded in different ways and with different spellings due to different transliterations from Bangla, this process was quite involved. As one example, a firm recorded in one database as "Jeweler's Heaven" could be recorded in another database as "Jowler's Haven." Address information was similarly inconsistent across data sources. After extensive matching efforts, we achieved a high (albeit not perfect) match rate.

3 Tax Compliance Patterns: Evidence from the Linked Database

In our main sample (the set of firms surveyed in the baseline survey), we find that overall compliance is very low: 34.1% of firms are VAT registered; 2.6% of firms paid package VAT in the last year; and 5.7% paid a positive amount of regular VAT in the last quarter. We can also see that a firm becoming registered is not sufficient to ensure payment in practice. There are a substantial number of what NBR refers to as "stopfilers": firms that are registered but who do not file or remit taxes. Note that the NBR believes that essentially all firms in these areas should be VAT registered and should be paying regular VAT. There is therefore substantial room to improve compliance even on very basic measures such as registration, filing, and non-zero payment. We see substantial variation in compliance across sectors (Table 1). We also see variation based on firm size, with a very steep gradient in compliance by number of employees (Table 2).

We also see a wide range of compliance across geographic areas in the data. Figure 3 shows registration rates by cluster in our sample areas: in Panel A all clusters are included, and in Panel B the sample is restricted to clusters with more than 10 firms. Note that "0% registered" is the largest category and is omitted from the figure for ease of display. The number of firms falling into the 0% category is given in the figure notes. We could imagine a situation in which geographic areas are either very low compliance or very high compliance; empirically, that is not the case. We observe a wide range of registration shares, indicating substantially heterogeneity within small geographic areas in a given firm's choice of whether to register. We observe similar patterns for tax payment (results available on request).

4 Social Recognition and Tax Compliance

Our analyses of the matched database support our hypotheses both about the challenges faced by the tax authority in reducing evasion in this context and about the promise of social recognition as a tool to improve compliance behavior. The results above indicate that traditional enforcement has not been very effective, even in obtaining high compliance on basic margins of compliance (registration, filing) that do not have strong data requirements to enforce. We now turn to an examination of some of the prerequisites for social recognition to serve as an effective mechanism to encourage voluntary compliance.

A first basic requirement is that firms perceive tax compliance as a desirable behavior. In contexts with low compliance and low faith in institutions, it is not obvious that firms would necessarily view tax payment as a particularly pro-social behavior. If firms know that evasion is widespread but do not consider paying taxes to be a social good, social recognition interventions may not be effective.

We find that firms overwhelmingly believe that paying taxes is a "good" thing. While it is important to keep in mind that these are self-reported survey results, we do find that 84% of firms "strongly agree" that paying tax is a civic duty (Table 3). This is despite the fact that the majority of firms do not believe that most firms are truthful about taxes and also feel that the government does not use tax revenue appropriately.

Social recognition interventions also rely on the idea that firms do have fairly good information on their neighbors' true business activity and turnover so that they can accurately assess how much the firm should be paying in taxes. In our social networks module, we asked firms for information on up to five other firms with whom they have the most contact and asked them to estimate the number of employees and turnover of each of these firms. The majority of firms indicated other firms within their own cluster, and we find that perceptions of these variables and the "actual" employees and turnover (as measured by the firm's own self-report) are remarkably highly correlated (Table 4).

Interestingly, firm reports support the prior belief of the NBR that essentially all firms in Dhaka should be paying regular VAT. On average, firms report that only 10% of firms in their areas have turnover below the package VAT threshold. Our conversations with NBR tax officials indicate that they were not surprised with this result. The Commissioner for the Dhaka South area

expressed his view that only the smallest, most makeshift firms in Dhaka city could stay in business with turnover below the package threshold. The challenge for the tax authority is that in order to force firms to pay regular VAT, they need to be able to prove the true turnover of the firm in some way. In a context with cash transactions and essentially no ability to cross-check transactions, this is almost impossible. The package VAT system was in fact introduced in order to create a mechanism to obtain *some* tax revenue from firms, even if it is known to be less than what they should be paying.

