On Vat Threshold(s)

Duccio Gamannossi degl'Innocenti (TARC)
Christos Kotsogiannis (TARC)
Konstantinos Serfes (Drexel)

Tax Administration Research Centre

VICTORIA UNIVERSITY OF WELLINGTON
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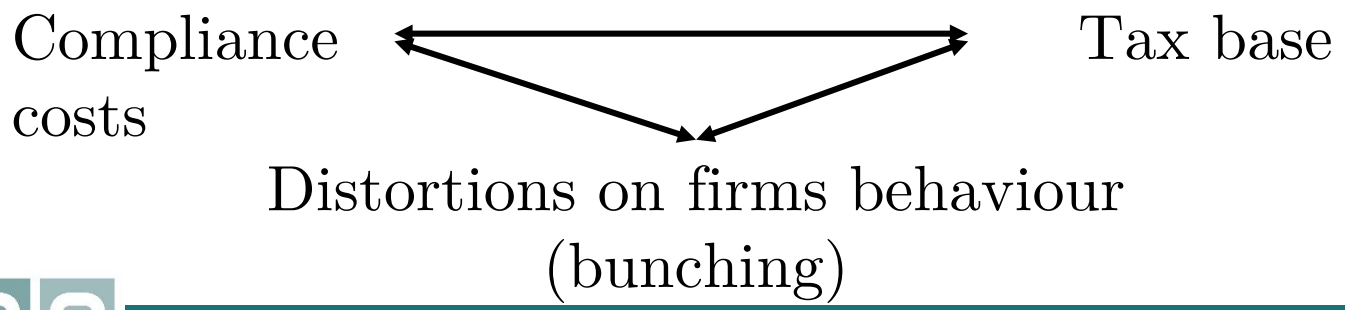
Road map

- Overview
- Research questions
- Brief (very) description of economy
- Results
- Concluding remarks

Overview

- Most countries use value-added tax (VAT) as the **primary indirect tax**
- A popular element of VAT systems is '**thresholds**' under which **registration is voluntary**
- VAT threshold idea arises because **most revenues come from high-turnover firms**
- Optimal VAT thresholds depends on a trade-off:

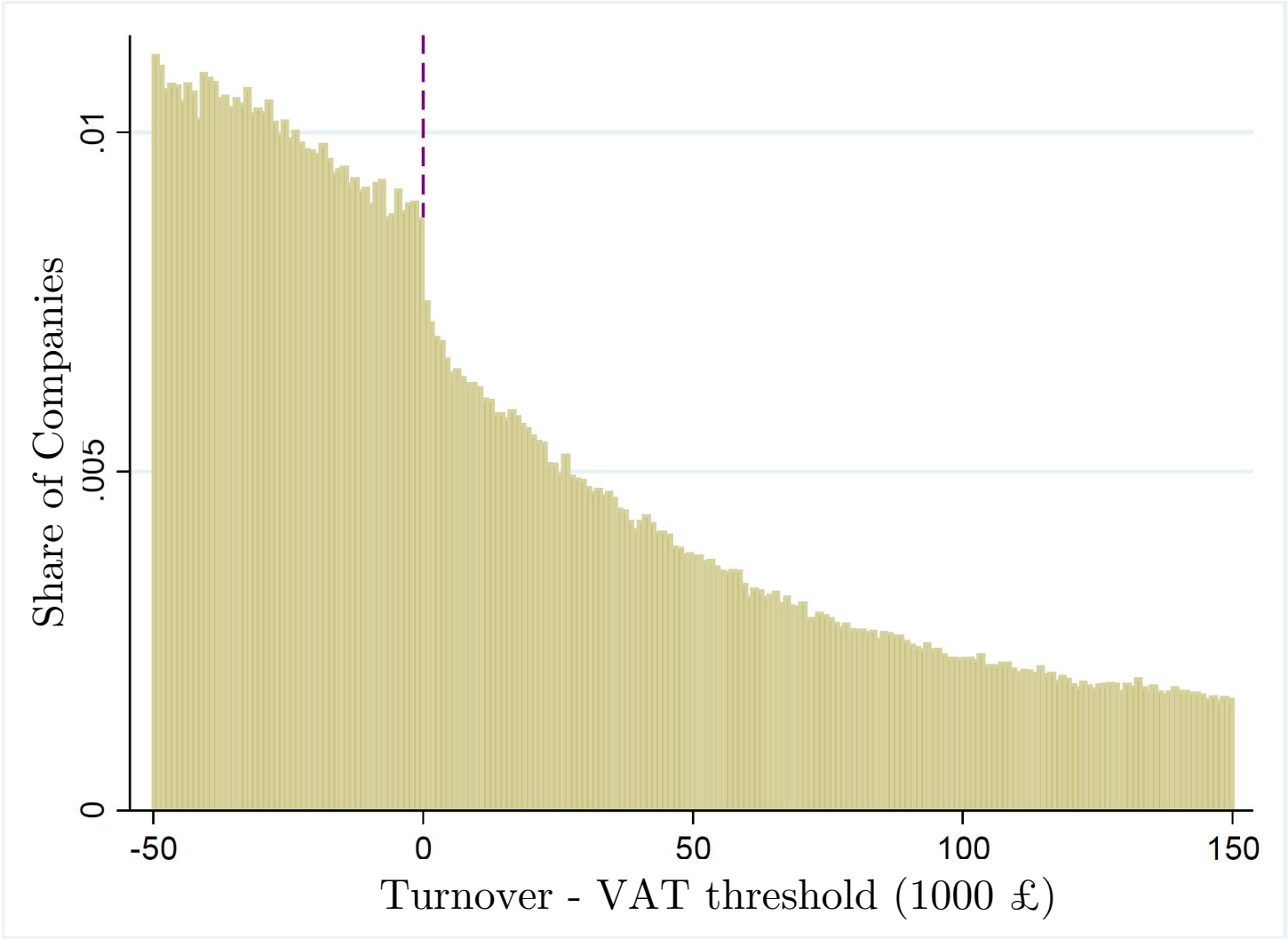


VAT – Some numbers

Nation	Revenues share	Rate	Threshold
AUS	13%	10%	70000 AUD
NZ	30%	15%	60000 NZD
OECD	20%	19%	
UK	21%	20%	85000 £

