

Formality Avoidance: Evidence from Notches in China's Value-Added Taxes

Xiaogang Che

City, Univ. of London

Jianhua Gang

Remin Univ.

Jie Guo

Durham Univ.

Haishan Yuan*

Univ. of Queensland

* January 30, Yonsei University

Optimal taxation theories typically abstract from the issues of tax **administration** and **compliance**.



But tax **evasion** and **avoidance** are pervasive, particularly in developing countries.

Practical Design of Tax System

- ▶ Inefficient taxes may be needed for raising public revenue in the presence of informality and evasion.
 - $\text{Tax} = \mathbf{Max}\{\text{Turnover Tax, Profit Tax}\}$ in Pakistan
(Best et al., 2015)
- ▶ Size-based designation and regulation are often practical compromises.

Question

Would these regulatory thresholds themselves lead to the persistence of informality?

Type of Taxes

- ▶ Income taxes
 - potentially progressive
 - demanding on enforcement and compliance
- ▶ Taxes on goods and services, consumption, and turnover etc.
 - potentially regressive
 - broad based
 - often harder to evade
 - double/multiple taxation: sales taxes or turnover taxes distort production efficiency



Are you available to start work
 Yes
 No

Full time
can you work
part time(s)?
 Full time
 Part time
 No

(please list)

GST EXAMPLE

Total value of final sales	\$110
GST on final sales value (\$110 ÷ 10)	\$10
Total to be remitted to the ATO	\$10

ATO

LOCAL WOOL FARMER

Sells wool to clothing manufacturer for \$10 + GST \$1

→ GST paid \$ -
GST Collected \$1
Payable to ATO \$1



CLOTHING MANUFACTURER

Buy's from local wool farmer for \$10 + \$1 GST
Sells jumper to retailer for \$20 + \$2 GST = \$22

→ GST paid \$1
GST collected \$2
Payable to ATO \$1



RETAILER

Buys from clothing manufacturer for \$20 + \$2 GST
Sells to consumer for \$100 + GST \$10

→ GST paid \$2
GST collected \$10
Payable to ATO \$8



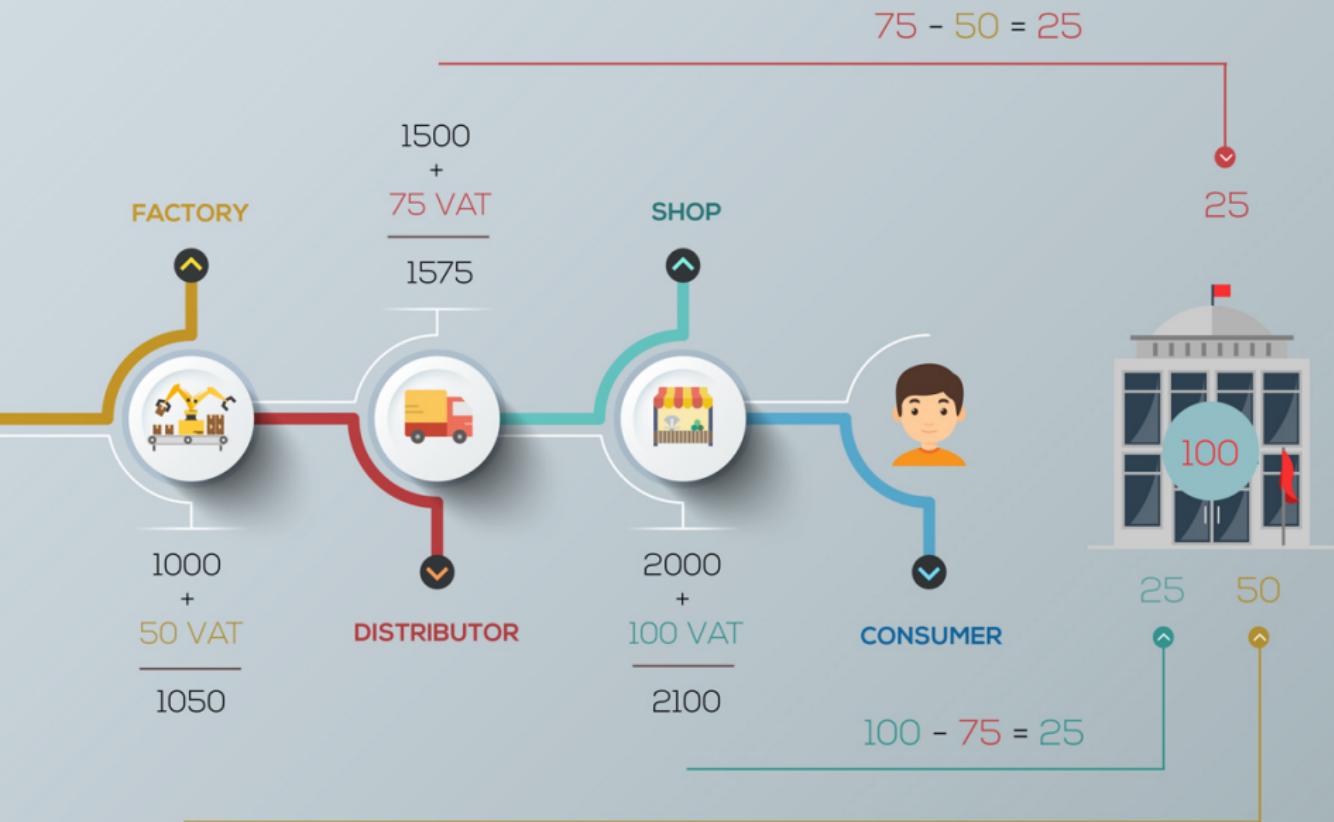
CONSUMER

Buy's from retailer for \$100 + GST \$10 = \$110

Total GST received by the ATO

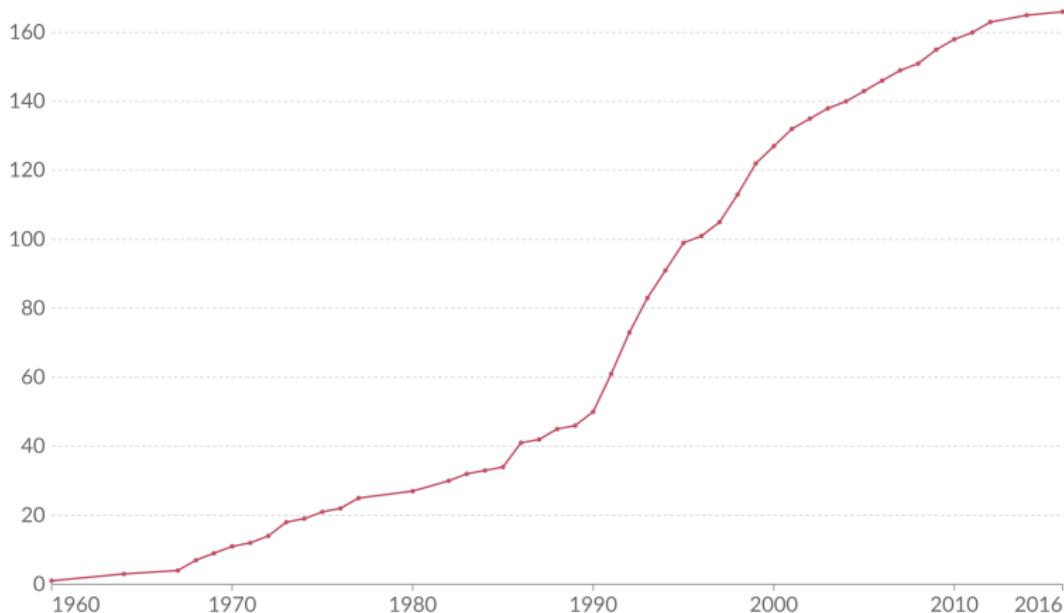


How VAT Works



Number of countries having implemented value added taxes, Countries with VAT, 1960 to 2016

Our World
in Data

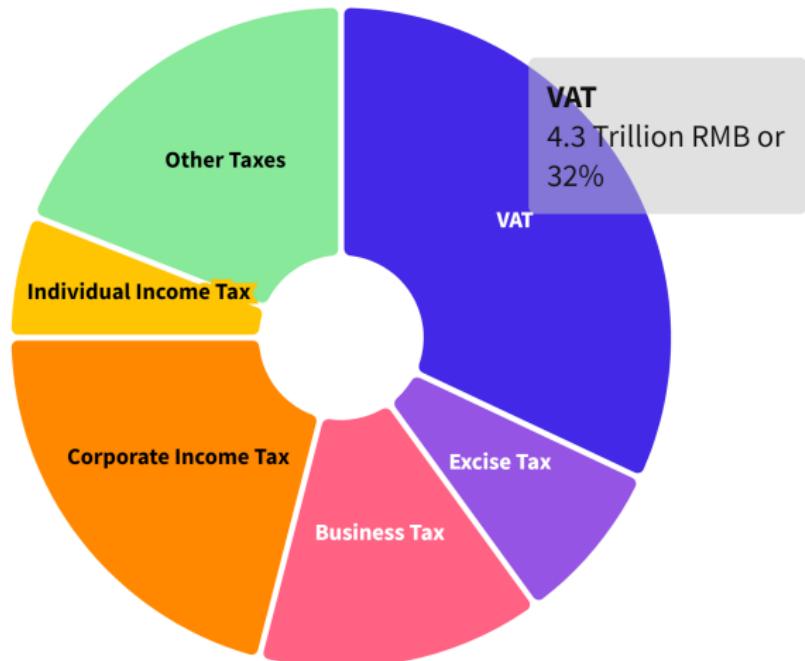


Data source: OECD – Consumption Tax Trends 2016

OurWorldInData.org/taxation | CC BY

Tax Revenue by Tax Type

China, 2015



Data: State Taxation Administration of the P.R.C.

Taxpayer Status

Small firms with revenue below a relevant threshold could register as a small-scale taxpayer.

- ▶ General Taxpayer

- standard VAT rates (e.g., 17% for manufacturing)
- input tax credit
- demanding bookkeeping

- ▶ Small-scale Taxpayer

- lower rates (e.g., 3% for manufacturing)
- no input tax credit
- could not issue VAT invoices on their own
- weak requirements on bookkeeping

Revenue Cutoffs

The revenue cutoffs above which firms have to register as a general VAT taxpayer vary by sector:

- ▶ Manufacture
 - RMB 500,000 (\approx KRW 94 million)
- ▶ Commerce (wholesalers & retailers)
 - RMB 800,000 (\approx KRW 150 million)
- ▶ Services (post-reform 2014)
 - RMB 5,000,000 (\approx KRW 938 million)

Small firms **could opt to** register as a general taxpayer if they meet the accounting requirements.

Empirical Question

Would firm revenue bunch just below the cutoffs?

- ▶ There may be potential advantages from remaining small-scale VAT payers.
- ▶ But no bunching if revenue is hard to manipulate precisely.
- ▶ Cutoffs may also be sufficiently high that firms have found it to be worthwhile to formalize in the VAT system before hitting the cutoffs.

