Propagating Formality via Value Added Tax Networks: Evidence from India*

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Abstract

A major challenge faced by governments in developing countries is to increase their tax base by formalizing the economy. In this paper, we investigate whether Value Added Taxes (VAT) can increase formality. Firms in the VAT scheme have incentives to buy inputs from formal suppliers to collect input tax rebates. Therefore, informal upstream businesses in the supply chain may want to formalize in order to sell to the downstream firms in the VAT. Using administrative records from the state of Karnataka, India, we document that small firms are willing to pay 1 to 4% higher taxes to join the VAT regime. Only firms operating in upstream sectors, such as manufacturing and wholesale, are paying this "VAT Premium", consistent with the mechanism explored in this paper.

JEL:
Keywords:

1 Introduction

Informality is pervasive in middle-income and developing countries. This poses a challenge for governments to raise sufficient tax revenues in order to finance essential infrastructure projects. For example, India's tax revenue corresponds to 11% of its Gross Domestic Product (World Bank), which is considerably below the OECD average of 34% (OECD). Therefore, it is important to identify policies that can help governments in developing economies to increase formality and hence their tax base.

In this paper, we examine whether the Value Added Tax (VAT) system could be used as a tool to increase formality in such economies.[1] The mechanism by which the VAT may propagate formality is via input-output networks along the supply-chain. Firms in the VAT scheme have incentives to source their material inputs from formal suppliers, in order to obtain rebates on taxes paid in the previous stage of production. Therefore, informal upstream firms in the supply chain face incentives to formalize in order to sell their products to downstream firms in the VAT scheme.

To investigate this possibility, we measure small firms' willingness to pay to be part of the formal VAT supply chain, using administrative tax records between 2008 to 2015 from the government of the state of Karnataka, India. In our empirical setting, large firms have to comply with the VAT scheme, while small firms can choose between paying VAT or a turnover (revenue) taxes. This set up allows us to measure a small firm's willingness to pay to be part of the formal VAT supply chain by quantifying the additional tax liability they incur to join the VAT scheme with respect to their turnover tax burden.

We find that small firms in upstream sectors like Manufacturing and Wholesale pay an additional 1% of turnover in tax burdens to be part of the VAT regime.[2] Interestingly, the same is not true for downstream firms in sectors such as retail. In these downstream sectors, firms only join the VAT scheme when this switch reduced their tax burden by 1%.

The VAT structure's incentives rationalize these results. Firms across all sectors in the production chain may find it advantageous to enter the VAT if obtaining tax credits on their inputs can reduce their tax burdens. However, only upstream sectors in the production chain perceive the VAT to be attractive irrespective of their current tax burdens, as just their presence in the VAT chain translates into better sales and growth prospects. There-

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[1] The VAT is particularly relevant, as it is a common policy prescription for developing countries in the class of indirect taxes implemented. Over 140 countries across the world currently levy the VAT.

[2] Given that these firms were paying 1% of their turnover in the CoT, the additional tax burden translates into a total tax burden of 2% on turnover upon entering the VAT.

fore, it is only small upstream firms that should pay a premium to be part of the VAT. Consistent with this logic, we find no evidence of a willingness to pay for being in the turnover scheme, as firms across all sectors in the production chain require a reduction of 1% to 4% of their tax burden to leave the VAT.

We then examine whether the willingness to pay to be in the VAT scheme is larger in sectors with larger shares of production in the VAT scheme. This should be the case, under the assumption that upstream firms tend to sell products within their sector. In sectors that supply inputs to downstream buyers (e.g. Manufacturing or Wholesale), firms choose the VAT not only because of high input costs that they can claim as tax rebates but because being in the VAT chain translates into better sales. As a consequence, small firms in sectors with larger shares of production in the VAT must pay more to participate in this scheme. We document a positive correlation between the sector's VAT willingness to pay and the sector's share of VAT production, confirming this intuition. Reassuringly, this pattern is not present when we examine the willingness to pay to be in the turnover scheme.

Given the impossibility of observing the same firm in both tax regimes at a point in time, we simulate the difference in tax burden across taxation schemes in two different ways. The first simulation is a measure of the change in this burden expected by the switcher before switching, and the second is a measure of the tax burden change expected by the switcher after switching regimes. These simulations are possible, given firm knowledge of the prevailing tax rates in both regimes at any point in time. The results are robust across these simulations, both in the aggregate as well as in disaggregations by industry.

We present additional facts that suggest the preference for the VAT regime by small firms. Upon registering with the tax administration, 81% of these firms pick the VAT as their first choice. Among entrants in the VAT scheme, 43% have turnovers below the threshold of mandatory registration, which means that they could be exempt from taxes if they chose not to register. The vast majority of this voluntary group (79%) decide to operate in the VAT. We also find no evidence of bunching in the neighborhood of the turnover-VAT threshold. Hence, the turnover regime option does not seem to generate adverse incentives for firms to stay small.

This paper relates to the literature on VAT taxes. De Paula and Scheinkman (2010) document that the VAT gives rise to informality chains in Brazil, wherein informal (formal) firms trade only with other informal (formal) firms, since formal VAT firms can only use receipts from formal upstream firms to deduct the input costs from VAT payments. Experiments in countries with VAT scheme document its self-enforcing mechanism (see for

instancePomeranz (2015) and Agostini et al. (2014)). However, the VAT capacity to formalize the economy through the production chain is less understood. As far as we know, our work is the first to document that small firms outside the VAT scheme are willing to pay a premium to be part of the VAT chain. Since these small firms are the closest to informality in our administrative dataset, our results suggest that VAT schemes could play an important role in the formalization of developing economies.

Our work also relates to the growing literature on taxation in developing economies. Policy recommendations for tax systems in these nations often differ from those prescribed for advanced economies. These differences arise after accounting for difficulty in monitoring income and transactions that leads to informality and evasion (Gordon and Li (2005), Bachas and Soto (2015)). As an example, Best et al. (2013) point out that governments in these countries looking to maximize revenue must resort to taxing turnover instead of taxing profits as predicted by standard public finance theory (Diamond and Mirrlees, 1971). Huang and Rios (2016) point out that a linear consumption tax as the VAT is desirable even for redistributional purposes, in environments in which the income tax is less enforceable than consumption taxes. In the current work, we identify another justification for the VAT: it generates incentives for firms to formalize.

Finally, the present work relates to the literature on the optimal thresholds for implementing turnover taxes and VAT in developing countries (see for instance Krueger (2013), Keen and Mintz (2004), Dharmapala et al. (2011)). We do not find evidence of bunching around the turnover-VAT threshold and the firm size distribution remains smooth, suggesting that turnover tax schemes for small firms are not more attractive than the VAT.

The rest of this draft is organized as follows: Section 2 presents an overview of Karnataka's Value Added Tax system. Section 3 describes the data. In Section 4, we present the theoretical framework. Section 6 concludes and discusses the next steps going forward.

2   The Karnataka Tax System

Karnataka is a state situated in the south of India inhabited by 62.5 million people[3], and contributes to 5.2% of the India's GDP in recent years. The state is important for industrial activity in India in the field of information technology, aeronautics, and manufacturing. The Government of Karnataka maintains a good reputation in implementing modern practices in tax collection, and was the first Indian state to receive Presidential assent to

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[3]Population statistics are as of the 2015 Census

implement the VAT in India. The Commercial Taxes Department is located in the state's capital city, Bangalore, and is the authority that implements VAT in Karnataka since its introduction in 2003.

In Karnataka, a business with turnover above INR 1 million is required to register with the government and file tax payments[4]. Upon crossing this threshold of mandatory registration, all businesses with turnovers above INR 2.5 million must comply with the VAT regime. Others with turnover between INR 200,000 and INR 2.5 million are given an option of a simplified tax scheme called Composition of Tax (CoT), wherein firms are only required to pay a simple turnover tax, in order to ease out their VAT compliance issues. The CoT scheme also includes Hoteliers and Restauranteurs, Works Contractors, and Stone Crushers[5], who may avail the CoT option even if their turnovers are over the CoT-VAT threshold of INR 2.5 million[6].

Under the VAT, the tax schedule depends on the commodity sold and the date of the transaction[7]. Currently, the VAT rates range from one to 20% for taxable commodities, and there are certain exempted commodities. Businesses make monthly VAT payments to the administration, except for those VAT firms with annual turnover below the CoT-VAT threshold that make quarterly tax payments. Under the VAT scheme, the dealers may claim input tax credits on taxes paid on their purchases. The input tax credit is credited back not in cash, but as a set-off on the tax payable by the dealer on his subsequent sales, either on local sales or interstate sales.