This finding indicates the promise of social recognition: a firm that is reported as not paying, or paying the package VAT, will be known to most of its peers as paying less than it should. While the NBR may "know" this as well, formal enforcement is constrained in ways that informal enforcement and pressure are not.

Finally, we find that firm perceptions of registration and tax payment of firms in their area are not as accurate as information about turnover and employees. We did not ask firms specifically about compliance of their network, but we did ask what share of firms in the area the respondent believes are VAT registered and are meeting their tax obligations (Table 5). We find that firms over-report substantially on average relative to true compliance. While perceived registration rates and actual registration rates are correlated across clusters, the correlation is weaker than the above firm perceptions about their network. These results may be partly driven by reporting (firms deliberately over-report compliance in their area, although they have no clear incentive to do so) and may also reflect the fact that firms will naturally know more about their closest contacts than the area as a whole. However, they also provide suggestive evidence that firms know a lot about the business activities of their neighbors but do not know as much about their taxpaying behavior. In this case, a recognition intervention is likely to provide new and relevant information to firms and their neighbors.

5 Experimental Interventions: Research Design

In this section, we outline a planned field experiment that will directly test the causal effects of various types of social recognition on firm tax compliance. The study is being implemented as a randomized controlled trial, with information about the taxpaying behavior of the peer network being applied at the level of "clusters" of approximately 20-60 firms (on average) in a market area, as described above. Ideally, clusters are groups of two or more businesses where intra-cluster peer interactions are high while inter-cluster interactions and information spillovers are limited. This is

important since neighboring clusters may be randomly assigned to treatment and control groups. We will also measure firm interactions directly and ask about informational spillovers in our baseline and endline surveys.

All firms in the sample will be sent a letter on NBR letterhead containing firms' own registration and remittance information based on the baseline administrative records. This will both allow firms the opportunity to correct any mistakes regarding their status and demonstrate to firms that NBR can match tax information to firms, giving credibility to the intervention. Some of the initial letters will contain additional information, depending on which treatment group the firm's cluster has been randomized into.

Treated firms will receive some combination of the following treatments:

1) Recognition cards. Firms will be told that based on registration and payment in the coming quarter, they will be eligible for a card recognizing them as a compliant taxpayer. These cards will have different "levels": ex: bronze for registration, silver for paying package VAT, and gold for paying regular VAT above a given threshold.

   Importantly, a firm will be eligible for a given type of card if they themselves meet the criteria and *also* if a set share of firms in their cluster meet the criteria. This creates direct incentives for firms to care about the compliance of their neighbors.

   Having different levels allows the same type of recognition to be "marginal" for different clusters at different levels. Thus, a "slum" area with low registration levels may find the bronze card relevant, while in a formal shopping center, the bronze card will not carry much status and firms may care about showing that they are gold card holders. The cards will not currently be associated with tangible benefits other than status, although such benefits could be associated with the cards in the future.

2) Announcement of "peer group recognition." Firms are told that they will receive a subsequent letter that has information on registration, filing, and payment status of all of the firms in their cluster. For privacy reasons, we will be reporting firms in categories rather than providing the specific tax payments of individual firms.

3) Provision of baseline information. The initial letter will contain current registration, filing, and payment rates for the cluster on average.

The final set of treatments will be as follows. Again, treatment will be randomized at the cluster level, not the firm level.

	Control	Peer Group Recognition	Cards	Cards + Peer Group Recognition
No Baseline info	A	C	E	G
Baseline info	B	D	F	H

Note that even the control group (group A) will receive a letter from NBR with information about their own compliance behavior according to NBR records. Thus, we will not have a within-sample "pure" control in which firms receive no communication from the tax authority or a "placebo" letter with no real content. It is possible that receiving a letter with one's own information will have direct effects on compliance. We will be able to capture this non-experimentally through the time series and also comparing across the circle border using an RD design to firms that are not in our experiment.

This design will allow us to examine how firm compliance is affected by a variety of dimensions of peer behavior and social recognition. For example, a comparison of Groups A and B will test whether firms are affected by finding out about overall peer compliance. Groups C and D allow us to examine how firms react to the news that their behavior will be made public to their peers. Groups E and F create a joint liability structure in which firms have direct incentives to care about the compliance of their peers, and Groups G and H add an extra dimension since firms will realize that others in their group will know if they prevented the group from reaching the threshold for receipt of recognition cards.

