

VAT Threshold(s)

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- ➊ Overview
- ➋ Model (main insights)
- ➌ Results
- ➍ Conclusion

- Value Added Taxes (VAT) are almost ubiquitous (>160 countries) and account for a sizeable and growing part of total revenues ($\approx 4/5.5\%$ of GDP in developing/developed country)
- A common feature of VAT systems is 'thresholds' on turnover
 - Above the threshold registration is compulsory
 - High variation in thresholds: Cameroon 80,000\$; Pakistan 22,700\$; Albania 32,000\$; France €35,000; Germany €100,000; UK £87,000
- Imposing a registration threshold is sensible and practical
 - **Compliance costs** push out of the market small firms
 - **Admin. and compliance costs** might be higher than revenues for small firms
- The **threshold induces distortions** in firms' decisions:
 - ① Distortion of firms' size → **bunching** below the threshold
 - ② Distortion of **prices and quantities of inputs and outputs**

Most closely related papers in the VAT threshold literature:

- The impact of VAT thresholds on **firms' size** and **registration choice**:
 - Firm **splitting** to stay below threshold (Onji 2009)
 - Firm choice of **bunching** and/or **voluntary registration** below threshold (Almunia et al. 2019)
- The **spreading along the production-chain** of firms' responses to VAT
 - **Transmission of compliance** (de Paula and Scheinkman 2010, Hoseini 2019, Hoseini and Briand 2020)
 - Firms prefer to trade with firms with same registration status -**transaction sorting** (Gadenne, Nandi and Rathelot 2019)
 - Increase in **vertical integration** induced by VAT (Singh 2019)
- **Optimal VAT threshold**
 - Seminal paper Keen and Mintz (2004) identifies revenue and welfare maximizing thresholds
 - Later extended to account for evasion and informality Kanbur and Keen (2014)
 - Their optimal thresholds have been widely applied but entail simplifying assumptions that we relax

Our paper studies optimal VAT thresholds in a richer modelling setting

The economy in Keen and Mintz (2004) consists of a **Competitive market** that provides inputs to a **Final goods sector**

- The production-chain is compressed into two layers
- Input and output **prices are fixed**

The Keen and Mintz model takes into account just one of the distortions induced by the VAT threshold - the size decision

- Cannot account for interdependence of registration choices across the production-chain
- Cannot account for the impact of price/quantity distortions across the production-chain
- Optimal VAT Thresholds in this simplified setting is very likely to be biased

Building on Almunia et al. (2019) we set-up a more realistic model of the economy:

- Three layers allowing for heterogeneity in input substitutability
Competitive, Intermediate and Final
- We explicitly model B2B and B2C links
 - **Prices** along the production chain **are flexible**
 - Input bought from registered/non-registered firms (**input intensity**) **is flexible**
 - Bunching occurs both in the Intermediate and in the Final good sectors

Our model accounts for distortions due to **bunching** and **price/quantity choices** as well as **their propagation along the production-chain**

Research Questions:

- **What are the revenue maximizing thresholds** for the Intermediate and Final sectors?
- **What are the welfare maximizing thresholds** for the Intermediate and Final sectors?

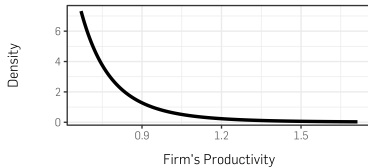
Model

(main insights)

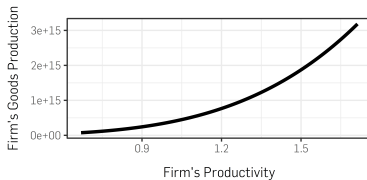
- The economy we model is a production-chain of **three sectors**:
Competitive, Intermediate and Final
- The Competitive sector is **entirely registered** and with **fixed prices**
- Prices in the Intermediate and Final sectors depend on:
 - **Productivity** of the firms
 - More productive firms have lower prices (costs + markup)
 - We model productivities as Pareto distributed
 - **Registration status** of the firms - registration affects output buyers' price and VAT credits on input purchases