Eligible businesses that opt for the CoT scheme pay a fixed rate on their turnover irrespective of the commodity produced, unlike the VAT. Firms with turnovers below the CoT-VAT threshold pay only 1% tax on their turnover, while Hoteliers & Restauranteurs, and Works Contractors pay 4% of their turnover. Stone Crushers pay a flat rate based on the capacity of their stone crushing machinery, irrespective of their turnover[8]. Unlike in the VAT, the CoT does not have a self-policing mechanism that cross-checks reported turnover, because firms only report their turnover and pay sales tax to the government. They aren't eligible to claim input tax rebates, and hence do not report their purchases.

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[4]This threshold of mandatory registration used to be INR 200,000 until April 2010, and was thereafter shifted to INR 500,000 in April 2010; INR 750,000 in April 2014, and is currently INR 1,000,000 since April 2015.

[5]The calculation of tax liabilities of Hoteliers and Restauranteurs, Works Contractors, and Stone Crushers involve cumbersome calculations, and hence CoT is allowed as an option irrespective of their turnover.

[6]The CoT-VAT cutoff used to be INR 1.5 million before April 2010.

[7]This is because tax rates may be subject to change due to amendments and notifications to the Value Added Tax Act of 2003

[8]Since the flat rate is based on the capacity of their stone crushing machinery, and it could even be zero

Furthermore, The CoT scheme prohibits firms to effect any interstate trade.

In the event that a CoT firm exceeds the CoT-VAT threshold or engages in out-of-state trade, the government forces such firms to switch to the VAT regime from the first day of the succeeding month after the violation. A firm may also voluntarily switch from VAT to CoT Scheme and vice versa, after initially registering with the administration under either taxation scheme. The change of scheme, however, is only permitted after the passage of 12 months[9].

The VAT is implemented by the *credit* or *invoice* method. This method may be illustrated by a simple example. Consider two firms in the economy, A and B. Firm A is an *up-stream* firm in the supply chain as it is involved in initial production stages, while Firm B *downstream* as it needs Firm A's goods as inputs in its own production. The VAT is implemented by first taxing the reported turnover of both firms A and B. Simultaneously, the downstream firm B also reports its purchases of inputs from upstream Firm A, and receives a tax credit for the amount of taxes paid by Firm A in the previous stages of the production. Hence, both upstream and downstream firms effectively pay taxes on their value-added, because downstream firms may utilize their tax credits to offset their future tax liabilities.

However, input purchases from informal upstream suppliers do not qualify for tax credits, as no taxes are paid in the previous stage of production. Thus, every downstream firm in the formal supply-chain prefers to buy their inputs only from upstream formal VAT. This makes upstream informal firms embrace the VAT and tap the larger downstream demand in the formal VAT chain, as opposed to operating outside the formal VAT chain and saving on its compliance costs[10]. Therefore, the VAT regime has the capacity to formalize the economy through firm networks along the supply chain.

3 Data

Establishment level data is obtained from administrative tax records maintained by the Commercial Taxes Department of the Government of Karnataka. The data we have access

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[9]Details are provided in the Appendix

[10]The VAT's *self-policing* nature also obtains from its method of implementation. Because it is in the interest of downstream firms to report purchases and receive tax credits, the turnover of every upstream firm in the production chain essentially gets reported twice. Hence, the VAT's built-in automatic cross-check on the self-reported turnover of upstream firms makes it very difficult to under-report turnover, and is *self-policing* as a result.

Table 1: Summary Statistics, Annual

	COT		VAT - Small Firms		VAT - All Firms	
	Mean	SD	Mean	SD	Mean	SD
Turnover	320,318	1,586,460	521,201	645,046	10,155,212	32,306,996
TaxPayments	3,919	60,116	34.589	72,527	432,404	1,351,617
TaxCredits	.	.	29,519	98,933	274,068	871,721
Purchases	.	.	670,729	4,300,790	8,663,936	27,820,029
N	455,462		1,696,811		2,734,043	

Notes:
[1.] *Small Firms* are those who can choose their tax regimes as annual turnovers are below the CoT-VAT threshold; i.e. Turnover < INR 1.5 million in 2008-2009, and Turnover < INR 2.5 million) in 2010-2015.

to spans the period from 2008 until 2015. For a VAT registered entity, we observe reported turnover, purchases, input tax credits and tax payments at a monthly frequency for those above the CoT-VAT threshold and a quarterly frequency for those below the threshold. For CoT dealers, we only observe the reported turnover and tax payments at a quarterly frequency, since this is all they're required to disclose in consonance with the CoT tax code.

Table 1 presents annual summary statistics of the full sample, for all the *small firms*[11] across both CoT and VAT regimes, and the entire VAT sector. For a CoT registered firm, the average turnover is INR 320,318, which is only a 30th of the average size of the full VAT sample. The large standard deviation on CoT turnover is a result of firms in sectors like Hoteliers that may avail of the CoT option unconditionally. The average taxes paid by CoT firms reflects an average tax rate of 1% on their turnover. A small VAT firm's average turnover is INR 521,201, which is bigger than an average small CoT firm, but still very small compared to the full VAT sample. They pay taxes at an average of 7% of turnover, but receive approximately 85% of the taxes paid as credits against future tax liabilities. In comparison, firms in the full VAT sample pay about 4% of their turnover in taxes and receive 65% of those payments as tax credits. Purchases by small VAT firms is surprisingly higher than their turnover unlike in the full VAT sample. This may be explained by either early-stage investments by these small firms or evasive behaviour by overinflating purchases to receive tax credits.

In Table 2, the annual summary statistics are broken down by industry, and the last column measures Tax Burden as Tax Payments minus Tax Credits. The first row reiterates information of all the small firms in Table 1. The first column presents the share of small firms within each regime, and we see that 86% of all small firms prefer the VAT regime.

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[11]Firms below the CoT-VAT threshold of INR 1.5 million prior to 2010, and INR 2.5 million since 2010.

Table 2: Annual Summary Statistics, Small Firms

Industry	Firms (% of Total)		Turnover (INR million)		Tax Burden (% of Turnover)	
	CoT	VAT	CoT	VAT	CoT	VAT
All Small Firms	14	86	0.32	0.52	1.22	0.97
Retailer	21	79	0.38	0.6	1.08	0.70
Manufacturer	12	88	0.31	0.5	1.27	2.27
Wholesaler	3	97	0.41	0.5	1.05	1.47
Other	24	76	0.35	0.5	1.15	0.90
Contractor	26	74	0.13	0.3	3.00	-4.64
Distributor	3	97	0.38	0.5	1.20	1.47
Services	15	85	0.42	0.5	1.05	0.20
Agency	5	95	0.34	0.5	1.12	0.86
Hotelier	90	10	0.04	0.5	6.57	2.77
Auctioneer	12	88	0.26	0.4	1.01	1.58
Lessee	14	86	0.24	0.3	1.05	-1.36
Hire Purchaser	17	83	0.20	0.4	2.33	1.83

Notes:
[1.] *Small Firms* are those who can choose their tax regimes as annual turnovers are below the CoT-VAT threshold; i.e. Turnover < INR 1.5 million in 2008-2009, and Turnover < INR 2.5 million) in 2010-2015.

This pattern holds for nearly all sectors in the data. The first three industry categories - Retailer, Manufacturer, and Wholesaler - account for 76% of the entire small-firms sample, are the largest by turnover, and exhibit a high preference for the VAT regime. However, upstream sectors like Manufacturers and Wholesalers exhibit a much higher share of firms in the VAT and bear a higher VAT tax burden, in comparison to a downstream sector like Retail. Not only that, the VAT tax burdens of Manufacturers and Wholesalers is also higher than their respective CoT tax burdens, unlike that of the Retail sector. These patterns in the data hint at the differential value of the VAT depending on the upstream or downstream position of the establishment in the production chain - while all these sectors prefer the VAT, upstream firms may pay a premium to be part of it while downstream firms may obtain favourable tax credits by embracing the VAT.

Hoteliers, unlike all the other sectors in Table 2, have a substantially large number of firms in the CoT regime. As described in Section 2, both Hoteliers and Works Contractors are special sectors allowed to unconditionally opt for the CoT, and are even charged higher CoT tax rates than the rest of the CoT firms. In Table 2, this is reflected in the high tax payments for these two sectors under the CoT. However, a unanimous preference for the CoT is seen only among Hoteliers, with 90% of all small hoteliers opting for the CoT

regime and constituting the smallest establishments in the CoT regime (average turnover of only INR 40,000 approx.). Barring Hoteliers, the VAT is the regime encompassing a majority of small firms.