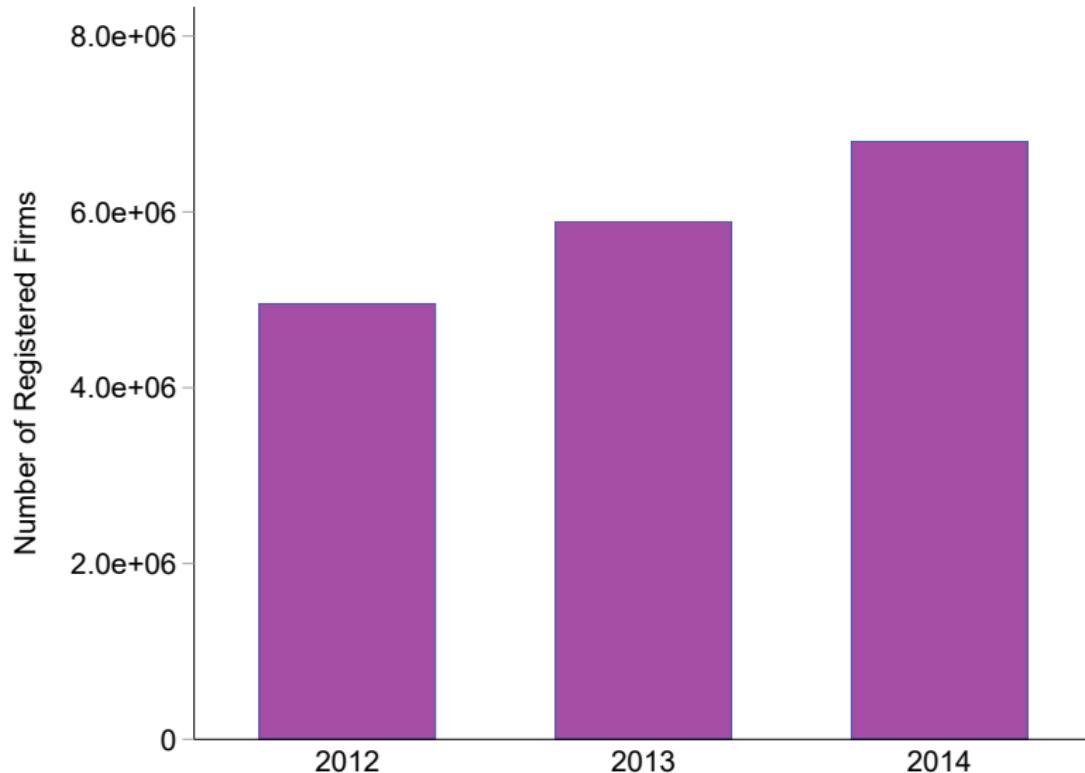
Primary Data

- ▶ Annual enterprise inspection and reporting
- ▶ State Administration for Industry and Commerce
- ▶ Accounting measures
 - revenue
 - expenses
 - profit & loss
 - industry
 - registered capital
 - operation venue
- ▶ Sample period: 2012 - 2014
- ▶ Geographic coverage: nationwide