The intervention will be repeated quarterly and we will collect administrative data on registration and tax payment on an ongoing basis.

6 Conclusion

Our analyses demonstrate the very low levels of current tax compliance in Dhaka City, Bangladesh. The results also reveal the limits of traditional enforcement mechanisms: in theory, the NBR should, at a minimum, be able to force register unregistered firms and require stopfiling firms to pay at least the minimum (package) required VAT. The high rates of informality and stopfiling imply strong institutional limitations to traditional enforcement. Improved revenue collection may be hindered by severe limits on administrative capacity as well as lack of strong performance incentives and corruption.

In such settings, encouraging voluntary compliance through social recognition may provide a more feasible and cost-effective way to improve revenue collection. Results from our linked database suggest that many of the prerequisites for such programs to be effective (ex: a view of tax compliance as a "good" thing, high levels of peer group information) are met in practice.

To the best of our knowledge, our planned field experiment will provide the first direct tests of the causal effects of social recognition and rewards in the taxation context. The results from this experiment will shed light on the underlying determinants of pro-social behavior and potentially provide an innovative and scalable policy mechanism to improve revenue collection in many developing economies.

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Tables and Figures

Figure 1

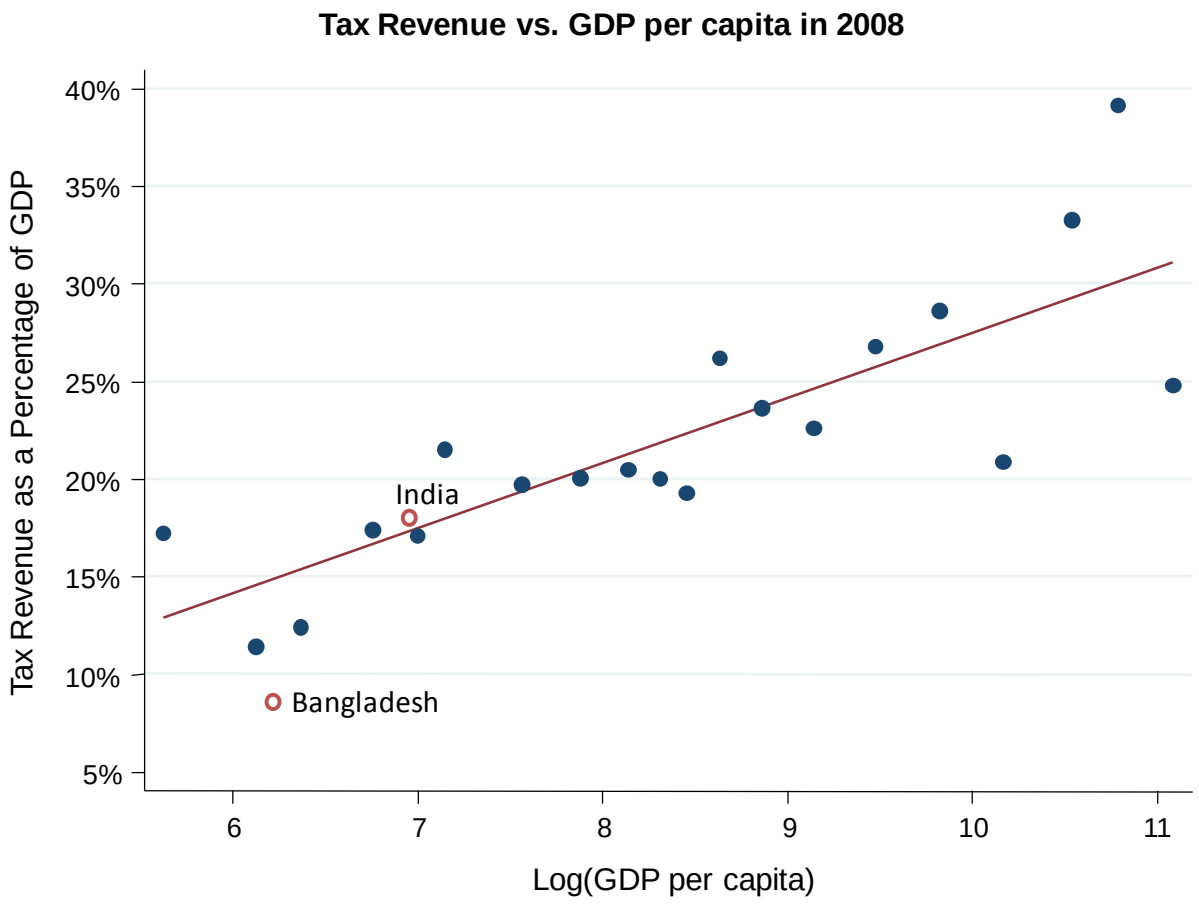

Figure 2

Figure 3

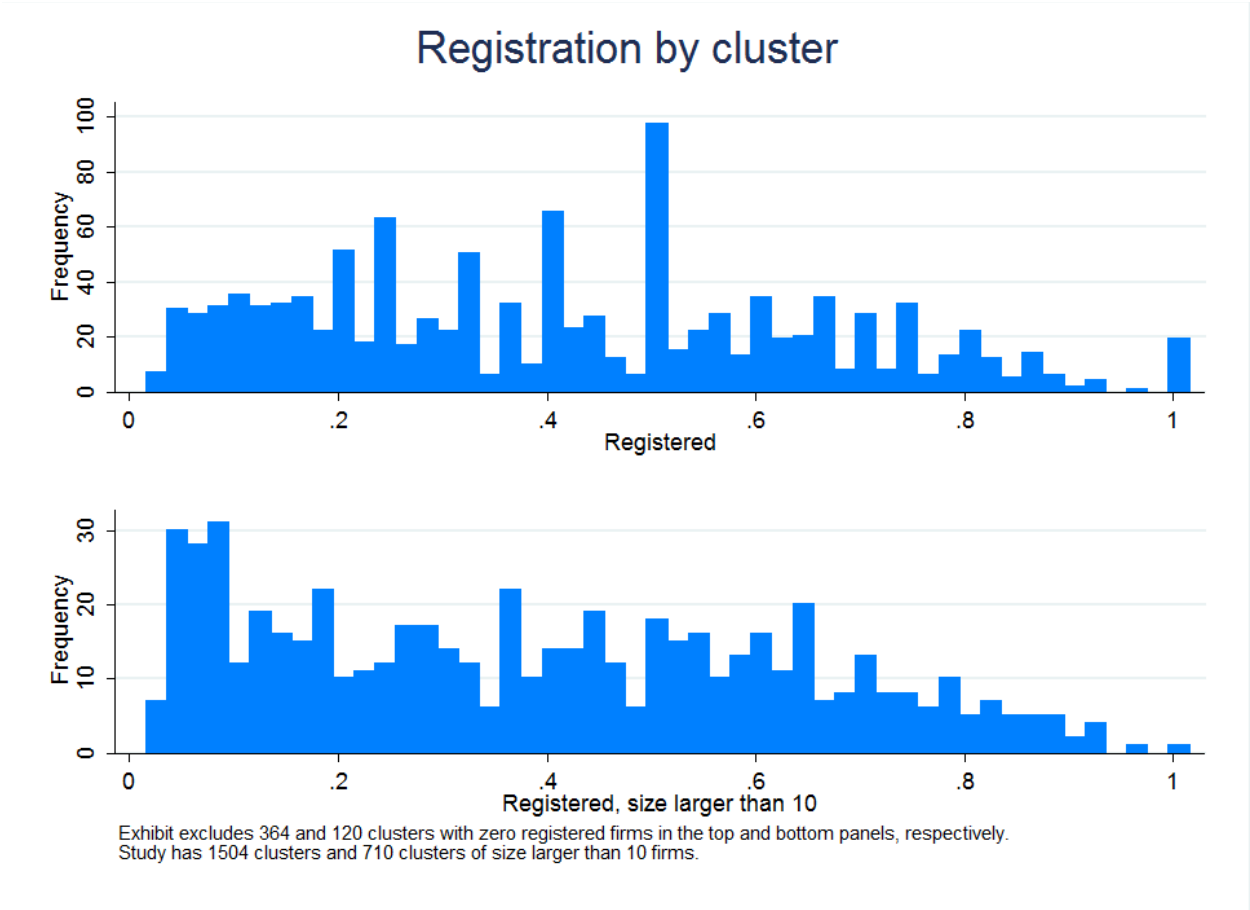

Exhibit excludes 364 and 120 clusters with zero registered firms in the top and bottom panels, respectively.
Study has 1504 clusters and 710 clusters of size larger than 10 firms.