However, 18% of small firms are registered in the CoT regime. While the option of this regime is provided by the government to relieve small firms from compliance costs associated with the VAT, the CoT system is also a more evasive habitat lacking the self-policing property associated with the VAT. Thus, the CoT option could potentially induce a sizeable number of firms to curb their growth prospects and bunch to the left of the CoT-VAT threshold, distorting the firm size distribution in the neighborhood of the threshold. In Figure 1, we plot the size distribution of all firms in the neighborhood of the threshold, for every year in the sample, and find no evidence of distortions - bunching on the CoT side and a missing mass to the VAT side - at the CoT-VAT threshold. The data suggests that within a VAT regime, the preferential treatment of small firms to mitigate compliance generates no adverse incentives for firms to strategically stay small to avail any benefits of regulatory exemptions. Put differently, small firms are willing to be part of the VAT in spite of being eligible to operate in more evasive alternatives[12].

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[12]This statement must be qualified by the fact that the CoT prohibits a firm from engaging in inter-state trade, and that the VAT preference might solely be explained by the non-existence of such restrictions in the VAT. We will return to this point in Section 5, where we look for indications of evasive behaviour among firms switching from VAT to CoT.
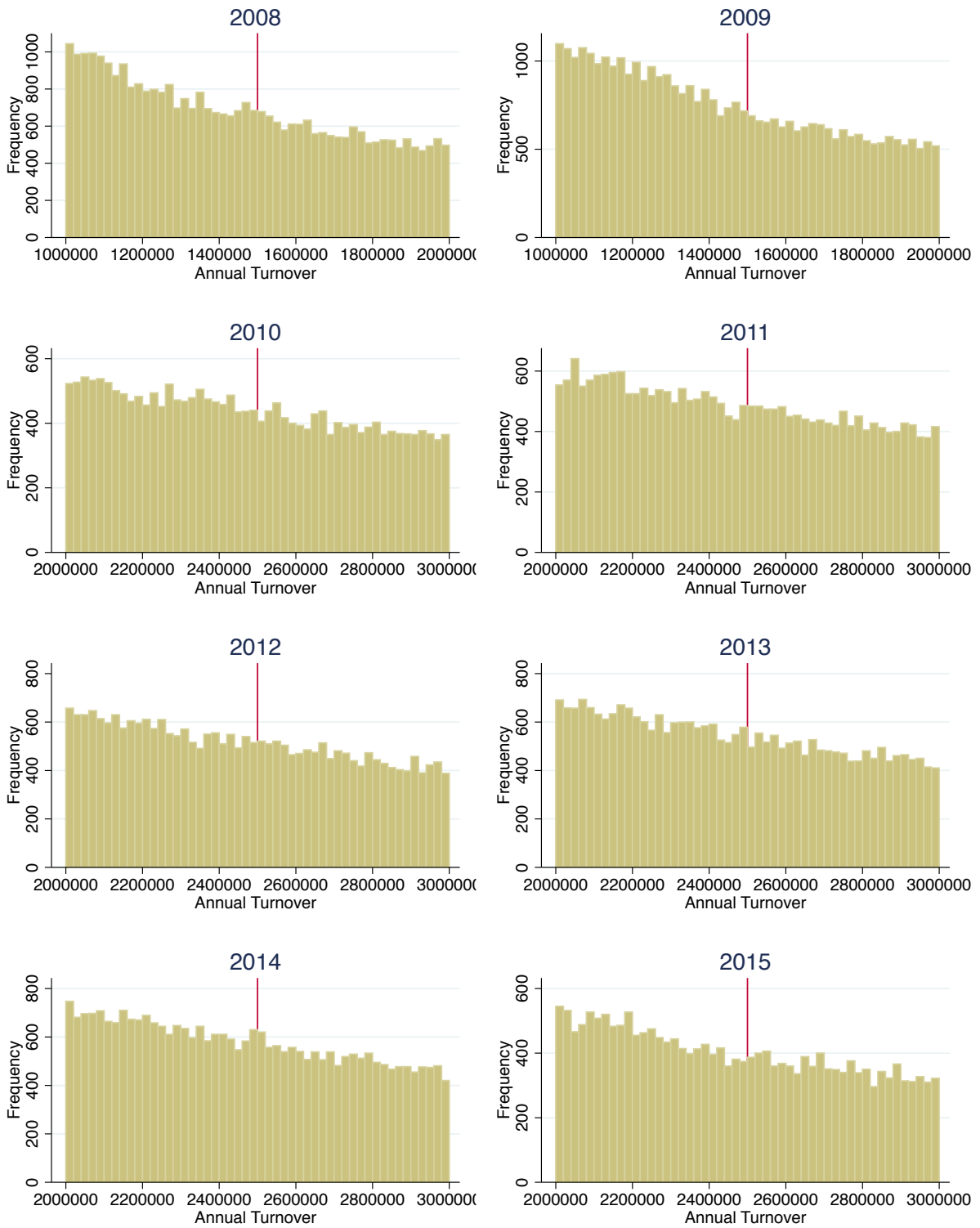
Figure 1: Bunching at the CoT-VAT Threshold

Furthermore, the VAT preference of small firms is consistently revealed in both new registrations within tax regimes as well as switches across regimes. Table 3 presents the VAT preference of new firms registering with the government. The dataset begins in 2008 with 213,960 small firms registered, of whom a majority of 72% are enlisted in the VAT. Over the years between 2009-2015, new registrations are highly in favor of the VAT regime, and the pattern of VAT preference is growing over time, from 86% in 2009 to 92% in 2015.

Table 3: New Registrations by Small Firms

| Entry Year | Registration Type | | All Small Firms |
	CoT	VAT	
Existing Firms			
2008	59,464	154,496	213,960
	(28)	(72)	(100)
New Entrants			
2009	4,646	28,863	33,509
	(14)	(86)	(100)
2010	4,881	38,725	43,606
	(11)	(89)	(100)
2011	3,812	38,885	42,697
	(9)	(91)	(100)
2012	4,136	39,378	43,514
	(10)	(90)	(100)
2013	5,328	41,118	46,446
	(11)	(89)	(100)
2014	4,450	41,864	46,314
	(10)	(90)	(100)
2015	889	10,697	11,586
	(8)	(92)	(100)

Notes:
[1.] *Small Firms* are those who can choose their tax regimes as annual turnovers are below the CoT-VAT threshold; i.e. Turnover < INR 1.5 million in 2008-2009, and Turnover < INR 2.5 million) in 2010-2015.
[2.] In parantheses is the % share of all registration counts

Upon registering in the CoT or VAT regimes, small firms may switch across regimes, as described in Section 2. On one hand, firms may switch from CoT to VAT either voluntarily, or forcibly because of violating any conditions that bind under the CoT. On the other hand, firms can switch from VAT to CoT, which are always voluntary by design. Table 4 displays these patterns in regime-switching across years. In total, we have 7,513 firms switching between 2009-2015, of which 78% are from the CoT to VAT regime. Even within CoT to

Table 4: Registration Switching by Small Firms

| Switching Year | VAT to COT | CoT to VAT | | All Switchers |
		Voluntary	Forced	
2009	28 (13)	133 (63)	51 (24)	212 (100)
2010	337 (21)	876 (55)	382 (24)	1,595 (100)
2011	303 (23)	704 (52)	334 (25)	1,341 (100)
2012	223 (20)	605 (54)	291 (26)	1,119 (100)
2013	239 (22)	525 (48)	320 (30)	1,084 (100)
2014	263 (25)	486 (46)	308 (29)	1,057 (100)
2015	238 (22)	655 (59)	212 (19)	1,105 (100)
Total	1,631 (22)	3,984 (53)	1,898 (25)	7,513 (100)

Notes:
[1.] *Small Firms* are those who can choose their tax regimes as annual turnovers are below the CoT-VAT threshold; i.e. Turnover < INR 1.5 million in 2008-2009, and Turnover < INR 2.5 million) in 2010-2015.
[2.] In parantheses is the % share of all switching counts

VAT switches, a majority are voluntary[13]. These patterns in switching are also consistently exhibited within each year.