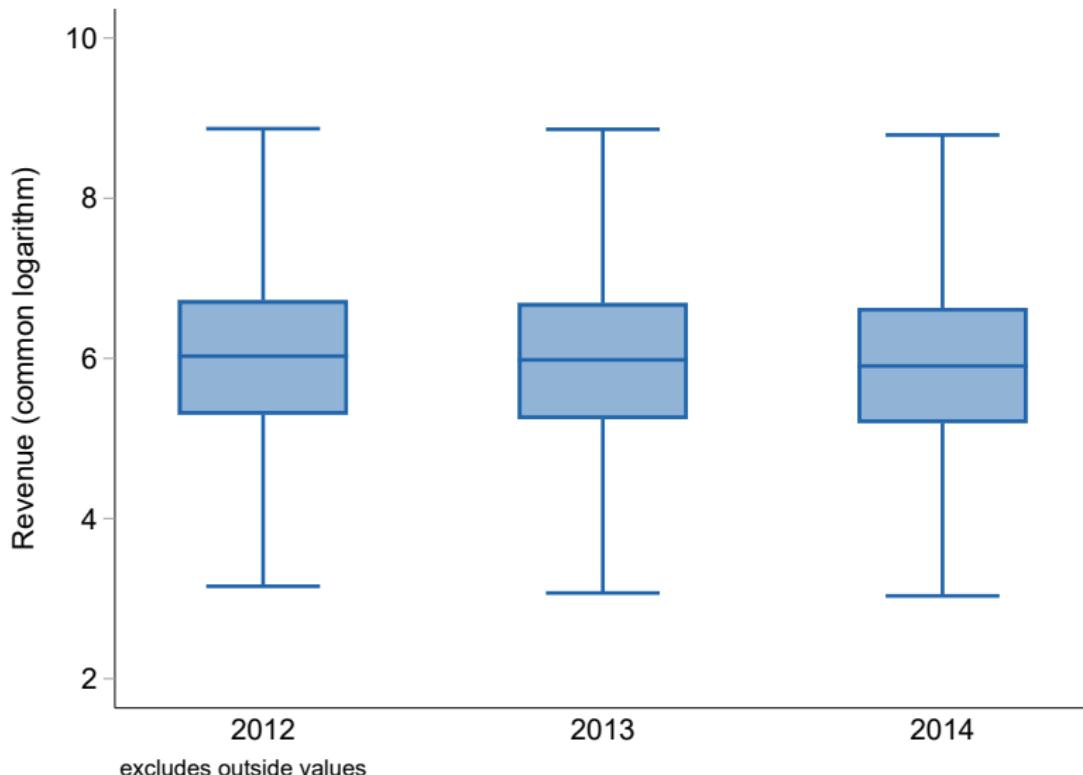
Auxiliary Data

- ▶ Chinese Custom data in 2006
- ▶ County GIS files

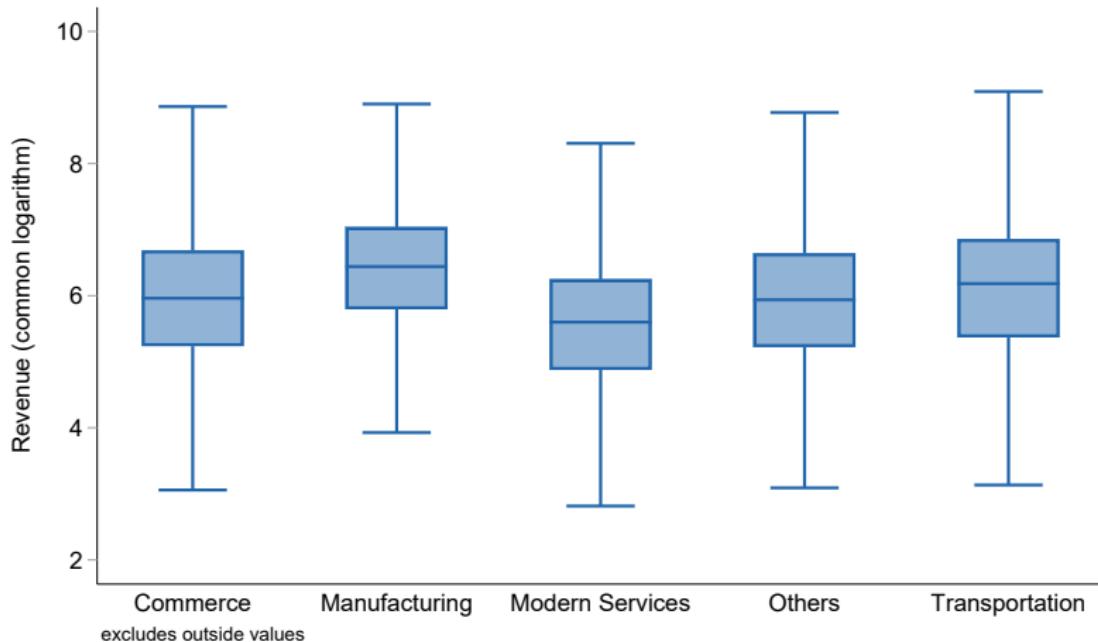
Number of Registered Firms



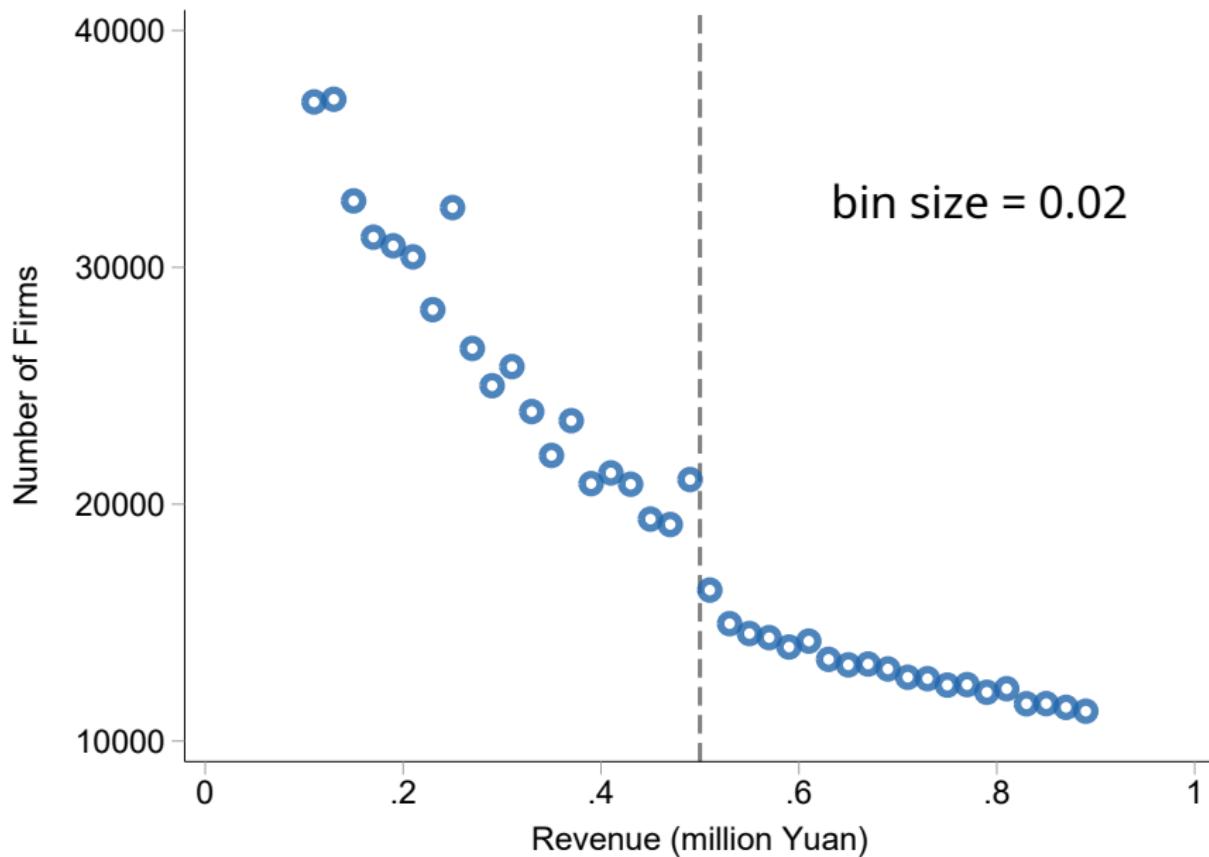
Firms Size in Revenue by Year



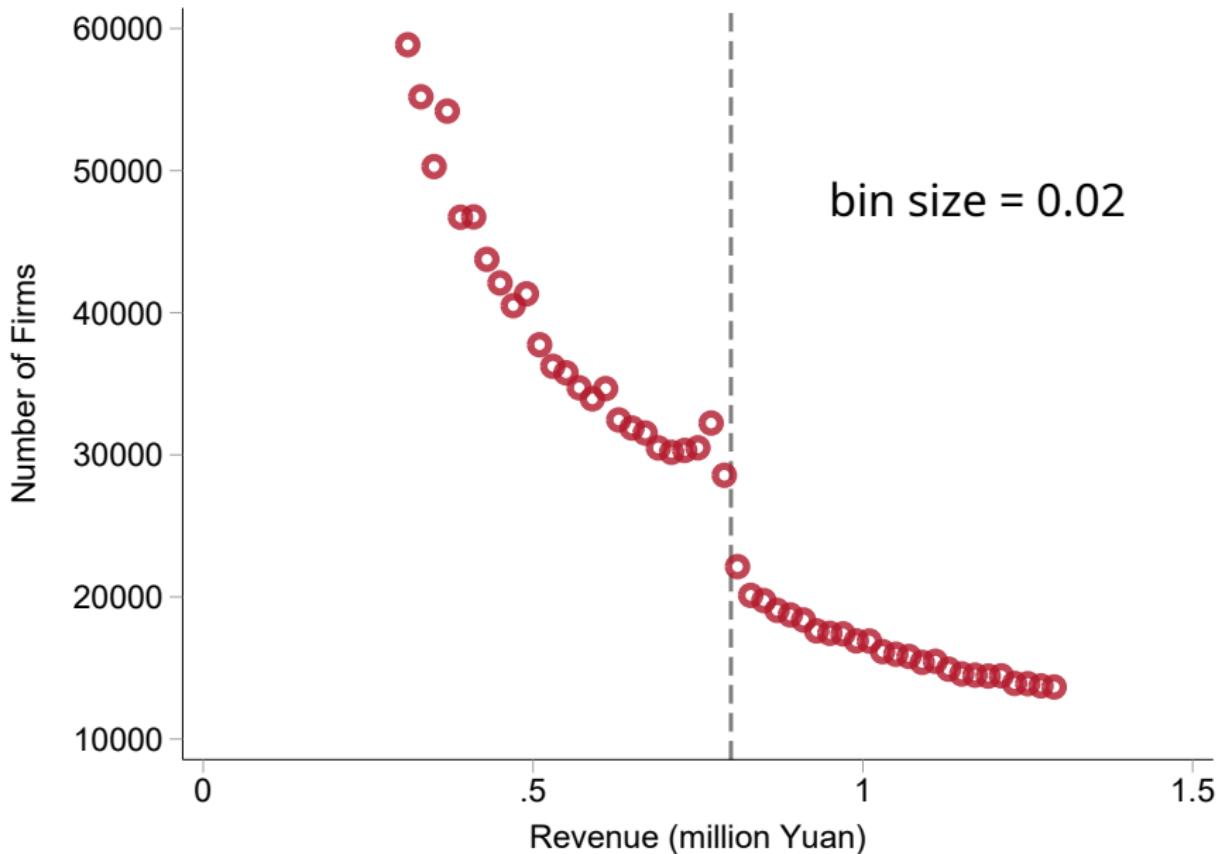
Firms Size in Revenue by Sector



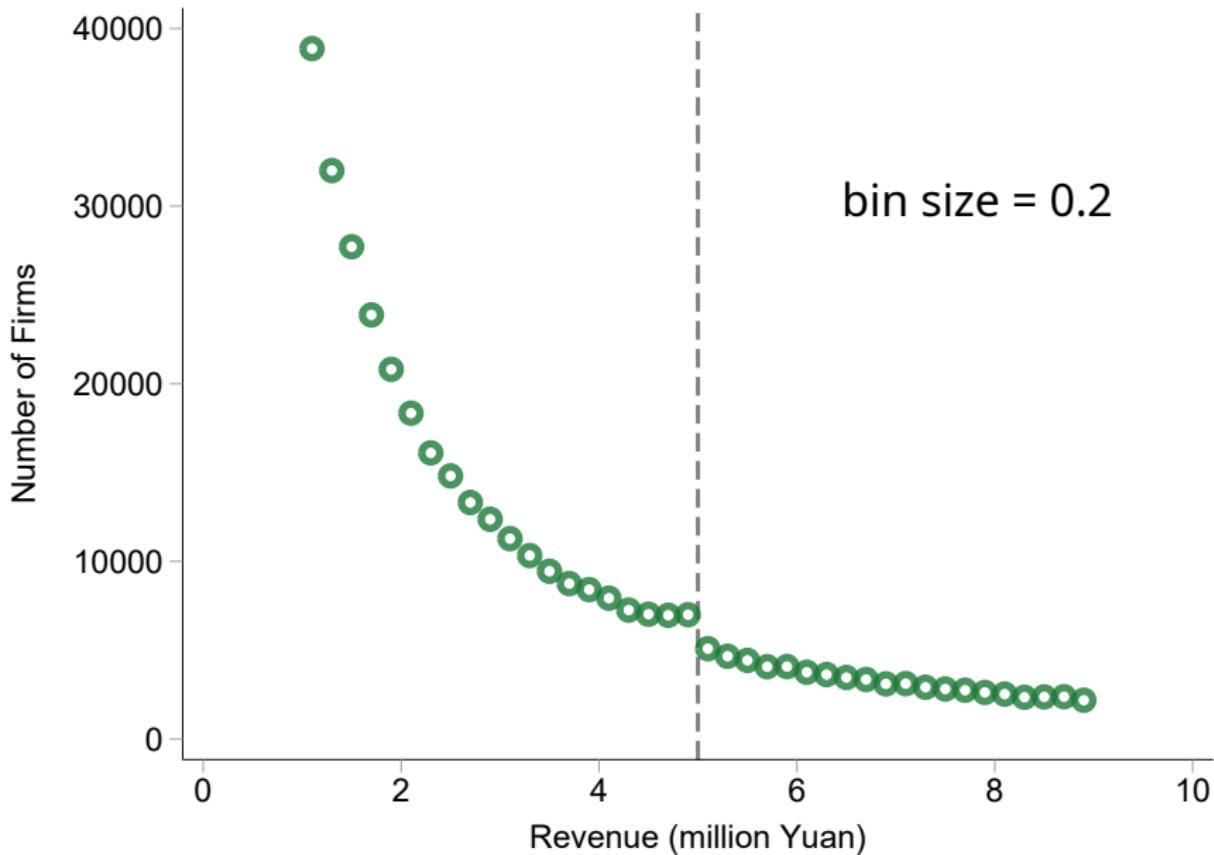
Manufacturers



Wholesale and Retail Traders

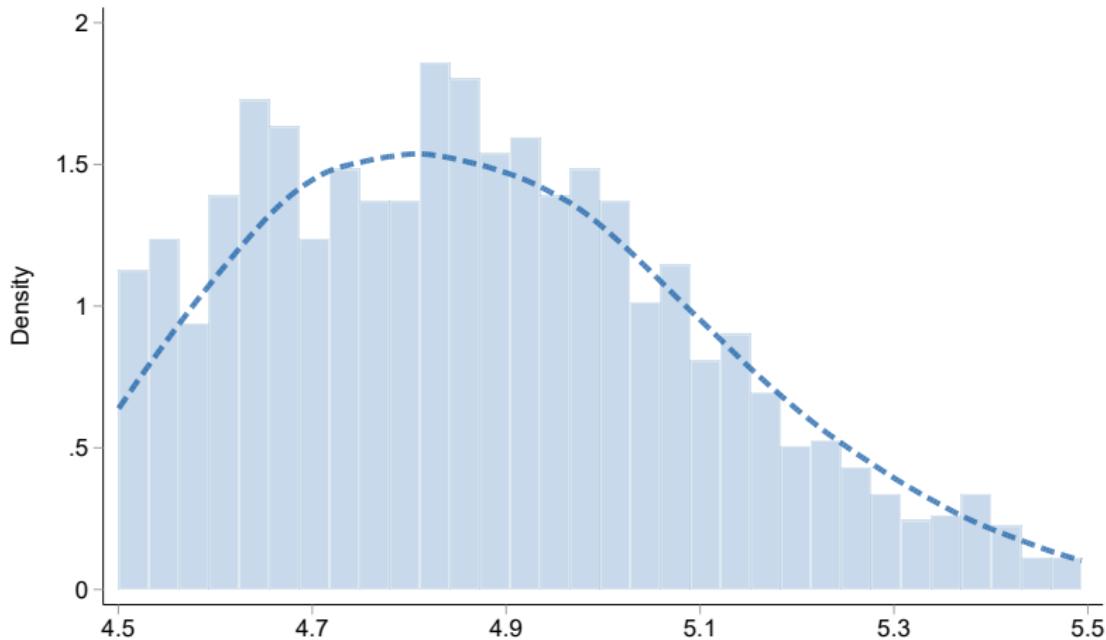


Service Providers



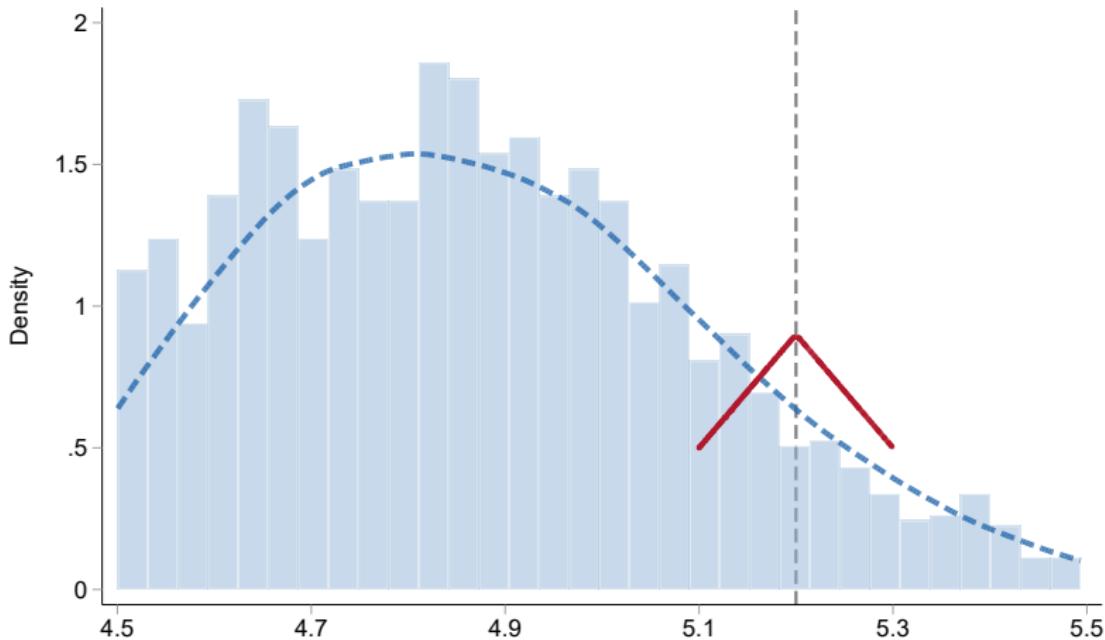
Kernel Density Estimation: Boundary Issue