Productivity and the firm illustrated - w/o Threshold

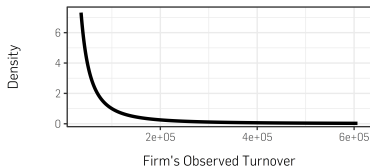
Productivity



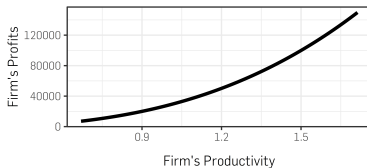
Goods Production



Turnover

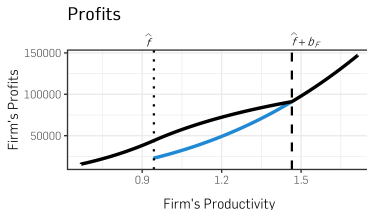
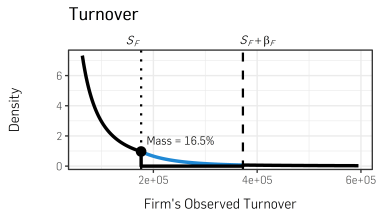
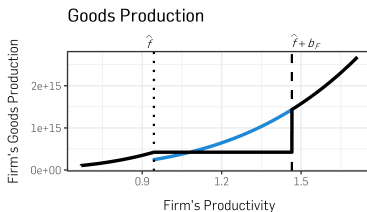
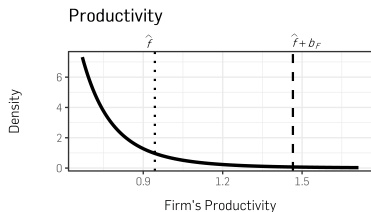


Profits

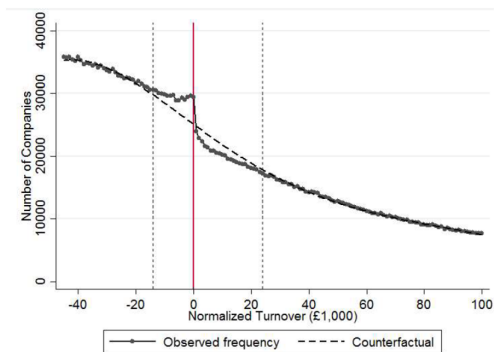


- Let's now consider the case where tax system entails a VAT threshold
- The VAT Threshold can be expressed in turnover or productivity terms
 - Threshold in Intermediate sector: turnover $s_I \longleftrightarrow$ productivity \hat{i}
 - Threshold in Final sector: turnover $s_F \longleftrightarrow$ productivity \hat{f}
- The threshold introduces a discontinuity in tax liabilities and profits
- Some firms with productivity higher than the threshold avoid registration by mimicking the ones at the threshold
 - They **sell same quantity/price** of firms at threshold
 - **Their profits are bigger** thanks to their higher productivity
 - This distortion wastes much of the possible gains from productivity
 - Above some value of productivity $\hat{i} + b_I$ ($\hat{f} + b_F$) is more profitable to register
 - Bunching is performed by all firms:
 - Intermediate sector $i \in [\hat{i}, \hat{i} + b_I]$ - Final sector $f \in [\hat{f}, \hat{f} + b_F]$

Productivity and the firm illustrated - w/ Threshold

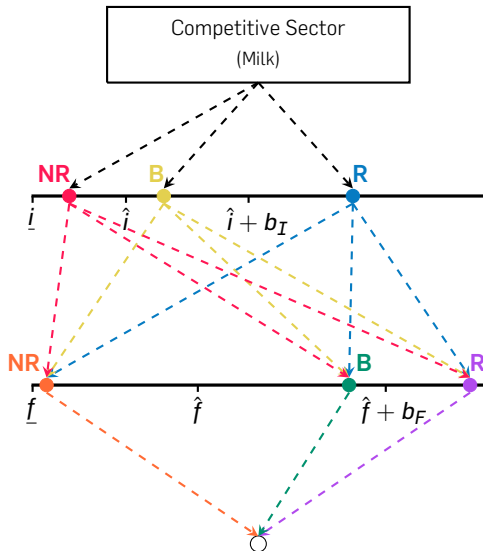


Turnover Distribution around the VAT Registration Threshold



Almunia et al. 2019

Illustration of the economy



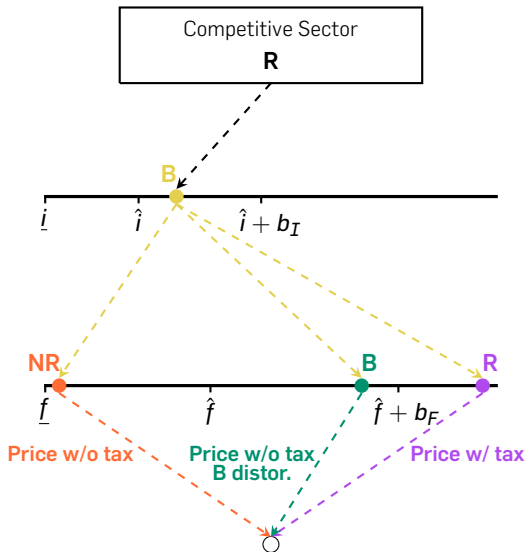
Different firms
(and goods sold)