A final piece of information that insinuates the attractiveness of the VAT is that 53% registered firms have turnovers below the threshold of mandatory registration (turnover less than INR 200,000). Among these firms, 80% opt for the VAT scheme. Those registered voluntarily in the VAT have a meagre average annual turnover of INR 70,121, and bear a tax burden of 1.5% of turnover. The remaining 20% in the CoT have an average annual turnover of INR 62,739, and pay 1% of that in taxes. Figure 2 illustrates the breakdown by sector. A high share of these small firms enter upstream sectors like Wholesale, Manufacturing and Distribution, while Retail has a small VAT share. Just like in the full sample, Hoteliers are an exception to the VAT preference across sectors. Voluntarily registered

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[13]Voluntary Switchers are defined as those CoT firms whose annual turnovers do not cross the CoT-VAT threshold within 12 months before the VAT switch. We cannot further exclude firms engaging in inter-state trade, as we do not observe this information for CoT firms. This shortcoming in our dataset renders our definition of a voluntary CoT to VAT switchers to be noisy, and this is the best we can do.
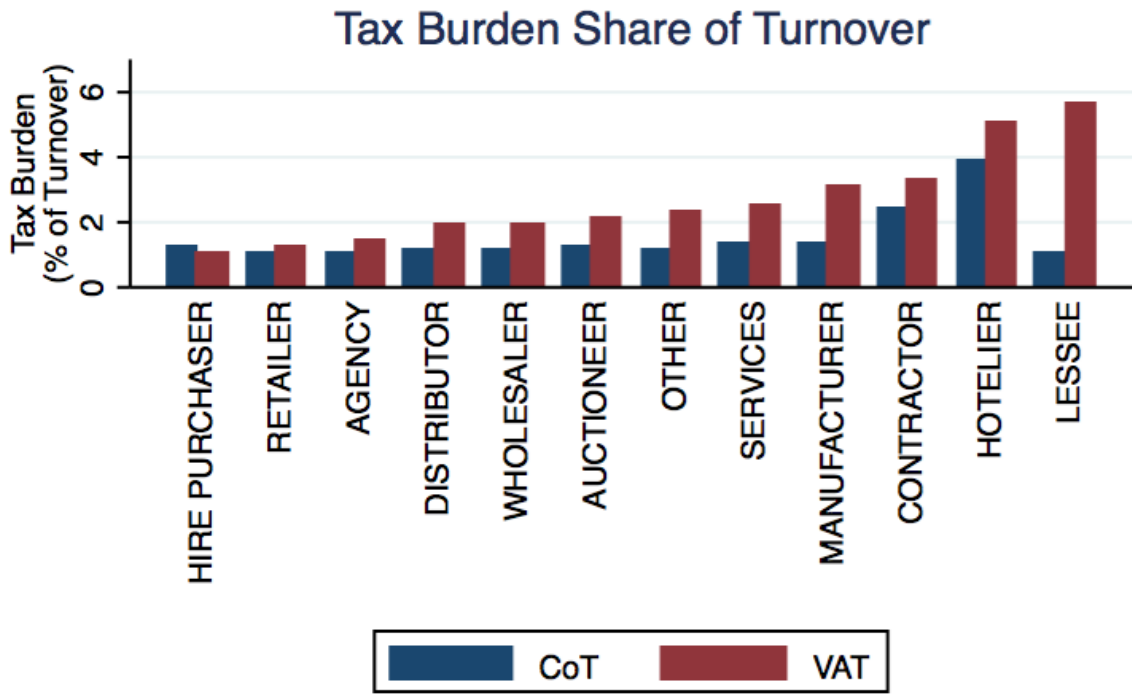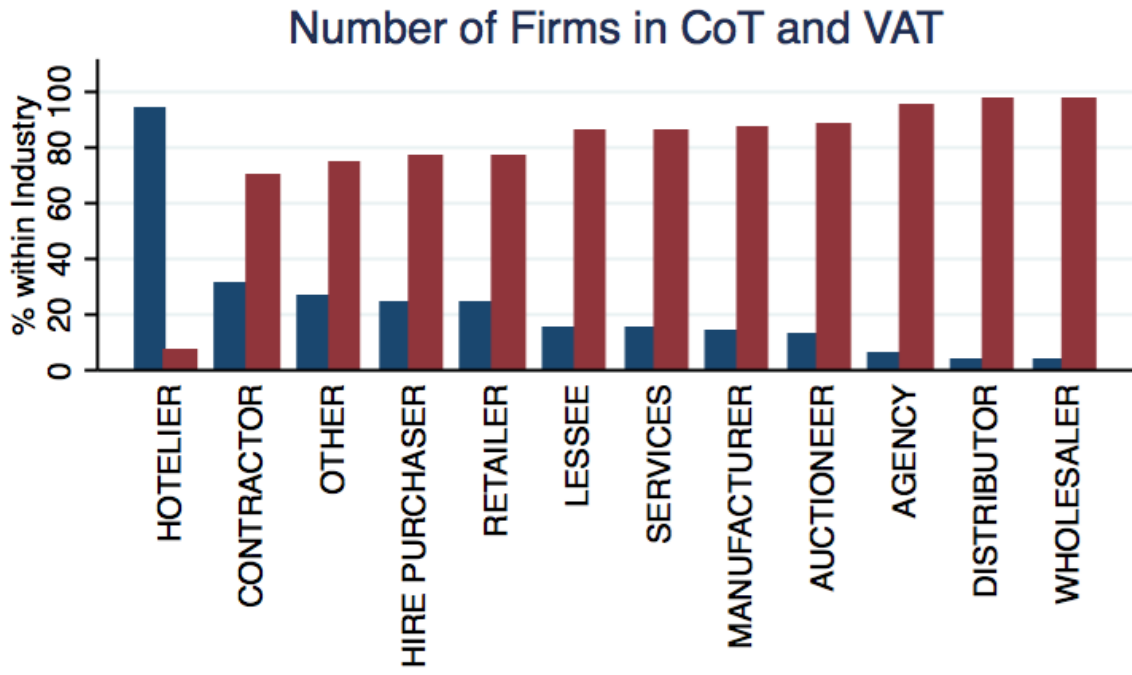
Figure 2: Voluntary Registrations

firms in upstream sectors also bear a higher tax burden, mirroring the pattern seen in the full sample.

In essence, these facts in the data point towards the importance of the VAT in encouraging small firms to formalize across the production chain, and collectively motivates our exercise to quantify a firm's willingness to pay to be part of the VAT (or CoT) regime, and understand the heterogeneity across firms in upstream and downstream sectors.

4   Measuring the Willingness to Pay

In this section, we set forth the different measures of a small firm's willingness to pay for either the CoT or the VAT. To ease the exposition and notation, we will present the measurement for the case of a CoT to VAT switcher, but the VAT to CoT case symmetrically follows and is presented in Appendix A.2.

Let the statutory tax burden for every firm i at time t be given by

$$TaxBurden_{i,t} = TaxPayment_{i,t} - TaxCredits_{i,t} \cdot 1\{VAT_{i,t}\} \tag{1}$$

where $1\{VAT_{i,t}\}$ is an indicator that equals 1 if the dealer is a VAT entity. Thus, the tax burden defined in (1) is essentially tax payments in the case of CoT firms, and tax payments net of credits for firms in the VAT.

A firm i in year $t-1$ will voluntarily switch from the CoT to VAT regime in period t, if the expected profits upon switching is positive.

$$E_{t-1}(\Pi_{i,t}^{VAT} - \Pi_{i,t}^{CoT}) \geq 0 \tag{2}$$

For each firm, Let p be the price of its output $q(p)$. Dropping the firm subscript and rewriting the above equation (2) into its turnover and tax burden components yields:

$$\underbrace{E_{t-1}\big[pq_t^{VAT}(p) - pq_t^{CoT}(p)\big]}_{\text{Turnover Premium}} \geq \underbrace{E_{t-1}\big[TaxBurden_t^{VAT} - TaxBurden_t^{CoT}\big]}_{\text{Tax Burden Premium}} \tag{3}$$

under the assumption that the cost is the same under both tax schemes. The left hand side (LHS) of equation (3) is the expected gain in turnover upon switching into the VAT. The right hand side (RHS), is the expected change in the tax burden upon switching. Quantifying the RHS helps us to arrive at a lower bound on the turnover premium of

switching into the VAT. If the tax burden premium in the RHS is positive for a firm, it is evidence of a *Willingness to Pay* to have a place in the VAT chain. If the RHS is negative for a firm, it is evidence that the VAT provides more favourable tax burdens upon switching regimes.

However, two limiting factors render the direct measurement of the tax burden premium (RHS) in equation (3) is impracticable. Firstly, it is impossible to observe the same switching firm in both the CoT and VAT regimes at the same time. Secondly, the calculation requires anticipating its growth prospects in turnover and the simultaneous changes in tax rates, which is infeasible prior to switching. For this reason, we employ two revealed preference simulations of the tax burden premium and compare it to the actual change in the tax burden, to bound our measurement exercise.