$$\hat{f}_h(x) = \frac{1}{nh} \sum_{i=1}^n K\left(\frac{x_i - x}{h}\right)$$



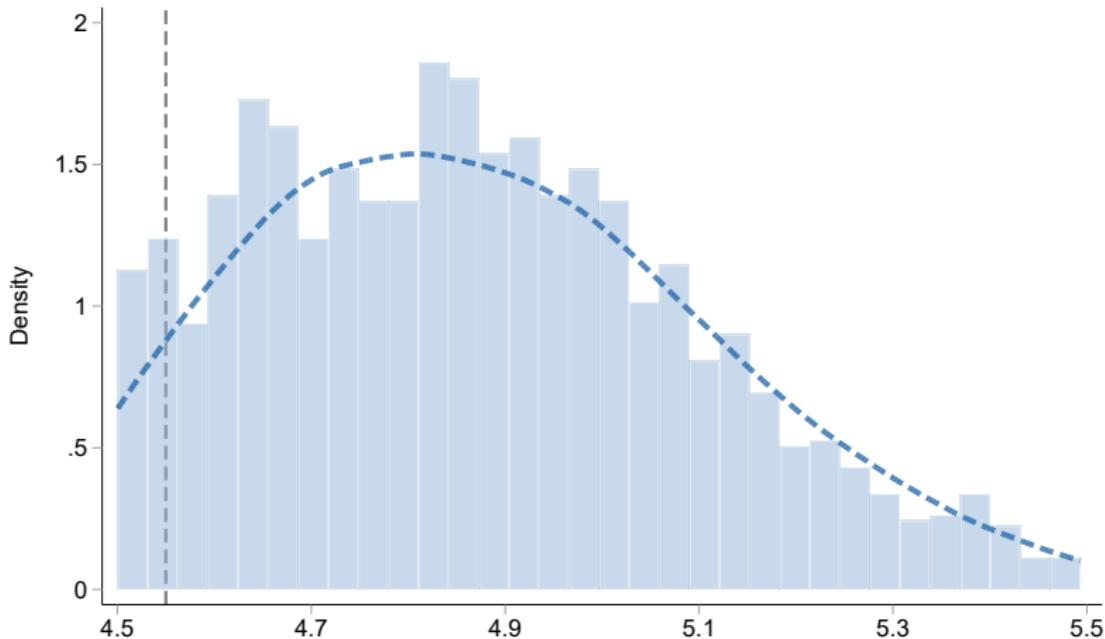
Kernel Density Estimation: Interior

$$\hat{f}_h(x) = \frac{1}{nh} \sum_{i=1}^n K\left(\frac{x_i - x}{h}\right)$$



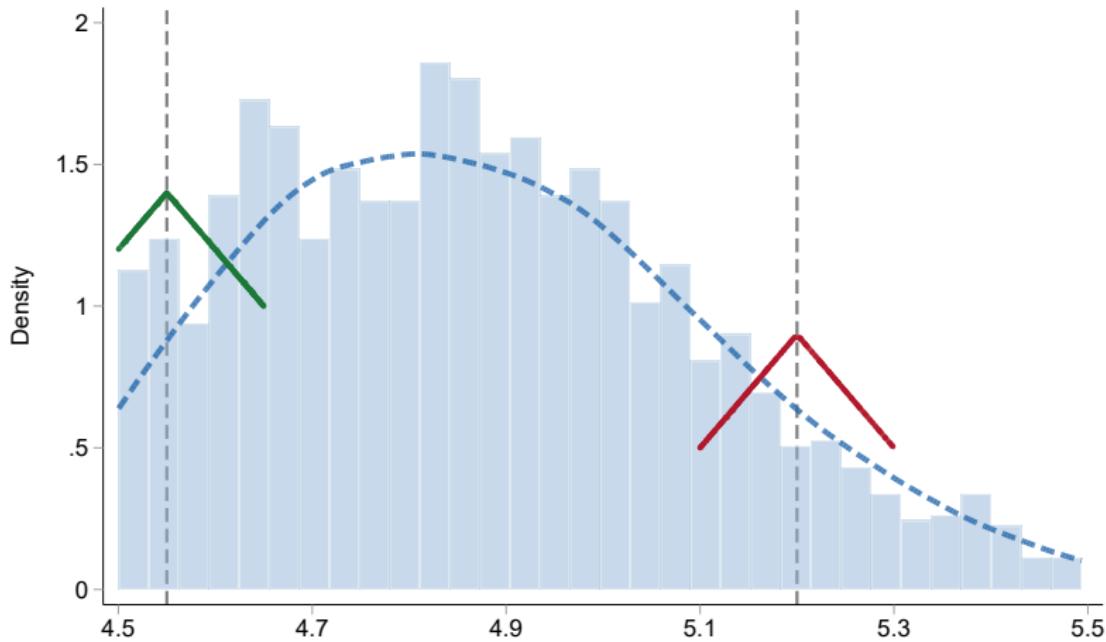
Kernel Density Estimation: Boundary

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Kernel Density Estimation: Boundary Issue

$$\hat{f}_h(x) = \frac{1}{nh} \sum_{i=1}^n K\left(\frac{x_i - x}{h}\right)$$



Other Density Tests

McCrary Test (McCrary, 2008)

- ▶ bin the data first
- ▶ estimate density using binned points using local linear regression
- ▶ Nadaraya-Watson suffers from boundary biases, local linear is better (Fan & Gijbels, 1996; Hahn et al., 2001).

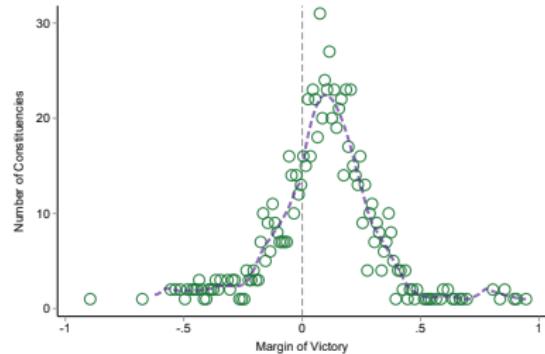


Figure: Hahn et al, 2018

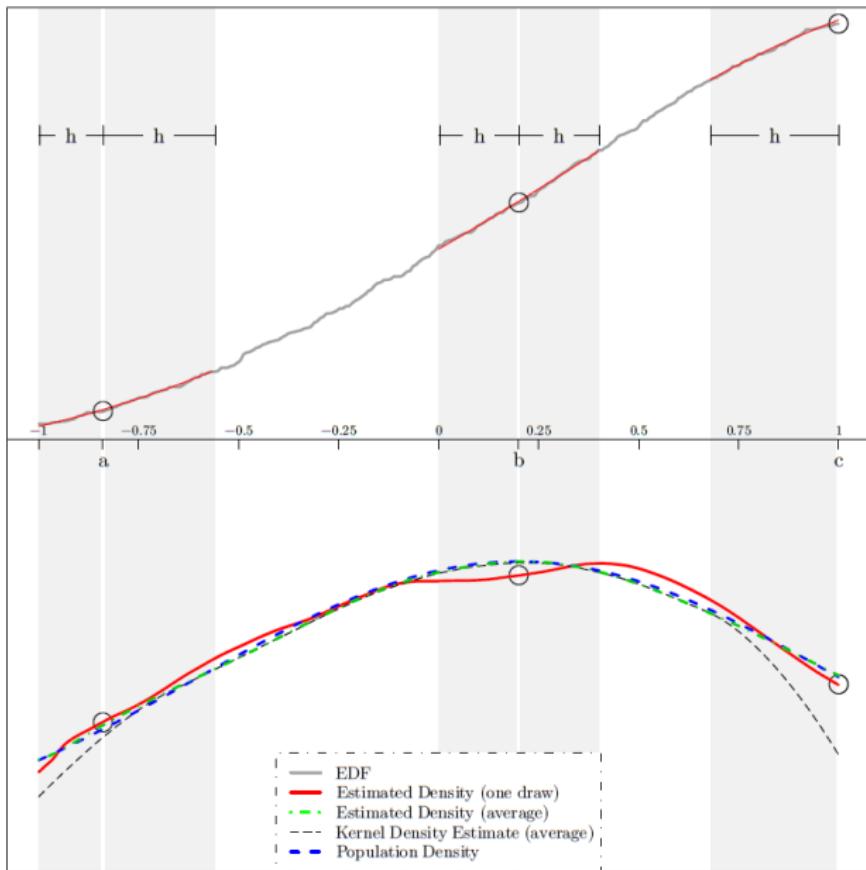
Otsu et al., (2013)

- ▶ Local linear likelihood estimator & empirical likelihood based tests
- ▶ estimate & adjust for boundary biases
- ▶ need to choose two bandwidths

Figure 1: Graphical Illustration of Density Estimator.

Local Polynomial Density Estimator (Cataneo et al., 2020)

- ▶ nonparametric
- ▶ boundary adaptive
- ▶ no need to pre-bin the data
- ▶ fully data-driven bandwidth choice



Local Polynomial Density Estimator

$$\hat{\beta}(x) = \arg \min_{\mathbf{b} \in \mathbb{R}^{p+1}} \sum_{i=1}^n [\hat{F}(x_i) - \mathbf{r}_p(x_i - x)' \mathbf{b}]^2 K\left(\frac{x_i - x}{h}\right)$$

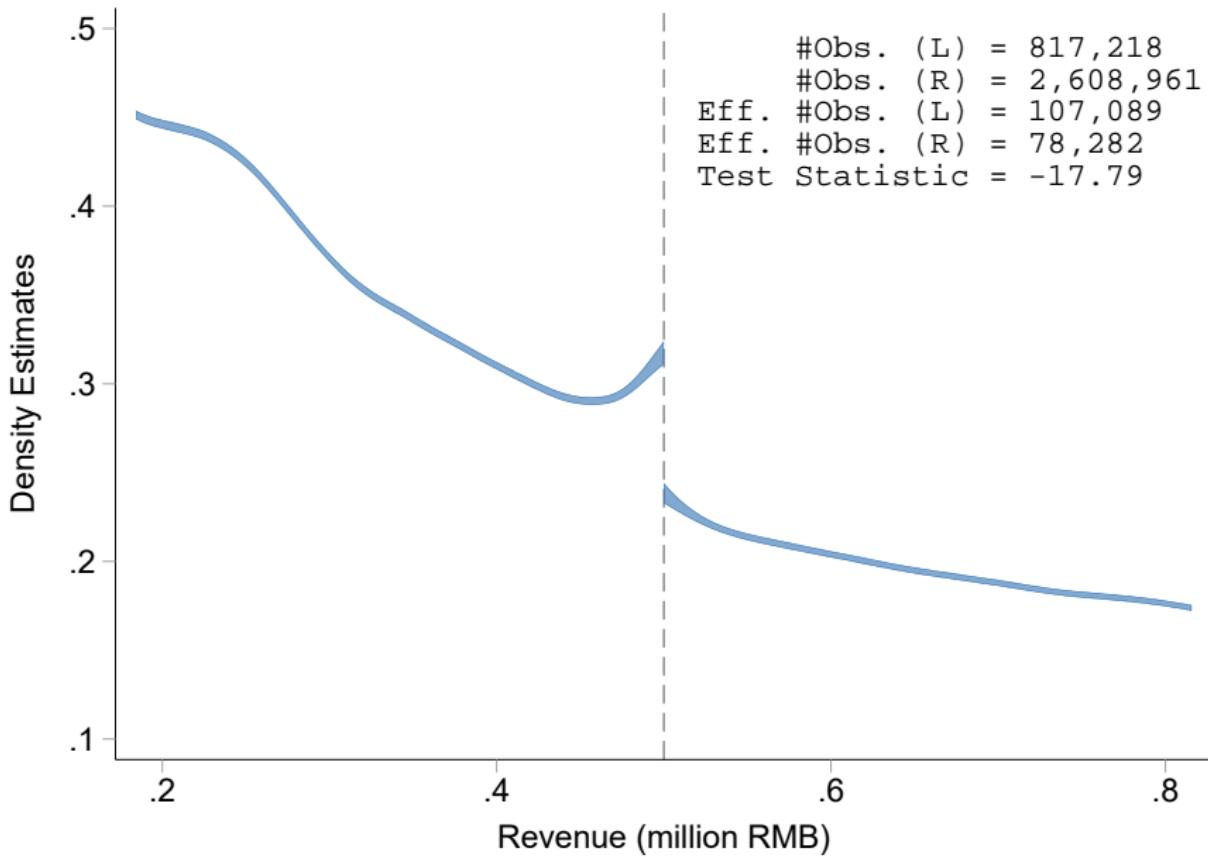
$$\hat{f}(x) = (0, 1, 0, \dots, 0)' \hat{\beta}(x)$$