Table 1: Tax Compliance by Sector

Panel A: Broad

	Nonpayers	Regular	Package	Registered
	%	%	%	%
Clothing and shoes	23.6	15.4	56.8	32.4
Health	6.1	18.8	8.2	8.4
Food	13.9	13.5	0.8	6.1
Electronics, HH furnishings	17.2	14.3	17.9	20.4
Construction and autos	3.6	1.1	1.1	2.1
White collar and services	13.4	15.7	2.8	11.7
Misc/uncategorized	22.1	21.1	12.4	18.8

Panel B: Specific

	Nonpayers	Regular	Package	Registered
	%	%	%	%
Non-gendered clothing	0.7	0.0	1.7	0.7
Female clothing	7.3	5.3	28.1	11.5
Male clothing	7.1	7.6	16.7	13.2
Shoes	2.1	0.6	9.0	3.5
Accessories	1.0	0.2	0.9	1.1
Jewelry	2.3	16.0	4.4	5.7
Lodging	0.0	1.1	0.0	0.2
Tailors and sewing shops	5.3	1.7	0.3	2.4
Meat and veg sellers	3.2	0.1	0.0	0.1
Restaurants	2.1	8.7	0.0	2.7
General store	8.7	4.8	0.8	3.2
Beauty and cosmetics	3.8	2.8	3.8	2.7
Health and child care	4.2	2.3	0.2	2.1
Printing, books and newspapers	5.6	2.2	0.5	2.8
Electronics and cellphones	12.3	2.7	12.4	13.9
White collar	3.4	3.8	0.0	3.2
Construction	1.9	0.5	0.9	1.0
Autos and rickshaws	1.7	0.6	0.2	1.1
HH furnishings	4.9	11.6	5.5	6.4
Hobbies	2.8	7.0	2.4	4.6
Education	1.6	2.8	0.0	1.1
Misc/uncategorized	17.9	17.7	12.3	16.6

Table 2: Compliance and Payment by Firm Size

	0-1 Employees	2 Employees	3+ Employees	Total
Registered (%)	17.57	38.02	42.11	34.05
Package (%)	0.661	3.531	3.163	2.590
Average payment for package payers, lakh	0.0532	0.0561	0.0620	0.0589
Regular (%)	0.939	4.273	10.07	5.718
Average payment for regular payers, lakh	0.0199	0.0631	1.740	1.265

Table 3: Firm Attitudes

	% Agree
Most firms know their own turnover	43.7
Most firms know what is exempt	38.4
Most firms truthful about taxes	24.3
Government interferes too much	37.8
Paying tax is a duty	97.6
Tax revenue is used for good	29.6

Table 4: Perceptions of employees and turnover on actual employees and turnover

	(1) Employees	(2) Employees	(3) Turnover	(4) Turnover
Actual employees	0.703***	0.805***		
	(0.00396)	(0.00517)		
Actual employees, squared		-0.00479***		
		(0.000164)		
Actual turnover			0.807***	1.439***
			(0.00627)	(0.0132)
Actual turnover, squared				-0.0121***
				(0.000228)
Observations	10326	10326	10326	10326

* p<0.10 ** p<0.05 *** p<0.01

Notes: Standard errors reported in parentheses. Turnover measured in lakh. Sample restricted to all firms that reported both turnover and employees and had at least one other firm estimate their turnover and employees.

Table 5: Firm Reported Perceptions of Compliance in Their Area

	Mean	Median	SD	N
% of firms under sales tax	49.47	50	27.14	17659
% of firms registered	70.24	80	29.20	18789
% of firms with low turnover	10.57	5	17.51	19625
% of firms meeting their tax related duties	45.31	40	28.92	18364
Total Observations				20002