The *Actual change in tax burden* upon switching from CoT to VAT, directly observed in the data, is given by:

$$\Delta TaxBurden_t^{Actual} = TaxBurden_t^{VAT} - TaxBurden_{t-1}^{CoT}$$

$$\implies \Delta TaxBurden_t^{Actual} = \left[(t_t^{VAT} Turnover_t^{VAT}) - TaxCredits_t \right] - \left[t_{t-1}^{CoT} Turnover_{t-1}^{CoT} \right] \tag{4}$$

where t^{VAT} and t^{CoT} are the tax rates in the respective tax regimes. This *Actual* measure has embedded in it a change in the firms' turnovers and the tax rates, upon switching regimes. In order to obtain a measure with the right counterfactuals, we present two revealed preference measures of simulated changes in the tax burden below.

The first simulation is a measure of the tax burden change expected by the switcher after switching into the VAT regime, simulating the expected turnover as the post switch (VAT) level and with the knowledge prevailing tax rates in both the CoT and the VAT. The assumption underlying the validity of this measure is that firms have rational expectations on their turnover, i.e. they predict perfectly the period t turnover at $t-1$. Since it is calculated from the post-switch perspective at time t, we call this the *"Simulated @ t"* measure:

$$E_{t-1} \left[\Delta TaxBurden_t \right]^{Sim(t)} = \left[(t_t^{VAT} Turnover_t^{VAT}) - TaxCredits_t \right] - \left[t_t^{CoT} Turnover_t^{VAT} \right] \tag{5}$$

The second simulation is a measure of the change in the tax burden that the switcher expects before switching into the VAT, keeping the Turnover fixed at the pre-switch (CoT) level and with knowledge of the VAT tax rate tomorrow. The expected tax credits in the

VAT are calculated by deflating the actual tax credits that the switcher begets upon switching by the growth rate of the turnover before and after the switch. The assumption here is that firms form their expectation based on the realization of their last turnover. Since it is calculated from the pre-switch perspective at time $t - 1$, we call this the *"Simulated @ t-1"* measure:

$$E_{t-1}\left[\Delta TaxBurden_t\right]^{Sim(t-1)} = E_{t-1}TaxBurden_t^{VAT} - TaxBurden_{t-1}^{CoT}$$

$$= \left[(t_t^{VAT}Turnover_{t-1}^{CoT}) - E_{t-1}TaxCredits_t\right] - \left[t_{t-1}^{CoT}Turnover_{t-1}^{CoT}\right] \tag{6}$$

$$...where \quad E_{t-1}TaxCredits_t = \left(\frac{Turnover_{t-1}^{CoT}}{Turnover_t^{VAT}}\right) \cdot TaxCredits_t^{VAT}$$

These three measures of the tax burden change - *Actual*, *Simulated @ t*, and *Simulated @ t-1* - are quantified for both types of regime switches, and look for evidence of a willingness to pay for either tax regimes.

5   Results

We measure a small firm's willingness to pay to be in the tax system, for a sample of 5,615 voluntary switchers between tax regimes - 3,984 from CoT to VAT and 1,631 from VAT to CoT. Aggregate summary statistics for the average switcher in each direction is presented in Table 5. For the average firm, switching into the VAT engenders a 70% growth in revenue, and switching out of the VAT results in a symmetric fall in revenue. For both type of switching, an average switcher's tax burden falls upon switching regimes, as indicated by the three measures of the tax burden difference upon switching regimes.

Upon disaggregating the simulated measures by industry, an interesting pattern is revealed for the CoT to VAT case. Figure 3 plots the average actual tax burden difference for each sector. It suggests a willingness to pay for the VAT for firms in industries such as Manufacturers, Wholesalers, Contractors, and Distributors. These are industries that are more likely to be positioned upstream in the production chain, and Figure 3 makes the case that such small firms are willing to pay a premium to be in the VAT network. The negative measures, as seen in the aggregate statistics in Table 5, is only true for firms in Retail, Hire Purchasing, Agency and Other industries.

We further analyze this heterogeneity in the VAT willingness to pay in Table 6, which

Table 5: Registration Switching: Summary Statistics

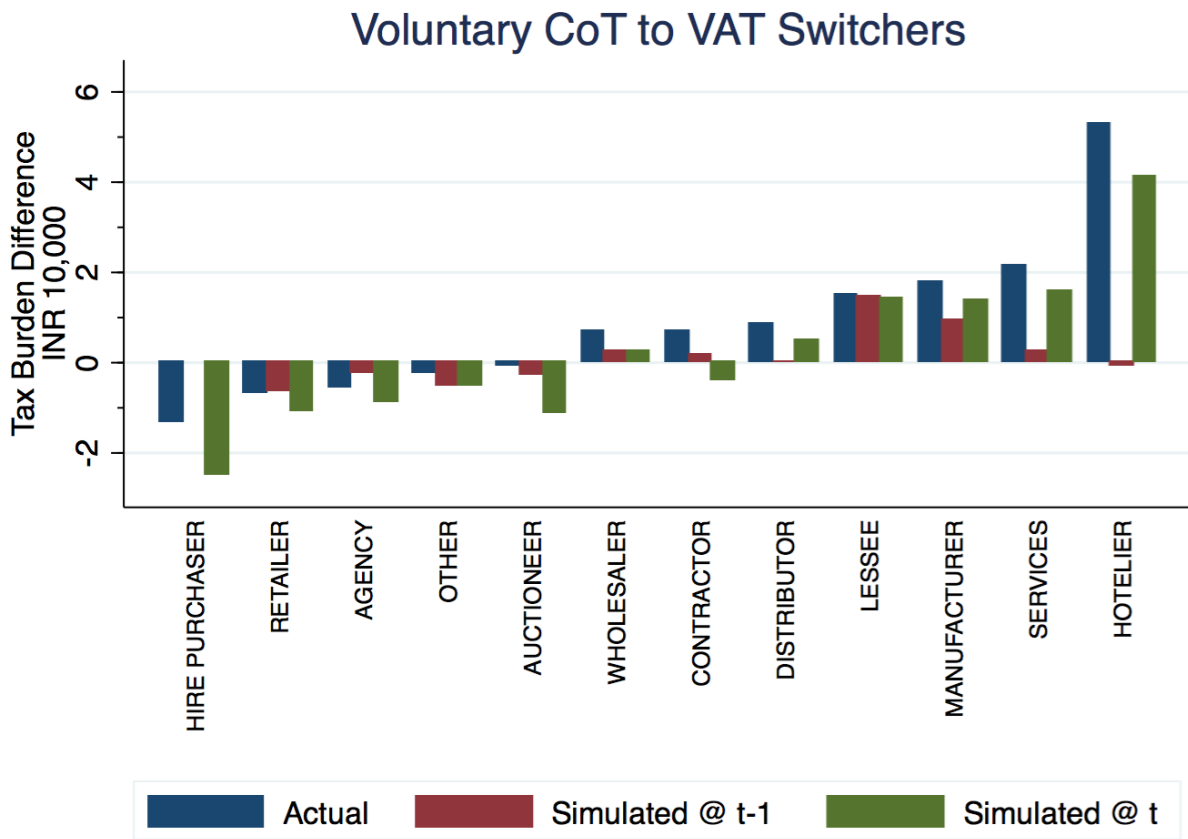|	CoT to VAT		VAT to CoT	
Number of Switchers	3,984		1,631	
	Mean	% of Turnover	Mean	% of Turnover
Turnover				
→ Pre-Switch	630,018		1,693,428	
→ Post-Switch	1,072,060		438,068	
Tax Burden Difference				
→ Actual	-1,406	-0.1	-19,142	-4.4%
→ Simulated @ t-1	-3,316	-0.5	-2,775	-0.2%
→ Simulated @ t	-5,114	-0.4	-4,468	-1.0%

Figure 3: Tax Burden Difference for CoT to VAT Switchers

is classified into three panels. Panel A provides the aggregate statistics for CoT to VAT switchers that was presented in Table 5, Panel B provides the simulated measures for sectors that reduce their tax burdens upon switching into the VAT, and Panel C provides the simulated measures for sectors that pay a premium to be part of the VAT. An addi-

tional last column calculates the "Simulated @ t" measure for all existing VAT firms, the only counterfactual simulation possible for non-switching VAT firms. In Panel B, Retail firms account for 87% of all the firms with negative measures of simulated tax burden differences, which alone explains the average firm's gain in shifting to the VAT in row 1. Because Retailers only sell to consumers, the VAT regime's appeal for a retail firm lies in the tax credits earned against all its inputs, which mechanically translates into a lower tax burdens switching into the VAT. Hence, switching into the VAT is a rational decision for a firm in B2C sectors like Retail. However, such tax discounts aren't the case for mandatorily registered VAT firms of these sectors, as the "Simulated @ t" indicates a higher simulated tax burden in the VAT.