where

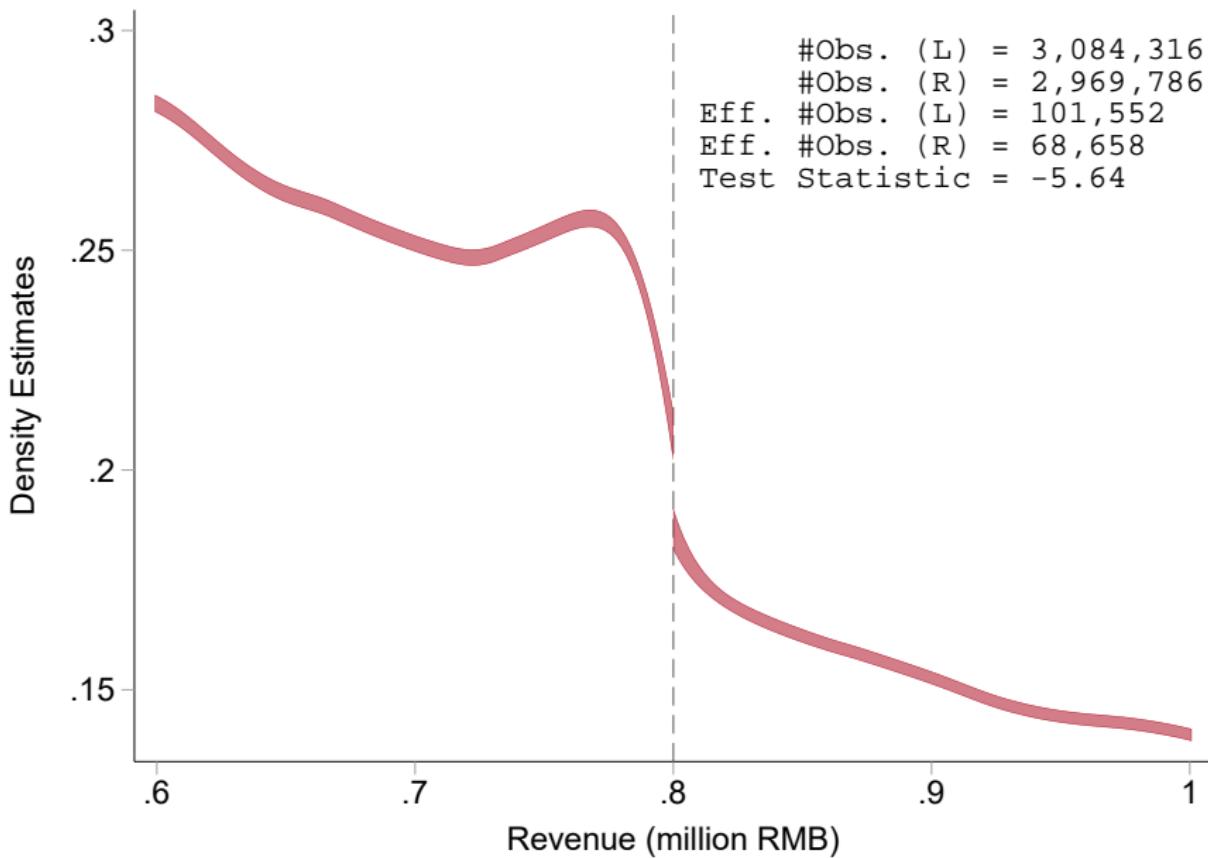
$$\hat{F}(x) = \frac{1}{n} \sum_{i=1}^n \mathbf{1}(x_i < x)$$

$$\mathbf{r}_p(u) = (1, u, u^2, \dots, u^p)'$$

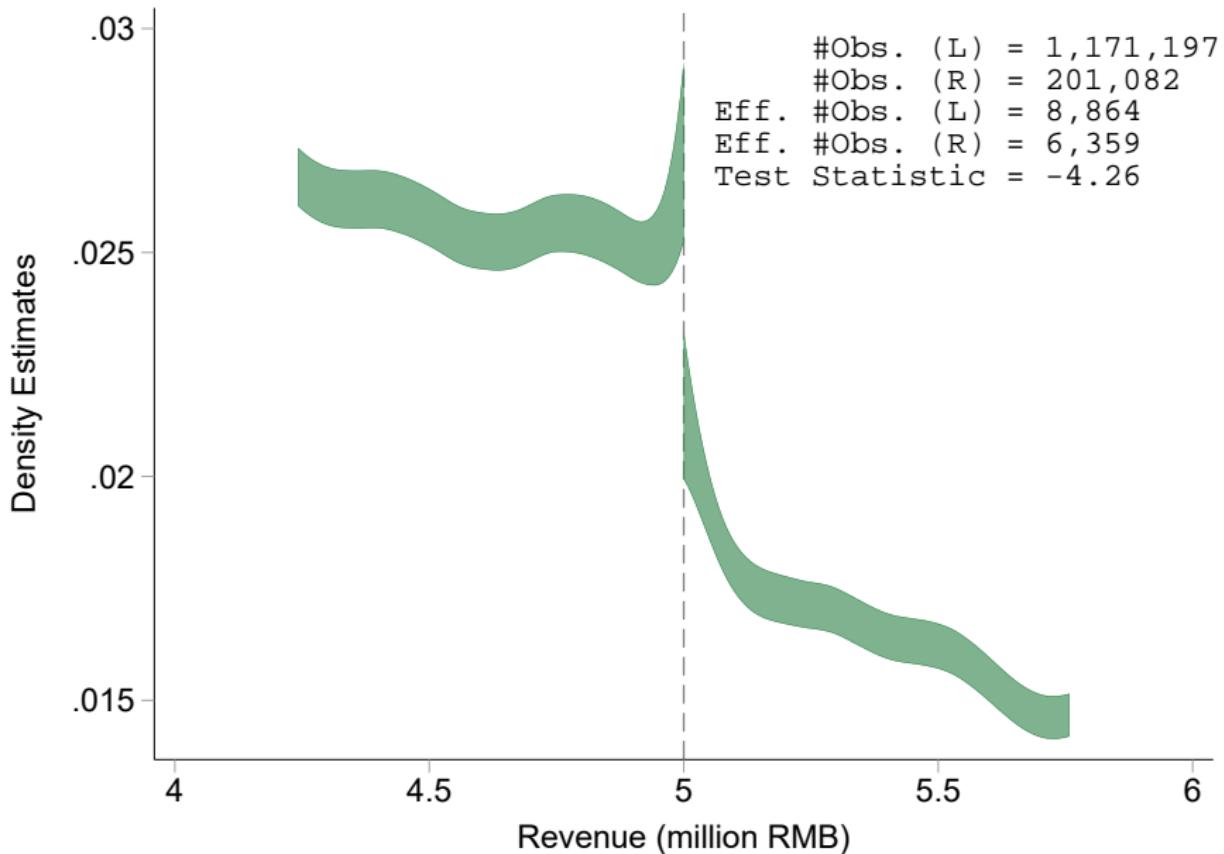
Manufacturers



Wholesale and Retail Traders



Service Providers



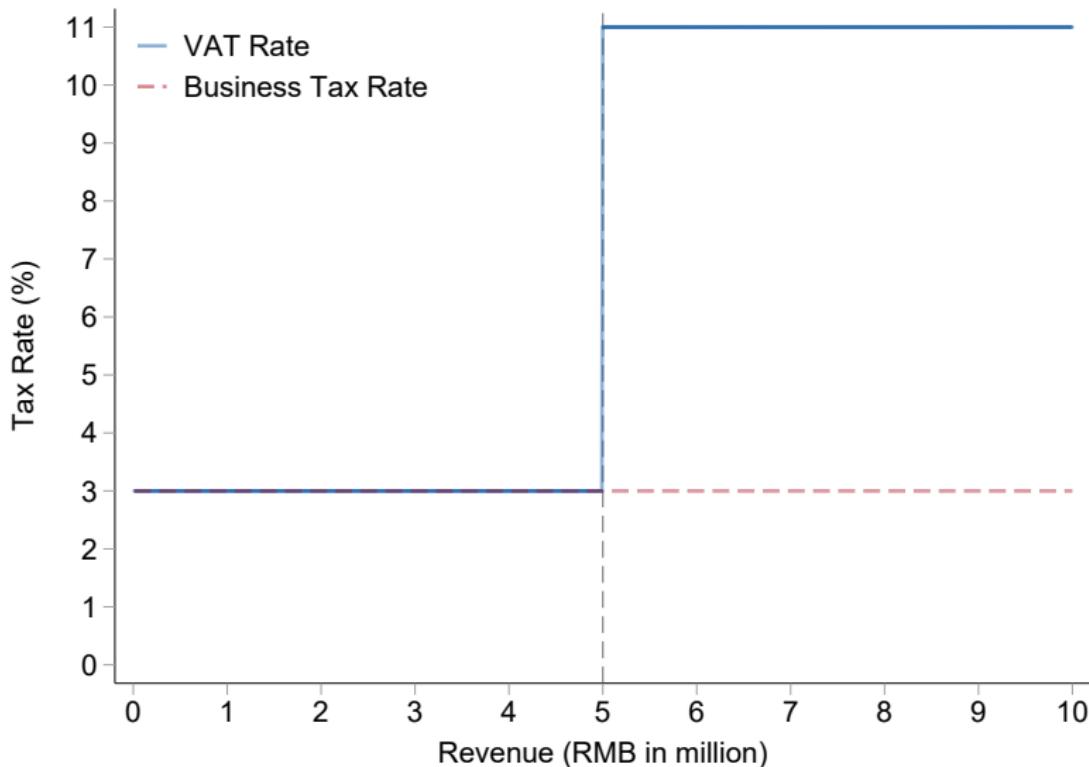
Reform of VAT on Services

Pilot industries in 2012

- ▶ Transportation ($\tau = 11\%$)
 - land (excluding railway)
 - water
 - air
 - pipeline
- ▶ Modern services ($\tau = 6\%*$)
 - R&D services
 - IT services
 - Cultural & creative services
 - Logistics
 - Consulting & certification services
 - Rental services ($\tau = 17\%*$)