Intermediate goods sector I
(Cheese: Brie, Mozzarella, Feta)

Final goods sector F
(Restaurants: French, Italian, Greek)

Consumers

Distortions - Intermediate Bunching



B:

Input distortion:

VAT not credited

Output distortion:

Indirect VAT effect (goods are complements)

R:

Input distortion:

Cascading

Output distortion:

Direct effect of VAT on price

B:

Input distortion:

Cascading

Output distortion:

Bunching + Indirect VAT effect (goods are complements)

NR:

Input distortion:

Cascading

Output distortion:

Indirect VAT effect (goods are complements)

Results

- Strategic interaction of **registration** incentives
 - Final goods firms always prefer non-registration
 - Intermediate goods firms registration increases in the share of Final goods firms registered
- Strategic interaction of **bunching** incentives
 - The incentive to bunching for Final goods firms increases in the share of bunching Intermediate goods firms
 - The incentive to bunch for Intermediate goods firms increases in the share of bunching Final goods firms
- There is **imperfect sorting of trade** - Intermediate goods firms trade more with Final goods firms with same registration status

We calibrate the model so to resemble the UK economy during 2004-2015

VAT tax rate	18.33%	
Cost of capital	15.4%	Maffii et al. (2019)
Wage	22700£	ONS (2020)
Admin. costs	1000 £	Keen and Mintz (2004)
Compliance costs	2000£	Walpole (2014)
N. firms Inter./Final	1.9 Million/1.9 Million	HMRC (2019)
Goods subs. Inter./Final	4/4	Melitz and Redding (2015)

The productivity distributions (Pareto) is calibrated to match empirical turnover
We minimize the MSE over:

- Percentage of Non-Registered and Bunching firms
- Turnover at threshold
- Turnover at the 90th quantile

	% NR+B	Turn. Thres.	Turn. 90q
Empirical	69.5	68900	151800
Calibrated Inter.	75.0	66263	158871
Calibrated Final	86.6	66155	161632

- The optimal thresholds balance trade-offs involving
 - Administrative costs
 - Distortions of Tax Base
- We characterize analytically the optimal threshold (and the trade-offs involved) in the simple case where no bunching takes place
- We numerically compute optimal thresholds in the general case
We study three settings where:
 - 1 We are the closest possible to the Keen and Mintz (2004) case
 - We compute the optimal Final sector threshold when the Intermediate sector is entirely registered. We then impose the optimal threshold to both sectors while maximizing revenues
 - 2 The threshold is the same in both sectors
 - 3 The threshold can be different across sectors

Optimal Thresholds - Net Revenues Maximization

	Keen and Mintz Ext.	$s_I = s_F$	$s_I \neq s_F$
Intermed. Sect. - threshold turnover	176308	92331	86918
Final Sect. - threshold turnover	176308	92331	118634
Intermed. Sect. - % Nonreg.	80.316	30.195	0.002
Intermed. Sect. - % Bunch.	15.511	54.509	79.903
Intermed. Sect. - % Reg.	4.173	15.296	20.095
Final Sect. - % Nonreg.	81.389	50.011	69.023
Final Sect. - % Bunch.	16.459	42.704	25.844
Final Sect. - % Reg.	2.152	7.285	7.285
Total Net Revenues	4.04×10^{10}	4.06×10^{10}	4.10×10^{10}

Welfare is a weighted sum of:

- ➊ Individuals' utility
 - Individuals' utility (quasi-linear) **increases in Final goods consumed and disposable money**
 - Disposable money is equal to the various form of income (wage, capital, profits) minus the cost of the Final goods
- ➋ Net revenues
 - We assume the social value of net revenues to be 1.2 (Keen and Slemrod 2017)

Preliminary results show that welfare maximizing threshold is higher than the revenue maximizing one

- Welfare maximization entails higher production than in the revenue case
- Consequence of the role played by income and consumption utility

Conclusions

- VAT thresholds cause an array of distortions and interactions along the production chain
- Optimal VAT Thresholds not accounting for the production chain are very likely to be biased with significant revenue/welfare implications
- The revenue maximizing threshold computed accounting for the production chain is lower than the one in the simpler model

- Complete the analysis of welfare maximizing threshold
- Investigate the relationship between product substitutability and optimal thresholds
- Allow for evasion and informality

Thank you for listening!

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