In Panel C of Table 6, we see the firms that are willing to pay a premium to be part of the VAT. Manufacturers and Wholesalers account for 72% of these firms and are willing

Table 6: Simulations of Tax Burden Difference

Industry	Firms	Voluntary CoT to VAT Switchers			All VAT
		Actual	**Simulated$_{t-1}$**	**Simulated$_t$**	**Simulated$_t$**
		(% of Turnover)			(% of Turnover)
A: All Sectors					
	3,984	-0.1	-0.5	-0.4	0.4
B: Sectors with Negative Measures					
Retailer	2,571	-0.6	-0.9	-1.0	0.1
Other	333	-0.3	-0.8	-0.6	0.2
Agency	32	-0.6	-0.4	-1.0	0.2
Hire Purchaser	3	-1.8	.	-3.4	0.5
Auctioneer	3	-0.1	-0.8	-0.9	0.6
C: Sectors with Willingness to Pay					
Manufacturer	545	1.4	1.5	1.0	0.5
Wholesaler	208	0.8	0.5	0.3	0.3
Contractor	168	0.7	0.6	-0.4	1.1
Services	50	1.9	0.5	1.4	-0.01
Distributor	34	1.0	0.03	0.5	0.7
Lessee	3	8.6	11.6	8.3	0.9
Hotelier	34	6.9	-2.7	5.4	1.8

Notes:
[1.] *Small Firms* are those who can choose their tax regimes as annual turnovers are below the CoT-VAT threshold; i.e. Turnover < INR 1.5 million in 2008-2009, and Turnover < INR 2.5 million) in 2010-2015.
[2.] In parantheses is the % share of all switching counts

to pay an additional 1% on their turnover (approximately) to be in the VAT chain, which is on top of their counterfactual tax burden of 1% in the CoT. Both these sectors are B2B in nature, and clearly possess an upstream position in the production chain. The VAT's appeal for firms in such upstream sectors like not only in earning tax credits against its inputs, but also for the opportunity to better service the input demands of downstream VAT firms. Hence, the willingness to pay for the VAT is a rational choice of these firms.

Panel C also presents a VAT willingness to pay for firms in other sectors. However, it is difficult to interpret the results of the simulations for sectors like Services and Distributors, which unlike Manufacturing may include firm of both upstream and downstream. For example, services may comprise upstream firms that provide consulting or IT services to downstream firms, or they may be downstream firms that provide end-use services like electricians, plumbers, etc. Similarly, Distributors may supply goods both to retailers as well as bulk consumers. While the data in Table 6 suggests that these firms are willing to pay a VAT premium, it would be better to disaggregate these sectors by downstream and non-downstream firms to clearly interpret the results. Finally, Panel C includes a small number of Hoteliers and Contractors that are sectors allowed to unconditionally pick the CoT, as operating in the VAT environment may prove very costly for such firms. Consequently, such firms will face a higher tax burden in the VAT. This explains the increase in tax burdens for such firms switching into the VAT, and must not be interpreted as evidence of a willingness to pay for the VAT[14].

While the simulations in Table 6 help pitch the case that upstream firms are willing to pay in order to be part of the VAT, an inherent weakness lies in the inability to identify the exact position of a firm in the VAT production chain, particularly for sectors that may include firms of both upstream and downstream nature. In order to circumvent this issue with the available data, we calculate the *Share of Production in the VAT* for each sector, and analyze the relationship between the existence of a *sector's VAT willingness to pay* and the *sector's share of production in the VAT*. A sector's share of production in the VAT, measured as the ratio of VAT Turnover to Total Turnover, acts as a measure of the relevance of the VAT to that sector. For example, sectors (like Retail) with firms that pick the VAT only to avail input tax credits must have a lower share of VAT production than sectors with upstream firms that pick the VAT to avail both input tax credits as well as the opportunity to service the input demand of downstream VAT firms. If this is the case, we hypothesize a positive association between our simulations and the sector share of VAT production.

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[14]One out of the two simulated measures are negative for Hoteliers and Contractors. This might reflect noise either from a small number of observations, or from outliers given that these are special sectors allowed to choose the CoT at any level of turnover.

All Firms
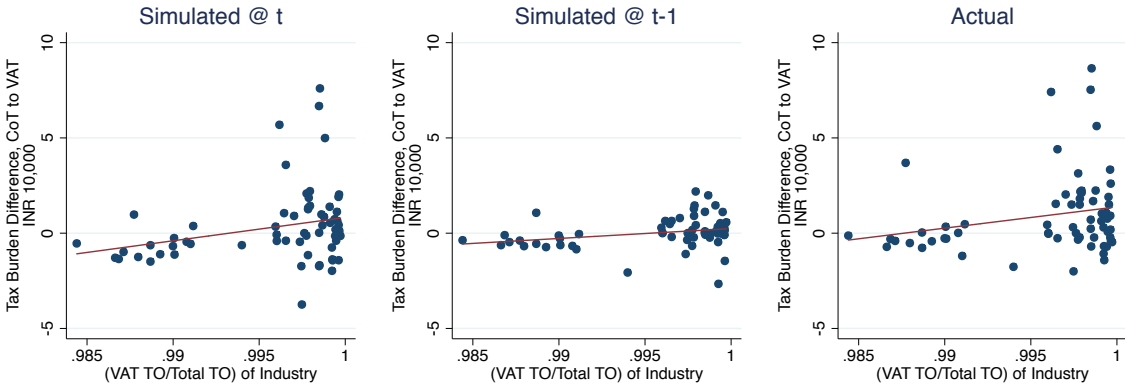
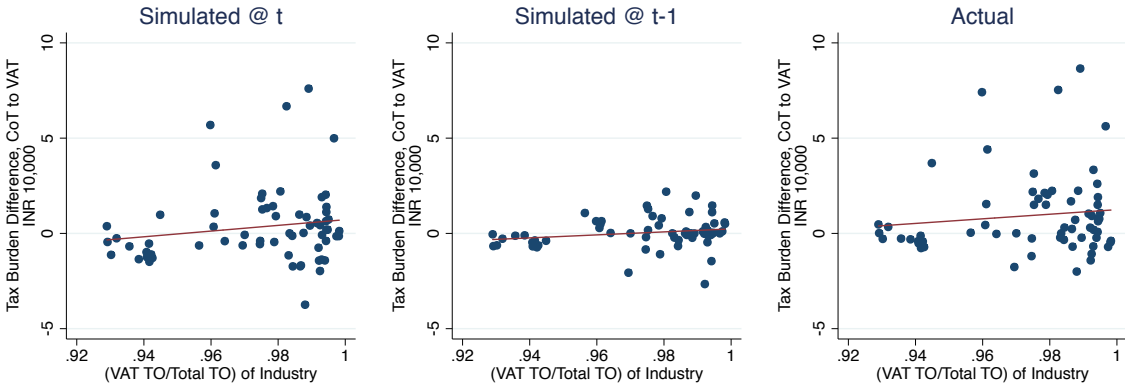# Small Firms
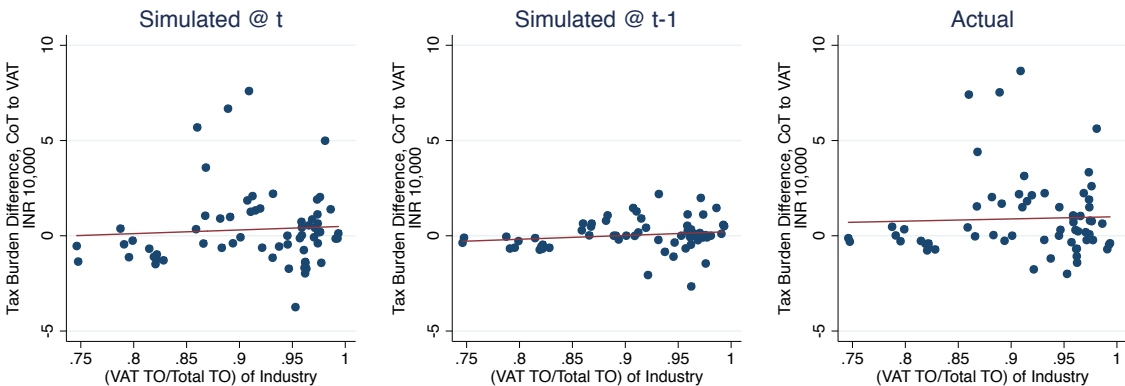
Small and Medium Firms

Figure 4: VAT Willingness to Pay vs. VAT Production Share

The scatter plots presented in Figure 4 confirm the aforementioned hypothesis. We see a positive relationship between the sector's VAT willingness to pay and the sector's share of production in the VAT; i.e., Sectors with a smaller share of VAT production have lower tax burdens upon switching from the CoT to VAT, while those with a larger share of production in the VAT pay a premium upon switching into the VAT. The positive relationship holds for all three measures of the additional tax burden upon switching, and is the largest for the *Actual* and *Simulated @ t* measures. However, the entire sector's share of VAT production on the X axis exhibits little variation, ranging from 98% to 100%. Therefore, in the bottom two rows of Figure 5, we restrict the X axis to only account for small and medium enterprises, and continue to obtain a positive relationship. Overall, this exercise confirms our hypothesis that small firms in upstream sectors are willing to bear an additional tax burden in order to participate in the VAT chain, rather than opt for more informal enviroments to operate.