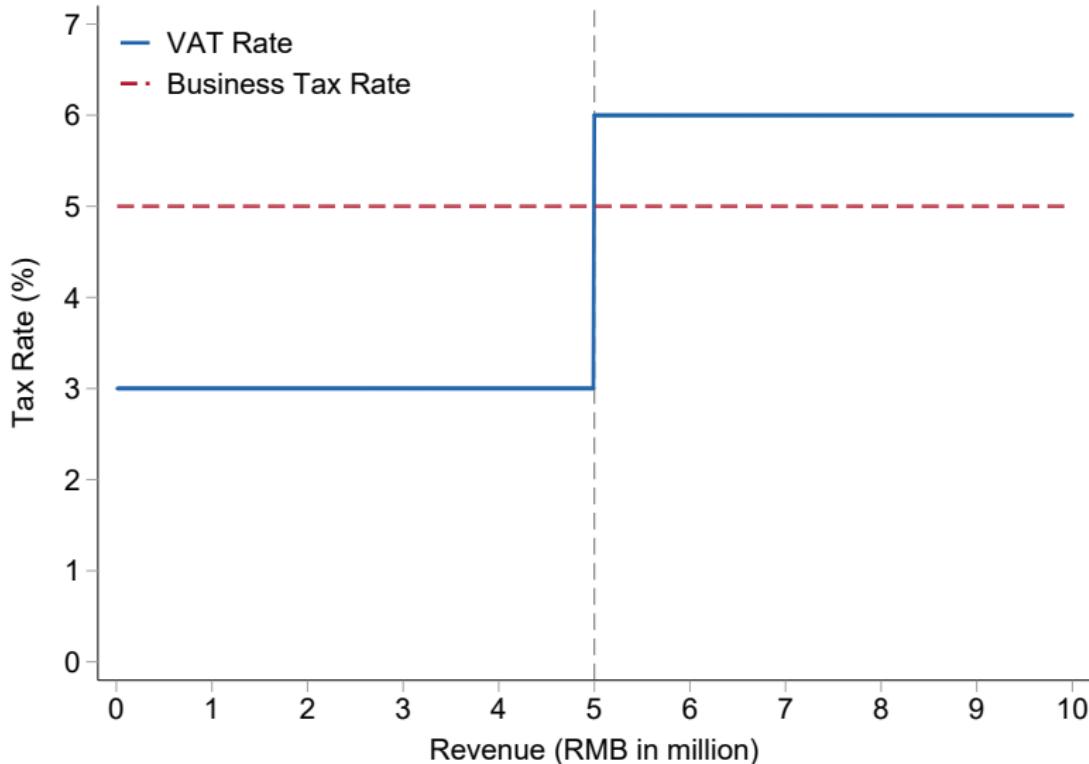
From Business Tax to VAT

Transport

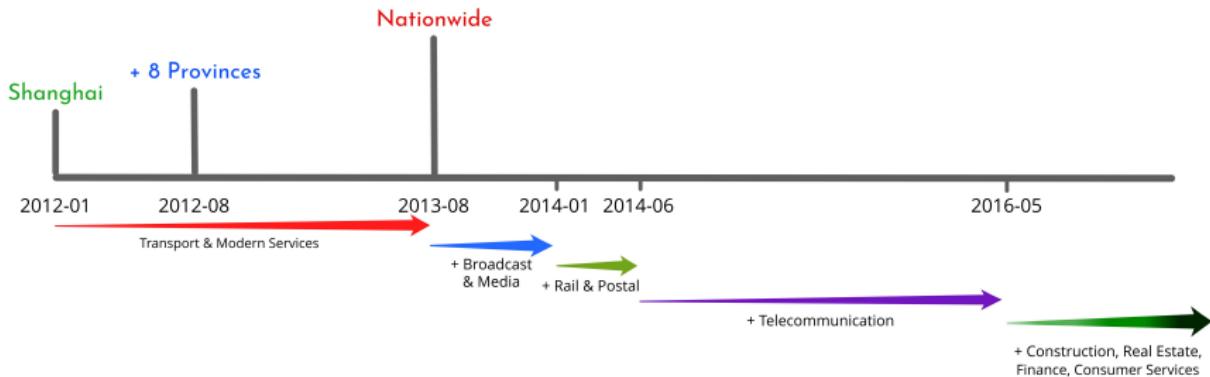


From Business Tax to VAT

Modern Services

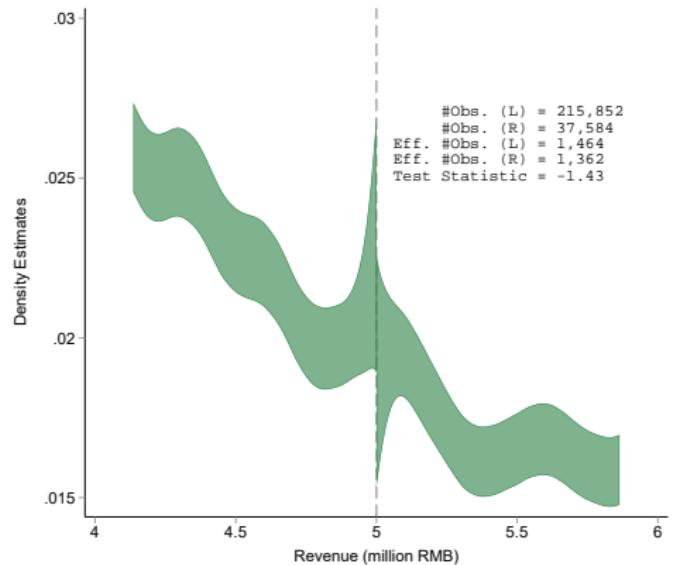
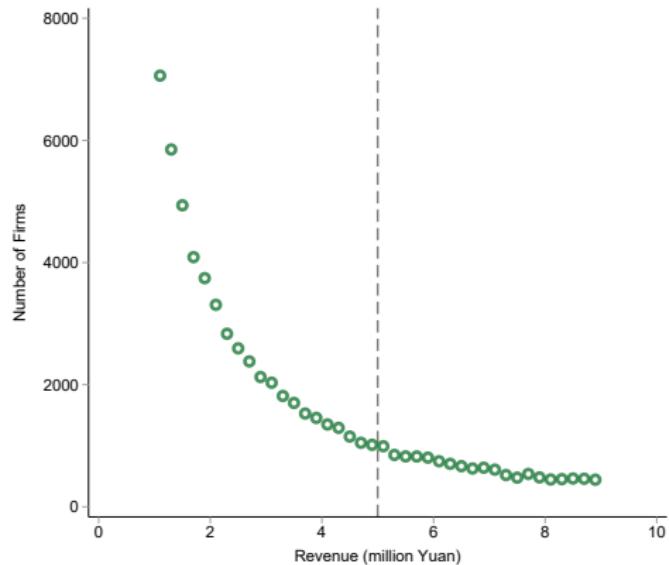


Reform Timeline



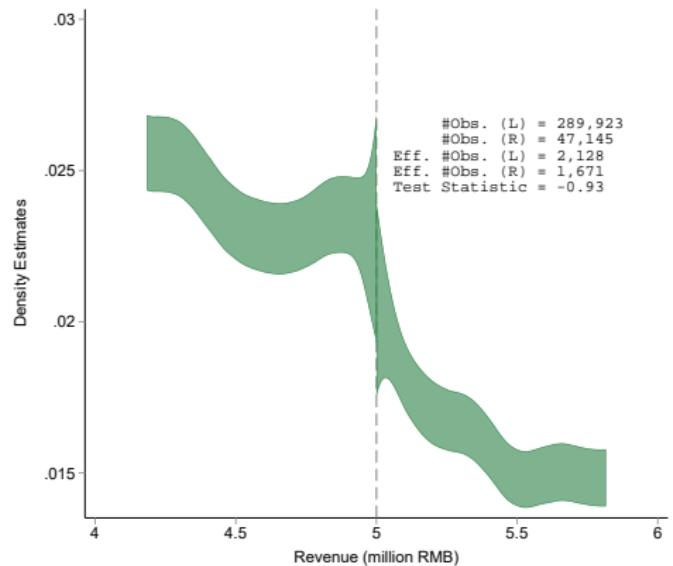
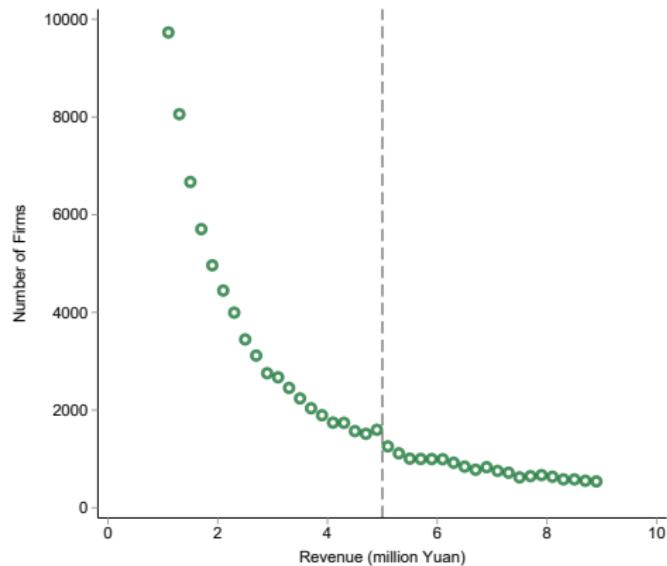
Transport & Modern Services: 2012

Non-Pilot Areas



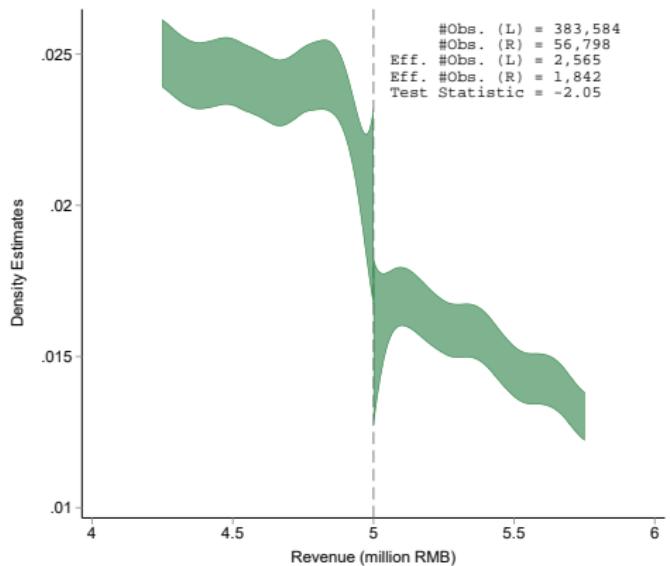
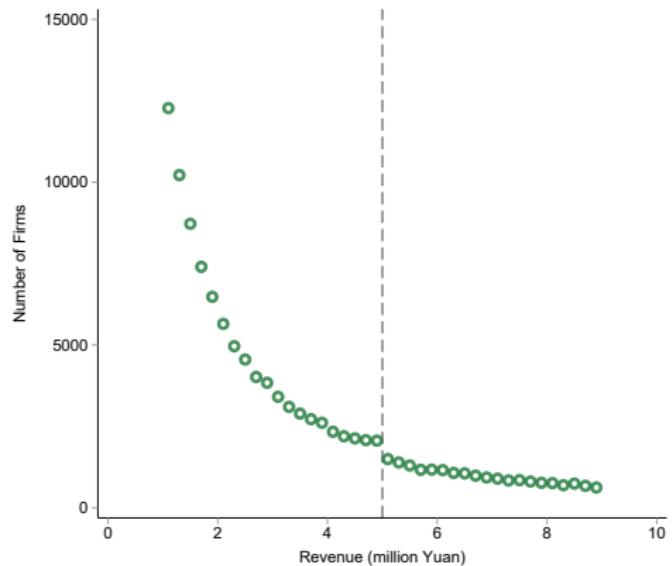
Transport & Modern Services: 2013

Non-Pilot Areas



Transport & Modern Services: 2014

Non-Pilot Areas



Spatial Heterogeneity

- ▶ VAT incentivizes firms to ask for and collect VAT invoices.

- General VAT Payer:

$$\text{VAT Payable} = \text{Sales} \times \text{VAT Rate} - \text{Input VAT Credit}$$

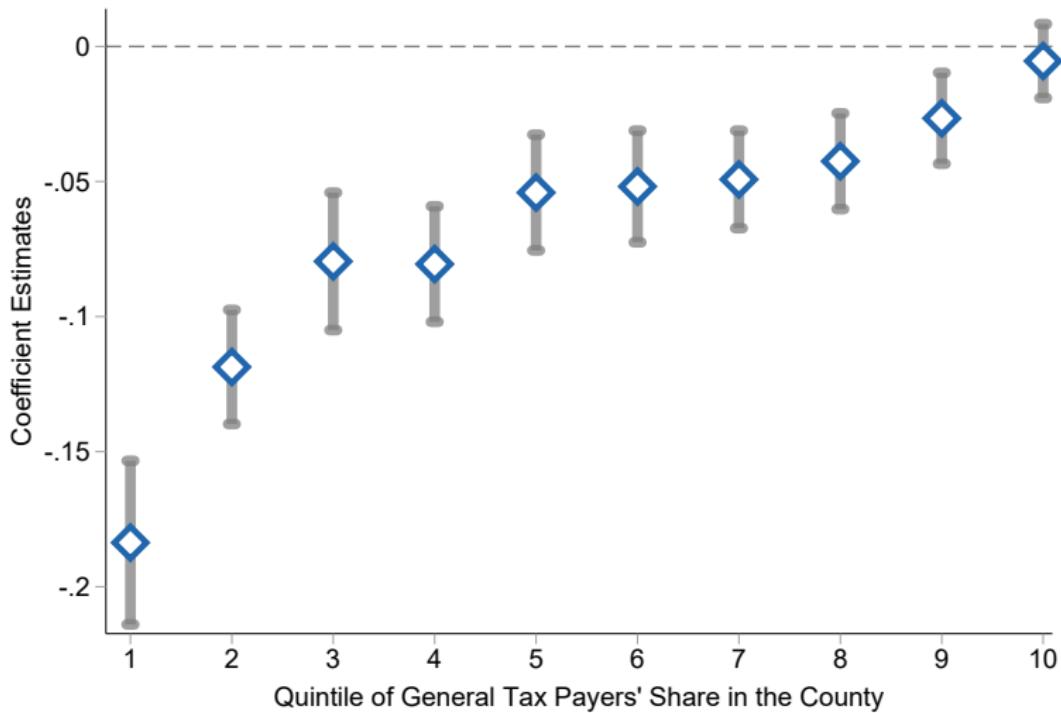
- Small-scale VAT Payer:

$$\text{VAT Payable} = \text{Sales} \times \text{Simplified VAT Rate}$$

- ▶ The tax credit from inputs in the calculation of VAT liability facilitates enforcement.
- ▶ Would areas with more formal VAT taxpayers also have less bunching?