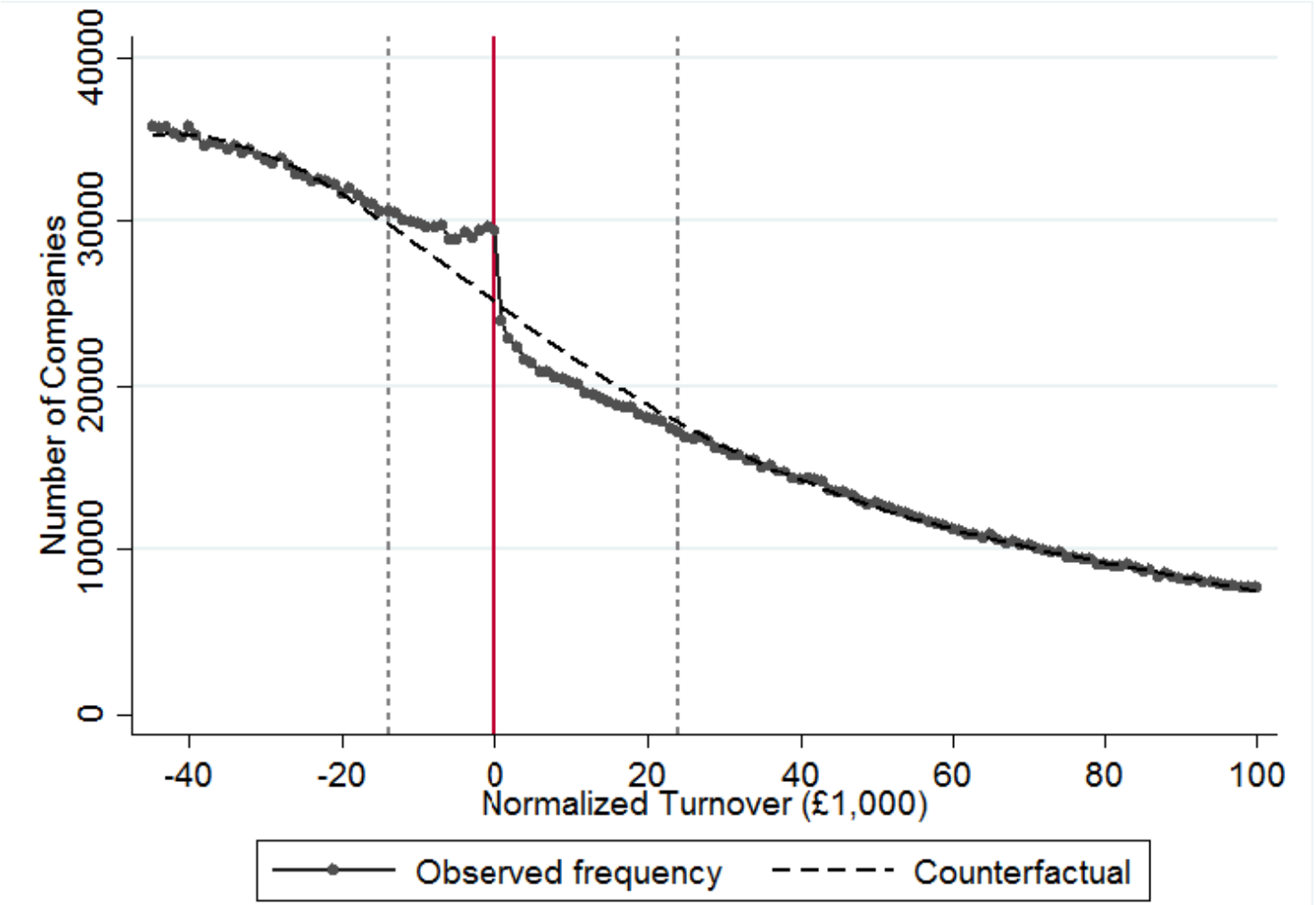
- The usual **VAT rates are quite high**
- **Large and salient tax notch** for businesses around the threshold

VAT – Bunching in UK



*Liu and Lockwood (2016)

VAT – Counterfactual distribution



*Liu et Al. (2018)

Overview

- Literature has discussed **optimal threshold**
  - Keen and Mintz (2004)
- Studies estimated the **extent of 'bunching'** at threshold and **voluntary registration** under threshold
  - Liu and Lockwood (2016)
  - Liu et Al. (2018)
- The optimal threshold rule identified in Keen and Mintz (2004) has been applied widely (FAD) but …

Overview

- A limitation of Keen and Mintz (2004) is the existence of **one** threshold (B2C)
- Restrictive assumptions on B2B transactions do not allow to model threshold across the production chain
- The implication is that threshold, and bunching, might be **over/under estimated**
- Significant welfare/revenue consequences