As a further robustness check, we symmetrically focus on VAT to CoT switchers and look for any evidence of larger tax burdens for firms switching into the CoT regime. In Table 7,

Table 7: Simulations of Tax Burden Difference

| Industry | Firms | VAT to CoT Switchers | | |
| | | **Actual** | **Simulated**$_{t-1}$ | **Simulated**$_t$ |
			(% of Turnover)	
A: All Sectors				
	1,631	-4.4	-0.2	-1.0
B: By Industry				
Retailer	810	-0.5	0.1	0.5
Manufacturer	352	-4.0	-1.3	-4.3
Hotelier	169	-1568.4	0.3	4.4
Other	124	-2.9	-0.4	-1.4
Wholesaler	78	-0.7	-0.5	-1.2
Contractor	58	-47.8	0.1	-2.4
Services	20	-1.2	-3.7	-1.9
Distributor	12	-4.5	-1.1	1.9
Agency	5	0.9	1.2	0.8
Lessee	2	-17.4	3.0	6.7
Auctioneer	1	1	.	.

Notes:
[1.] *Small Firms* are those who can choose their tax regimes as annual turnovers are below the CoT-VAT threshold; i.e. Turnover < INR 1.5 million in 2008-2009, and Turnover < INR 2.5 million) in 2010-2015.   [2.] In parantheses is the % share of all switching counts

Panel A gives us the aggregate statistics for 1,631 firms switching from VAT to CoT, and all the simulated tax burden measures suggest that switchers reduce their tax burdens upon switching into the CoT. Panel B in Table 7 provides these measures disaggregated by industry. Two important points emerge from Panel B in Table 7. First, for sectors like Manufacturing, Wholesale and Services, we find no evidence evidence of a willingness to pay for the CoT. As a result, these sectors have a clear willingness to pay only for the VAT. Distributors and Contractors also had a VAT willingness to pay in Table 6, but two out of three measures in Table 7 show no willingness to pay for the CoT. Second, we find some indication that small firms may switch from VAT to CoT for the opportunity to operate in evasive environments. Retailer switchers, accounting for 50% of the 1,631 VAT to CoT switchers, have *Actual* tax burden falling by 0.5% of turnover upon switching to CoT, even as all simulations suggest that they must pay 0.1-0.5% higher tax burdens in the CoT. This finding suggests that retailers switching from VAT to CoT might benefit from evasion, given the lack of a self-policing attributes in the CoT unlike the VAT. Hoteliers and Lessees switching to CoT also portray a similar pattern to Retailers. However, noise in the actual tax burden change for Hoteliers and the small number of Lessees make it difficult to confirm a story of evasion for these sectors. However, despite the restrictions imposed on firms operating in the CoT, we see that firms may still choose to operate in the CoT to reduce their tax compliance costs or evade taxes.

We also plot the correlations between the CoT willingness to pay and the share of production in the VAT in Figure 5, and find no relationship, which further bolsters our story for the VAT willingness to pay documented earlier in Figure 4. However, we see a negative relationship in the *Actual* measure, but this is only driven by the outliers for Hoteliers that we saw in Table 7.

6 Conclusion

In this paper, we find evidence that the Value Added Tax system (VAT) generates incentives for small informal firms to operate in the formal economy. Using administrative tax data from Karnataka, India, we utilize a setting in which a small firm is allowed to opt for paying either a simple turnover tax (CoT) or the full VAT. The provision of the CoT aims to mitigate a small firm's compliance costs associated with the VAT, but the regime lacks the VAT's powerful self-policing crosscheck on reported turnover.

We first document that a small firm extensively prefers the VAT over the CoT, both at the

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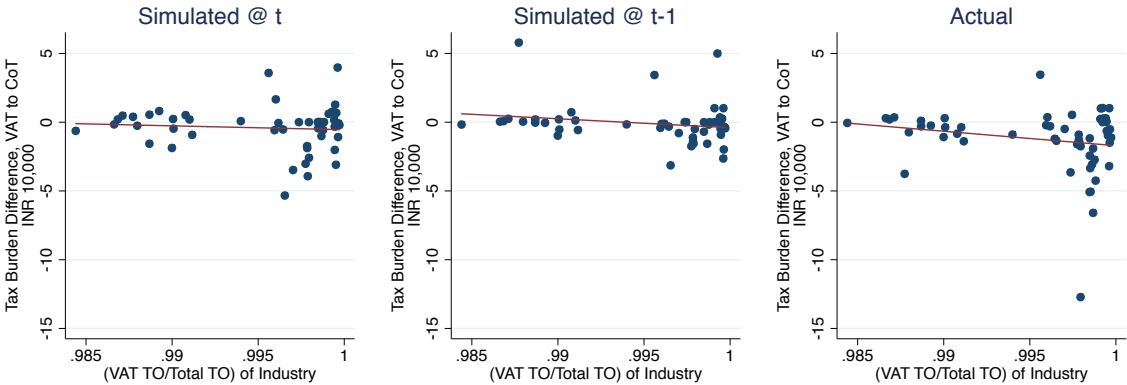
All Firms

Small Firms
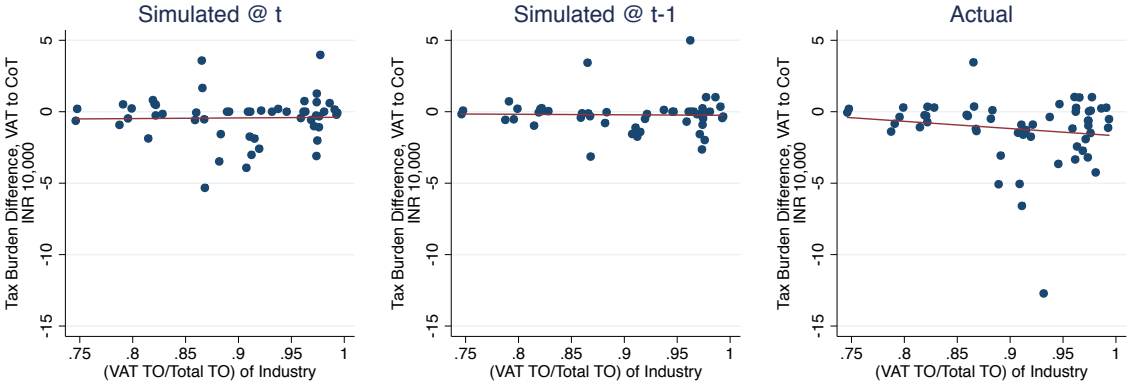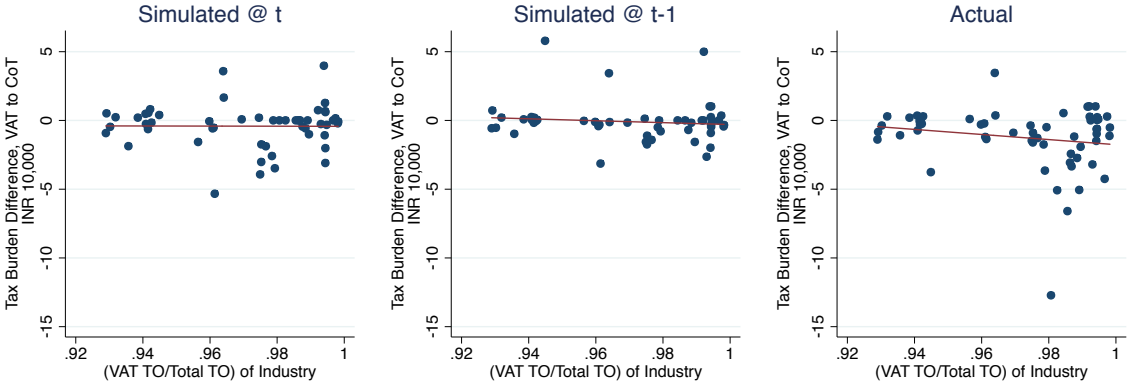

Small and Medium Firms

Figure 5: CoT Willingness to Pay vs. VAT Share of Production

point of registration as well as upon switching registrations. A puzzling but striking 43% of VAT registered firms are those with turnovers below the government's mandatory registration threshold. Furthermore, we find no bunching in the firm size distribution at the CoT-VAT threshold, indicating the power of the VAT in generating no adverse incentives for firms to strategically stay small and avail any benefits from regulatory exemptions in the CoT. In total, these preliminary facts in the data point out that small firms choose the VAT, despite being eligible to operate in more evasive alternatives like the CoT.