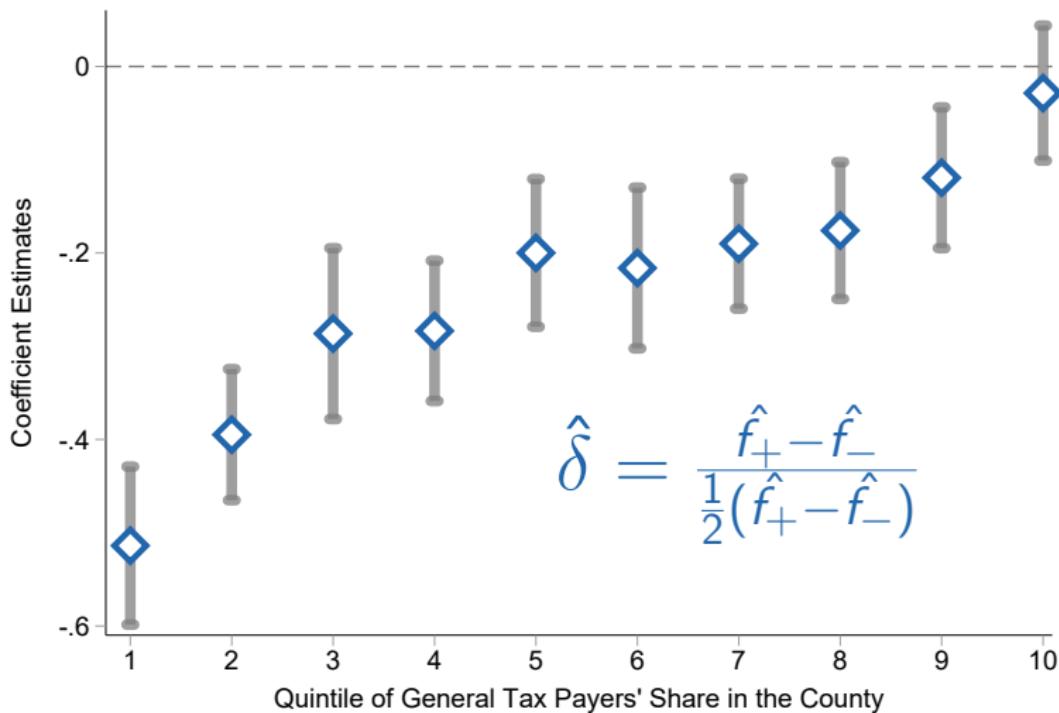
Bunching of Manufacturers

by the County's Share of General Tax Payers



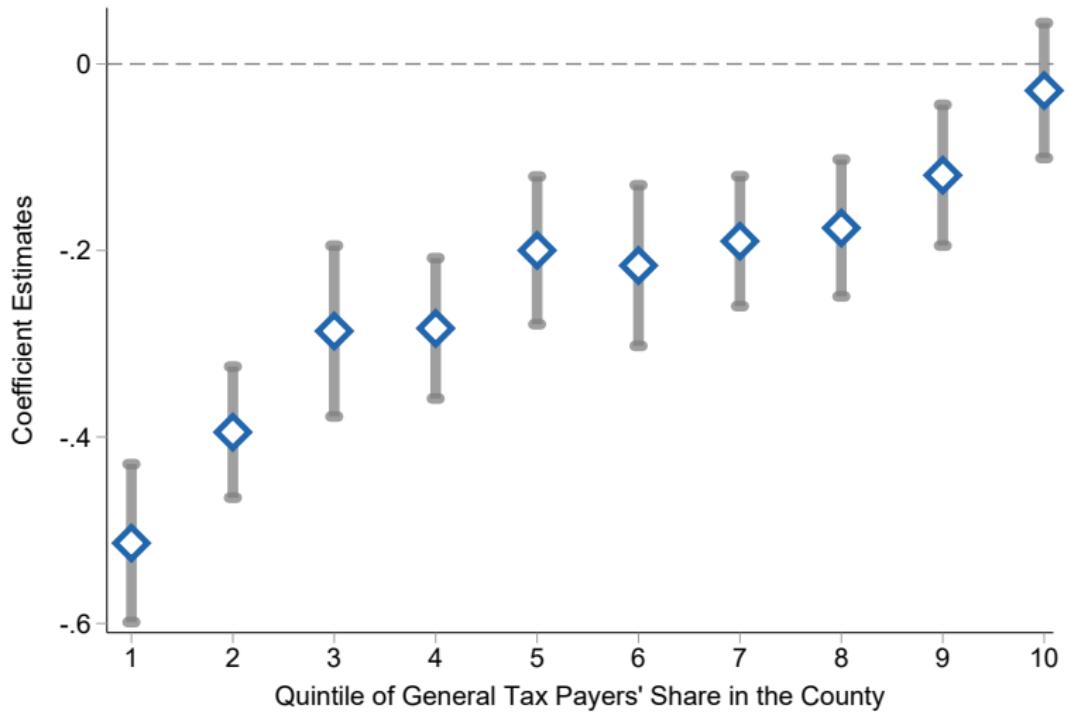
Scaled Bunching of Manufacturers

by the County's Share of General Tax Payers



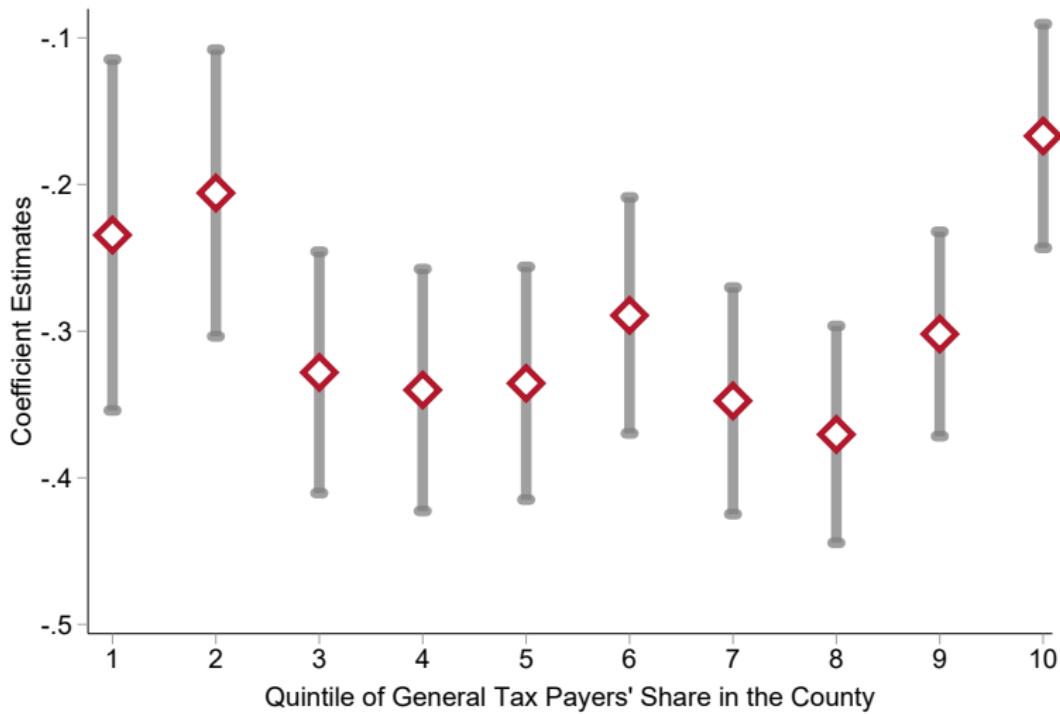
Scaled Bunching of Manufacturers

by the County's Share of Manuf. Firms with RMB 1 Million + Revenue



Scaled Bunching of Traders

by the County's Share of General Tax Payers



Concluding Remarks

- ▶ The substantial bunching to the left of the taxpayer designation cutoffs suggest formality avoidance in VAT system.
- ▶ Areas with more small manufacturing firms exhibit more bunching, which is consistent with **network externality** in VAT compliance.
- ▶ Optimal policy in the presence of informality and formality avoidance trades off national **uniformity** and **locality-specific distortion**.

Thanks! Comments are welcome!

Haishan Yuan

haishan-yuan.weebly.com



tax avoidance

noun

1. tax avoidance is the use of quasi-legal methods to modify a corporations financial situation to lower the amount of income tax liability.



tax evasion

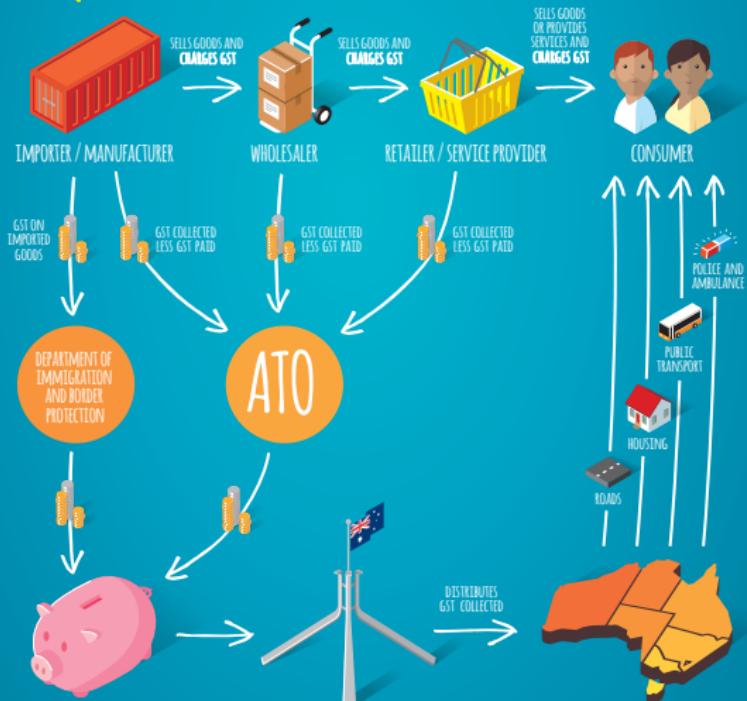
noun

1. tax evasion is the use of illegal methods to modify an individuals or corporations financial situation to lower the amount of income tax liability.

HOW GST WORKS

(GOODS AND SERVICES TAX)

10%
ON MOST GOODS
AND SERVICES SOLD
OR CONSUMED IN
AUSTRALIA



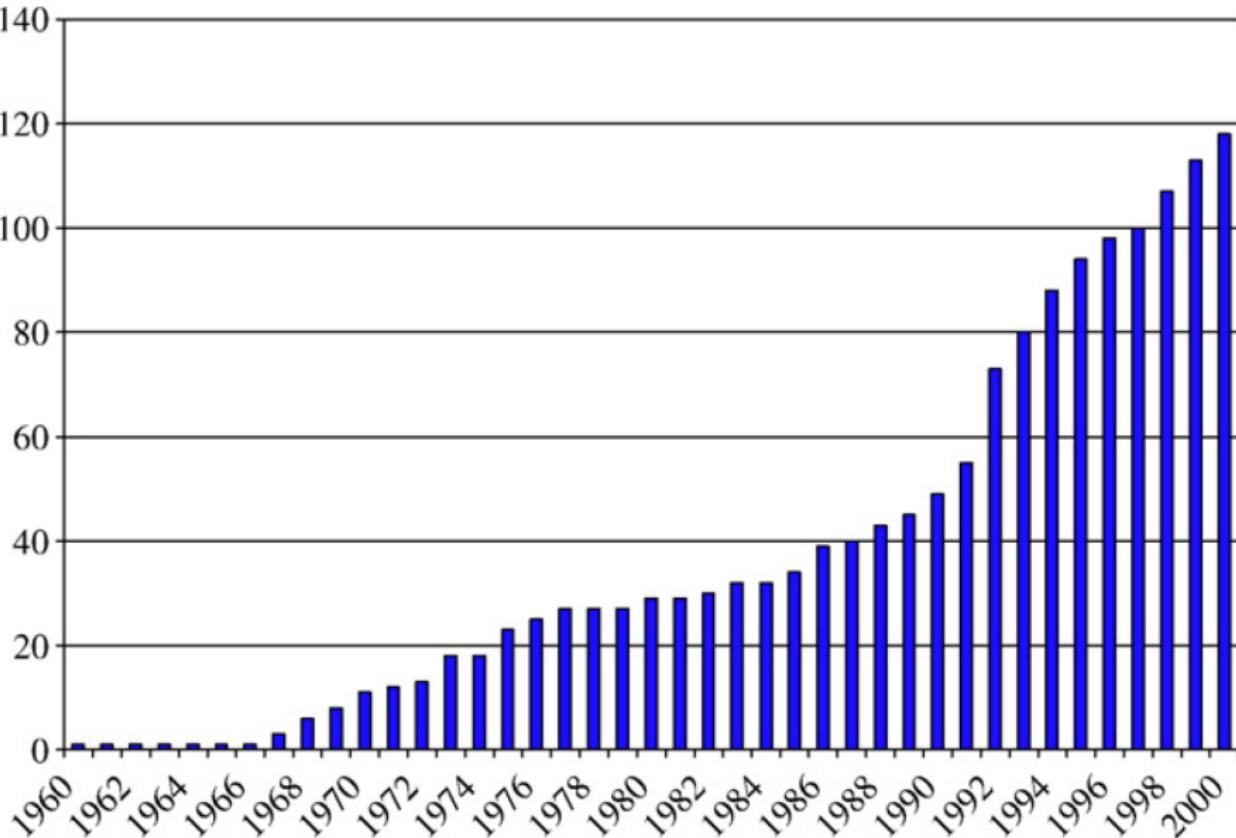
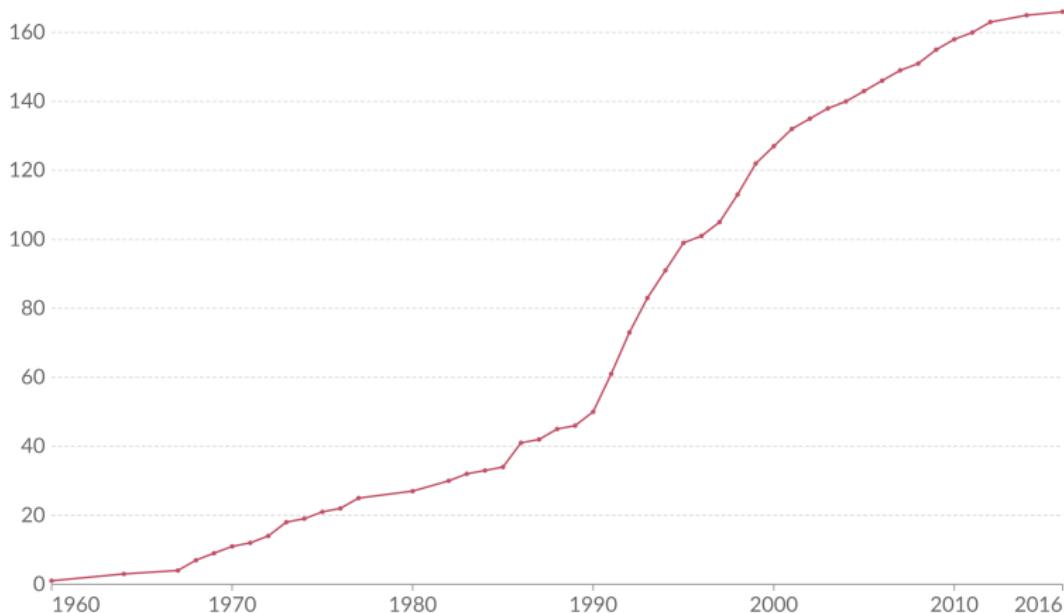


Fig. 1. The number of countries with a VAT.

Number of countries having implemented value added taxes, Countries with VAT, 1960 to 2016

Our World
in Data

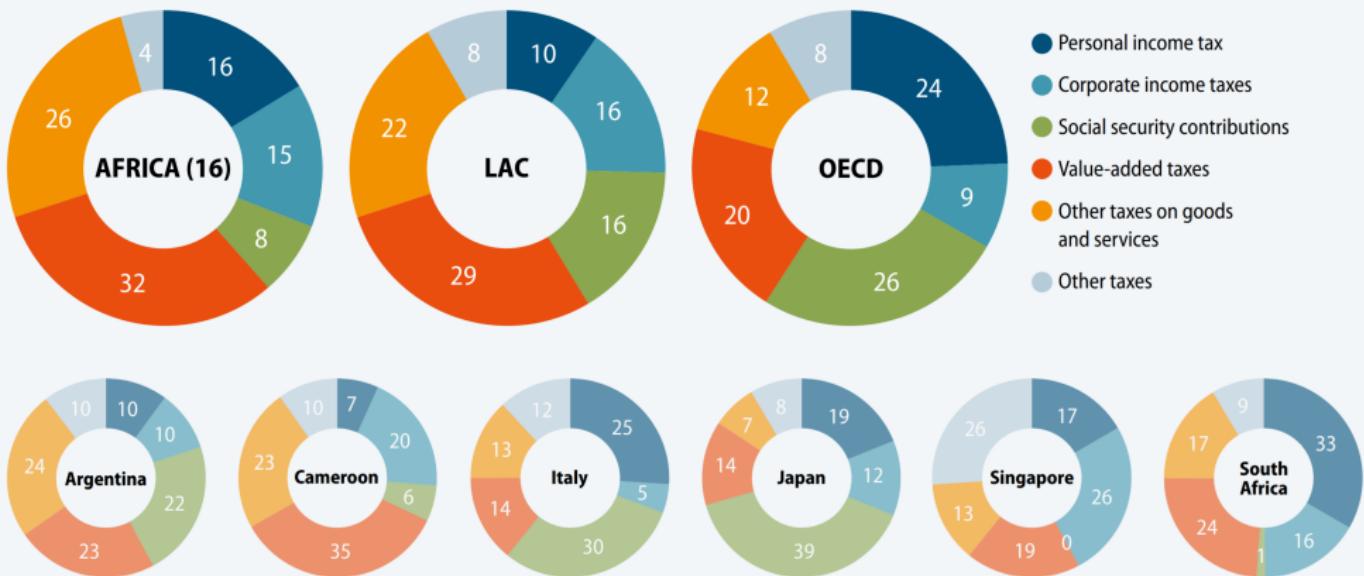


Data source: OECD – Consumption Tax Trends 2016

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**African, Latin American and Caribbean countries rely more on taxes on goods and services.
OECD countries rely more on social security contributions and personal income taxes**

Tax structures for the Africa (16), LAC and OECD averages in 2015 and for selected countries (%)



Goods and Services Taxes in China

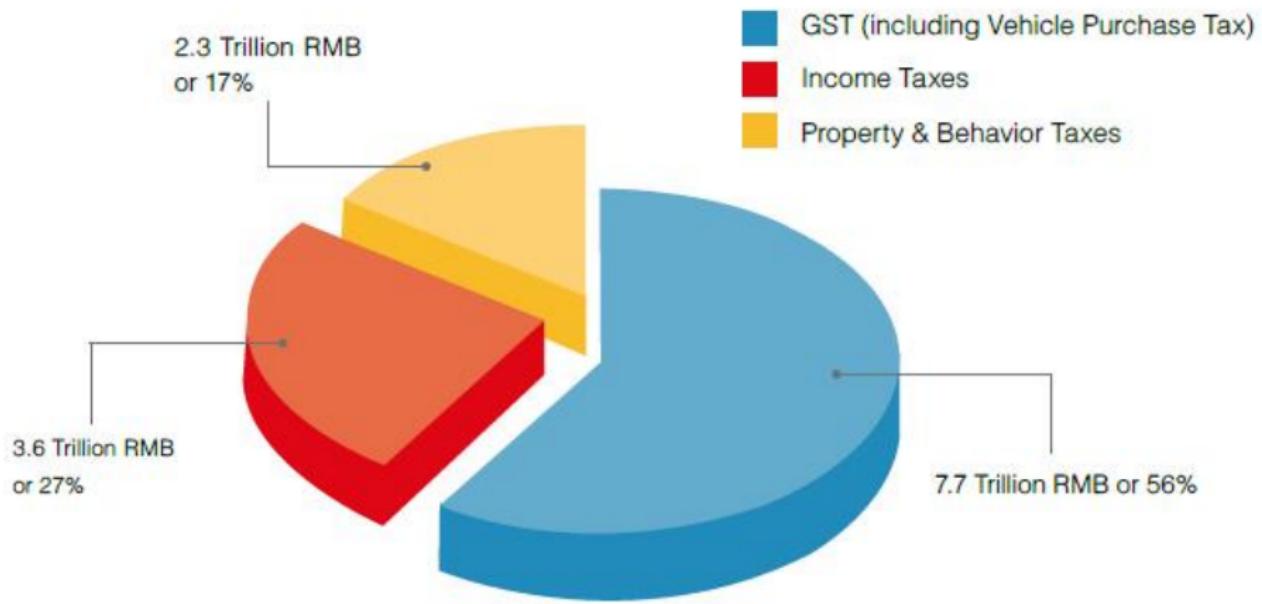


Figure 9 Tax Revenue by Tax Category in 2015

Value-Added Taxes in China

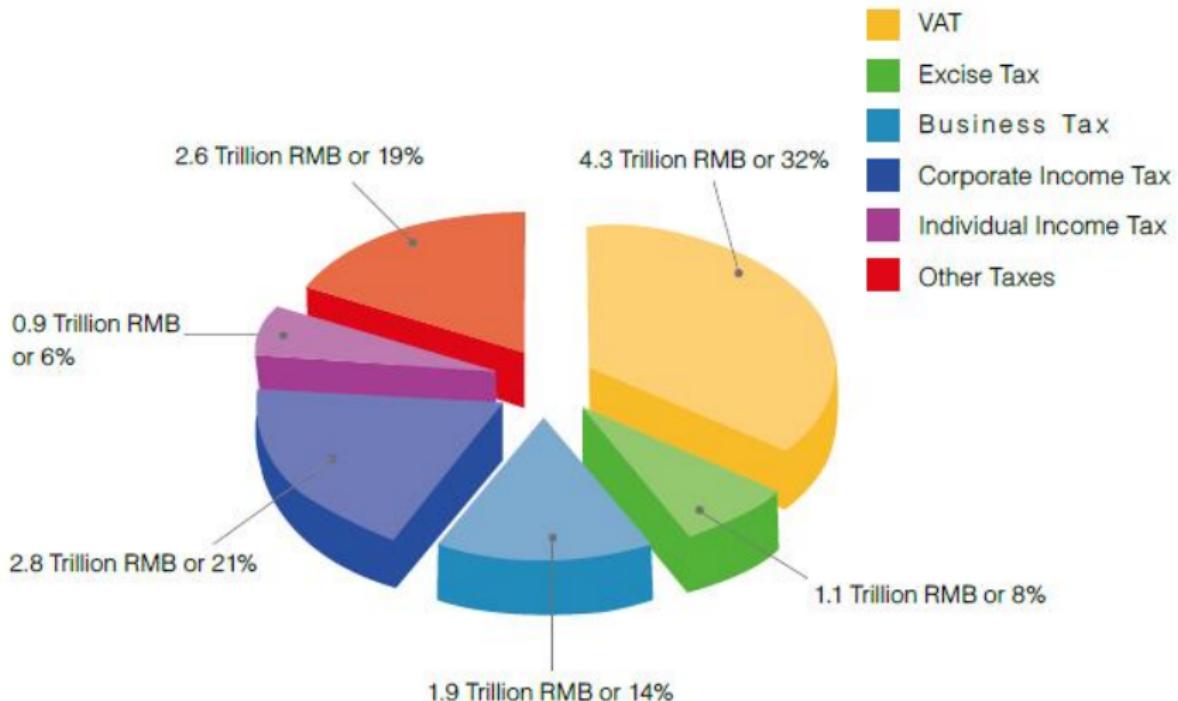


Figure 10 Tax Revenue by Tax Type in 2015

Policy Updates

- ▶ Standardizing cutoffs effective May 1st, 2018:
 - Manufacturing: ~~RMB500,000~~ → RMB 5,000,000
 - Commerce: ~~RMB800,000~~ → RMB 5,000,000
 - Services: RMB 5,000,000
- ▶ VAT rate changes effective May 1st, 2018:
 - Manufacturing: ~~17%~~ → 16%
 - Transportation, Construction & Telecommunication: ~~11%~~ → 10%
- ▶ VAT rate changes effective April 1st, 2019:
 - Manufacturing: ~~16%~~ → 13%
 - Construction & Transport: ~~10%~~ → 9%

Median Revenue