Next, we document the mechanism by which the VAT formalizes the economy - i.e., through the production chain. This is accomplished by quantifying a small firm's willingness to pay for either the VAT or the CoT, using revealed-preference simulations of the additional tax burden incurred upon switching regimes. In upstream sectors like Manufacturing and Wholesale, we find small firms willing to pay up to an additional 1% of turnover, but no willingness to pay for the CoT. Small firms in these upstream sectors are attracted to the VAT not just to earn input tax credits, but because they enjoy a larger downstream demand from VAT buyers that source their inputs only from upstream VAT firms. However, small firms in downstream sectors like Retail show no evidence of a willingness to pay for the VAT, and reduce their tax burdens by 1% of turnover upon switching into the VAT. This is because, unlike upstream firms, the attraction of the VAT for a downstream sector lies in the input tax rebates earned to offset future tax liabilities. Moreover, we find some evidence that suggests that Retailers may switch away from the VAT to CoT to evade taxes, as their tax burdens fall by 0.5% in the CoT while simulations suggest they must rise by 0.1-0.5%

Given the inability to perfectly isolate the downstream/upstream position of all the firms, we document the mechanism more generally by studying the relationship between a firm's willingness to pay for either tax regime and the sector's share of production in the VAT. We hypothesize a positive relationship - if sectors that produce more in the VAT consist of upstream firms that not only claim tax rebates but benefit from better sales in the VAT chain, they should be willing to pay more to be part of it. Our regressions confirm this intuition, indicating a positive correlation between the VAT willingness to pay and the sector's share of VAT production, while no such pattern is seen for the CoT willingness to pay. In conclusion, the findings make a compelling case of the VAT regime's critical role in attracting small firms into the formal economy through its incentives along the production chain.

Our next steps would be to extend this analysis to make causal statements about the VAT's impact on small firms in augmenting the formal economy. This maybe accomplished by

exploiting geographical variation, for example by utilizing the introduction of a big retailer in a location and comparing the behaviour of small upstream firms in that location with those in other location. We will need some geographical information for each firm, such as the city and district of operation. Secondly, our current methods to identify upstream and downstream firms by sector is imperfect. We seek transaction-level information from the government, such as the share of VAT buyers for each firm. For example, a firm in manufacturing must have a positive share of VAT buyers, while firms in B2C sectors like retail have no VAT buyers at all. This helps us identify whether a firm is downstream or not, and the degree to which the firm is upstream and finds the VAT attractive. Any other methods by which we may identify the upstream-downstream position of the firm in the VAT chain is highly beneficial towards improving the study.

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A Appendix

A.1 Conditions for Changing between CoT-VAT

The dealers can change from VAT to CoT Scheme and vice versa, after they are registered as one or the other. If a dealer desires to change from CoT Scheme to VAT Scheme, he needs to have fulfilled certain conditions as detailed by the administration.

- The dealer shall not have any goods in stock which are brought from outside the state on the date he opts to pay tax by way of composition and he shall not sell any goods brought from outside the state after such date.

- He shall not be a dealer selling liquor

- He shall not be a dealer effecting inter-State sales or exports

- He shall not be a dealer who has withdrawn his option to pay tax by way of composition and:

  - has paid tax under regular scheme (VAT Scheme) for a period less than 12 months; or

  - was not registered under the VAT Act during the preceding 12 months.

- He shall not be a casual dealer or a dealer who is voluntarily registered under Section 23 (even if his turnover is less than the threshold)

A VAT dealer cannot opt for the CoT scheme if he had opted for VAT from Composition scheme within last 12 months. In case a CoT dealer exceeds the maximum threshold, then automatically the CoT scheme gets withdrawn and he is liable to pay tax under VAT Scheme.

A CoT dealer can withdraw his option to pay tax under CoT Scheme and go to VAT scheme voluntarily if he has submitted the returns for 12 consecutive months or four consecutive quarters.

In effect, the change of scheme is not permitted within one year.

A.2 Measuring the Willingness to Pay

A.2.1 VAT to CoT Case:

The *Actual change in tax burden* upon switching from VAT to CoT, is just Equation (4) with the signs reversed, given by:

$$\Delta TaxBurden_t^{Actual} = TaxBurden_t^{CoT} - TaxBurden_{t-1}^{VAT}$$

$$\implies \Delta TaxBurden_t^{Actual} = \left[t_{t-1}^{CoT} Turnover_{t-1}^{CoT} \right] - \left[(t_t^{VAT} Turnover_t^{VAT}) - TaxCredits_t \right] \tag{7}$$

where t^{CoT} and t^{VAT} are the tax rates in the respective tax regimes. The two simulated measures in the VAT to CoT case are presented below.

The first is the the *"Simulated @ t"* measure of the tax burden change expected by the switcher after switching into the CoT regime. This measure keeps the Turnover fixed at the post switch (CoT) level, but varies the tax rates between both the CoT and the VAT. The expected tax credits in the VAT are calculated by deflating the actual tax credits that the switcher earned earlier by the growth rate of the turnover before and after the switch.

$$\Delta TaxBurden_t^{Sim(t)} = \left[t_t^{CoT} Turnover_t^{CoT} \right] - \left[(t_t^{VAT} Turnover_t^{CoT}) - E_t TaxCredits_t \right]$$

$$\implies \Delta TaxBurden_t^{Sim(t)} = \left[t_t^{CoT} Turnover_t^{CoT} \right] - \left[(t_t^{VAT} Turnover_t^{CoT}) \right.$$

$$\left. - \left(\frac{Turnover_t^{CoT}}{Turnover_{t-1}^{VAT}} \right) \cdot TaxCredits_{t-1}^{VAT} \right] \tag{8}$$

The second simulation is the *"Simulated @ t-1"* measure of the change in the tax burden that the switcher expects prior to switching into the CoT, keeping the Turnover fixed at the pre-switch (VAT) level and with full knowledge of the CoT tax rate in the post-switch year.

$$\Delta TaxBurden_t^{Sim(t-1)} = \left[t_t^{CoT} Turnover_{t-1}^{VAT} \right] - \left[(t_{t-1}^{VAT} Turnover_{t-1}^{VAT}) - TaxCredits_{t-1} \right] \tag{9}$$

Table 8: Pre-Period Summary Statistics: by RetailTreat99 Regions

	Non-treated		Treated	
	mean	sd	mean	sd
Small Firm Count				
Manufacturing	9.551697	22.01859	1828.585	4112.478
Wholesale	15.22554	28.78203	907.7957	1879.535
Distributor	2.298557	3.563137	159.7815	351.7436
Contractor	2.525273	5.896716	348.6185	774.6042
Small Firm Turnover				
Manufacturing (VAT)	194813.7	316894.1	134910.8	293344.7
Upstream (VAT)	198669.6	419512.2	143238.7	343613.2
N	236260		828897	

Notes:
[1.] *Small Firms* are those who can choose their tax regimes as annual turnovers are below the CoT-VAT threshold; i.e. Turnover $<$ INR 1.5 million in 2008-2009, and Turnover $<$ INR 2.5 million) in 2010-2015.
[2.] *Treated* districts are those that have entry of a Big Retailer with annual turnover larger than the 99th percentile of the retail turnover distribution.
[3.] *Small Upstream Firms* include Manufacturing, Wholesale, Distributors and Contractors.

Table 9: Pre-Period Summary Statistics for Small Firms: by Regions

	Non-treated		Treated	
	mean	sd	mean	sd
Manufacturing	21.99897	37.2551	1426.976	3708.155
Wholesale	32.00761	51.19465	710.2114	1699.193
Distributor	5.648318	6.38206	124.4418	317.498
Contractor	4.55102	7.256202	274.312	697.9724
Turnover				
Manufacturing (VAT)	161863.9	364129.7	136893.9	276369.3
Upstream (VAT)	177044.7	411962.9	145424.9	338594.4
N	2088704		1063428	

Notes:
[1.] *Small Firms* are those who can choose their tax regimes as annual turnovers are below the CoT-VAT threshold; i.e. Turnover $<$ INR 1.5 million in 2008-2009, and Turnover $<$ INR 2.5 million) in 2010-2015.
[2.] *Treated* districts are those that have entry of a Big Retailer with annual turnover larger than the 99.5^{th} percentile of the retail turnover distribution.
[3.] *Small Upstream Firms* include Manufacturing, Wholesale, Distributors and Contractors.