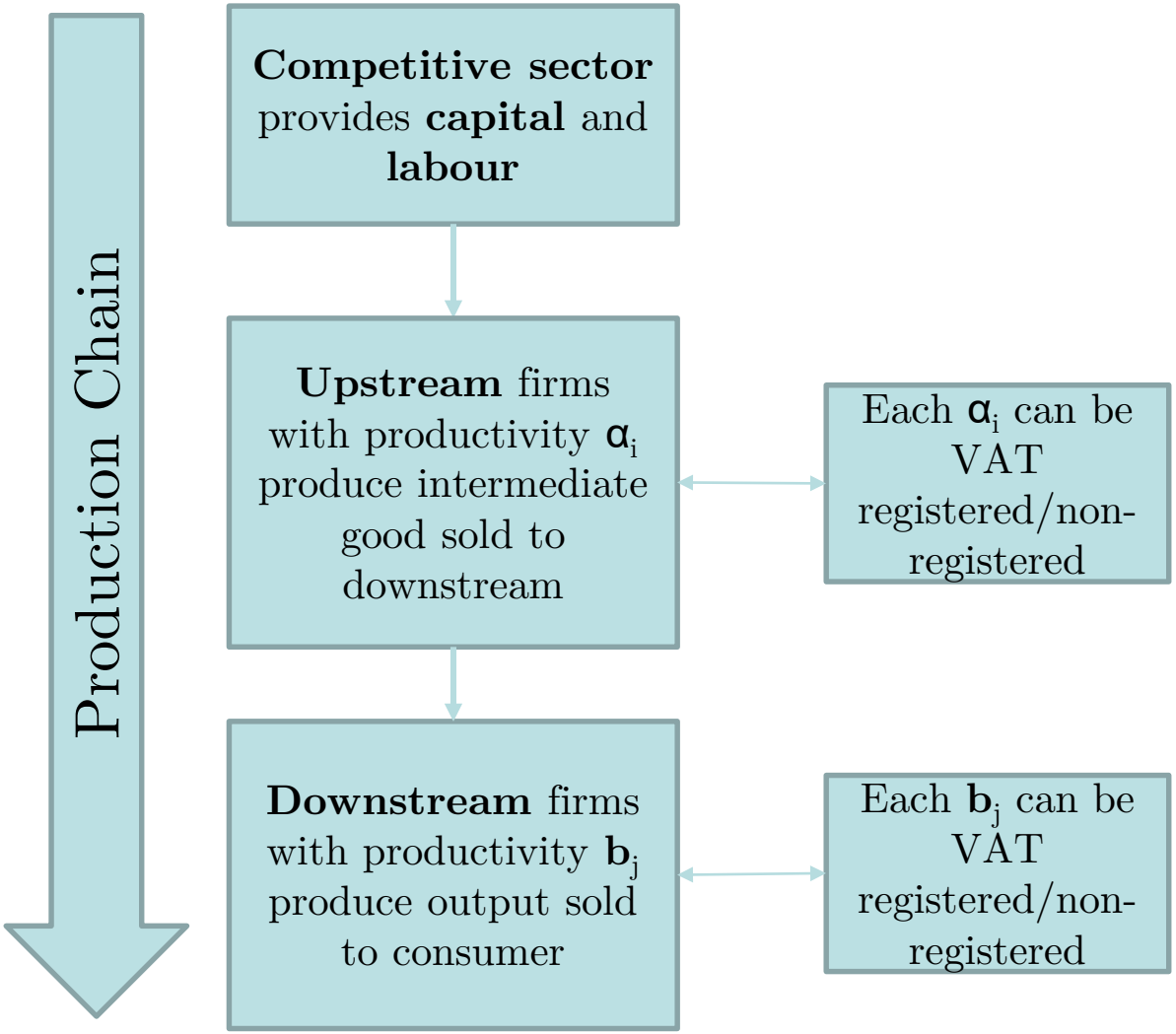
Research questions

- **What is the optimal thresholds for B2B and B2C**?
  - Considering the real-world case of **uniform threshold** and the best-case scenario of **distinct** threshold
- How does this optimal threshold compare to the one followed in practice? (Keen and Mintz, 2004)
- Since threshold defines VAT-registered and non VAT-registered
  - Is there **sorting in transactions** based on **registration?**

Description of economy

- **Monopolistic competition** framework
- **Competitive Sector** (B2B) Providing capital and labour to …
- **Upstream** (B2B) - A continuum of firms with productivity α_i selling to …
- **Downstream** (B2C) - A continuum of firms with productivity $\mathbf{b}_j$ selling to …
- **Consumer** with preferences for variety (Dixit-Stiglitz preferences)
- No evasion allowed (but can be added)

Schematically



Main variables of the model (Prices, Output Profits, etc) are determined by:

- Productivity of seller/buyer
- VAT registration status of seller/buyer
- Aggregate registration status in the two sectors

States of the world

- Prices depend on 4 states of the world (excluding bunching)

Proposition: Prices in Downstream

Proposition*:*

When a **downstream firm is VAT-non-registered** its **producer price is higher** relative to non-registration but **consumer price is lower** because VAT is not levied (irrespective of how many upstream firms VAT-register)

- For **VAT non-registered firm,**
  - **Cost effect: Input cost is higher** – cannot credit VAT
  - **Demand effect**: **Consumer prices is lower** – no VAT levied on price of the final good
  - **Demand effect offsets the cost effect**
- Thus. . .

Proposition: Downstream

Proposition:

All **downstream firms prefer to remain unregistered** irrespective of how many upstream firms register

- Though the **cost of inputs is higher** under no VAT-registration, **consumer prices will be lower** (as no VAT is levied on final goods), **and demand will be higher** (demand effect offsets the cost effect)

Proposition: Upstream

Proposition*:*

If registration is voluntary **upstream firms registration decision** is positively affected by the fraction of **downstream registered firms**

- An upstream firms switching to registration when **downstream is totally registered**
  - Increases demand and reduces costs – **same direction**
- If registration in downstream rises **the marginal unregistered firms will register**

Proposition: Sorting

Proposition:

Non-registered firms sales ratio **non-registered/registered** is higher than for a registered firm (and vice-versa)

- **No perfect sorting possible** given the preference for input variety of downstream firms
- Model exhibits **imperfect sorting**: relatively "more trade" is taking place between firms with same registration status

Optimal threshold

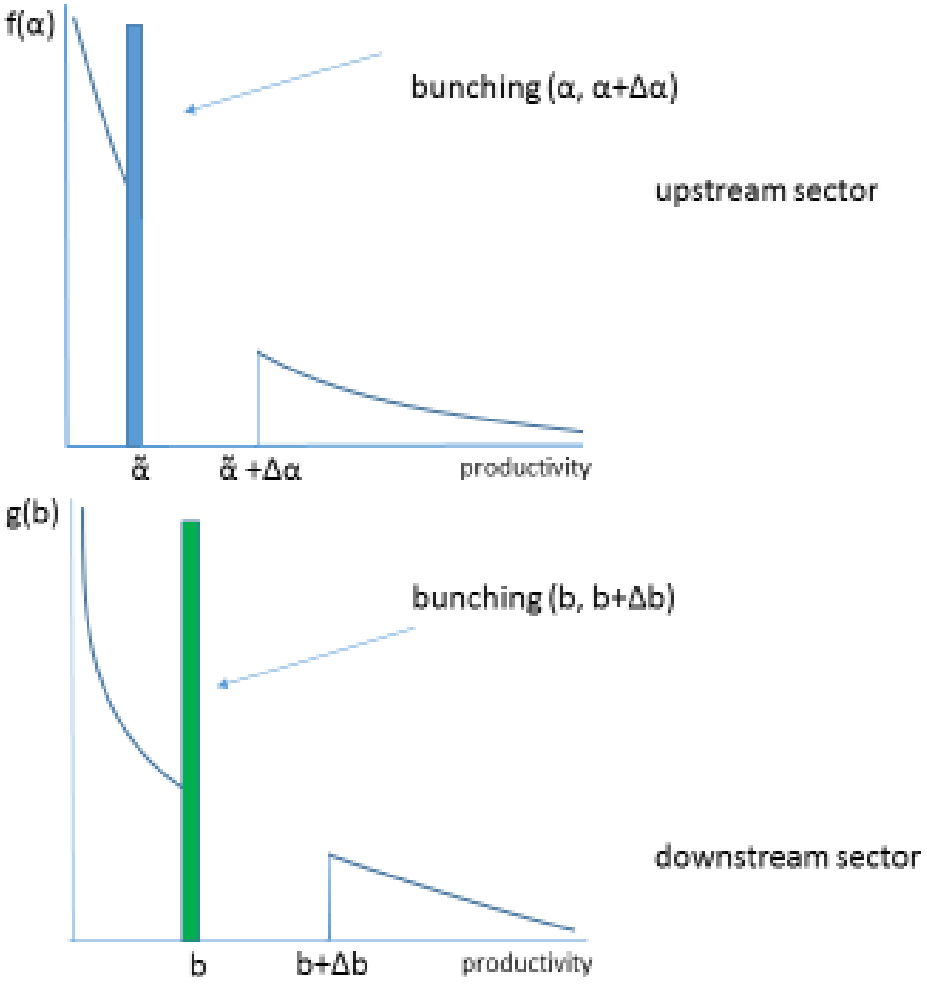
Proposition:

The optimal thresholds are characterised by the balance of trade offs involving, **Tax Base**, **Compliance costs** and firms' **bunching reaction across the production chain**

An increase of one of the threshold leads to

- Increase of the mass of firms who register
  - Increased tax base and increased Compliance Costs
- Change in bunching behaviour on both sectors (Interdependence across the chain)

Bunching across the chain



thresholds jointly determined

Numerical illustration

- *Assume truncated Pareto distribution with density*

$$f(x) = \frac{cL^c x^{-(c+1)}}{1 - \left(\frac{L}{H}\right)^c}$$

- *c* is the shape parameter
- *L* is the lower bound (normalized to 1) and *H* is the upper bound of the support

- Not calibrated yet—working on this

Revenue Maximization

Truncated Pareto

Shape = 2

Min = 1

Max = 10

t = 0.15

	Keen and Mintz	$s_x = s_y$	$s_x \neq s_y$
α	1.00	3.30	5.30
Δ_α	0.00	1.77	2.62
β	1.56	1.42	1.26
Δ_β	0.88	1.32	1.22
w	0.93	0.61	0.81
Upstream – Threshold turnover	1.85	5.88	9.15
Downstream – Threshold turnover	6.17	5.88	5.30
Upstream – % Unreg.	0.00	91.75	97.42
Upstream – % Bunch.	0.00	5.34	1.98
Upstream – % Reg	100.00	2.91	0.60
Downstream – % Unreg.	59.51	51.16	37.77
Downstream – % Bunch	24.57	36.46	46.83
Downstream – % Reg.	15.93	12.37	15.40
VA Tot.	139.66	135.54	134.93
Gross Revenues Tot	13.99	6.61	6.88
Compliance Costs Tot.	15.07	1.99	2.08
Net Revenues Tot	-1.09	4.62	4.80

Welfare Maximization

Truncated Pareto

Shape = 2

Min = 1

Max = 10

t = 0.15

	Keen and Mintz	$s_x = s_y$	$s_x \neq s_y$
α	1.00	5.86	5.63
Δ_α	0.00	4.14	4.37
β	6.39	2.77	5.06
Δ_β	3.61	2.70	4.94
w	0.96	0.95	0.97
Upstream – Threshold turnover	2.100	11.557	11.64
Downstream – Threshold turnover	25.25	11.557	21.10
Upstream – % Unreg.	0.000	98.07	97.82
Upstream – % Bunch.	0.000	1.93	2.18
Upstream – % Reg	100.00	0.00	0.00
Downstream – % Unreg.	98.54	87.80	97.07
Downstream – % Bunch	1.47	9.83	2.93
Downstream – % Reg.	0.00	2.38	0.00
Profits Tot.	102.56	108.76	112.15
Utility Final Goods Tot.	200.95	201.83	208.65
Soc. Val. Revenues Tot.	-2.34	4.23	3.69
Welfare	391.52	409.28	422.31

Concluding remarks

- Trade is more intense among firms with **same registration status**
- **Downstream** firms would never register voluntarily - **Upstream** firms may want to register voluntarily if enough downstream firms register
- Bunching decision is interdependent across the chain
- Literature has ignored this interdependence, so the recommended thresholds are **very likely to be biased with significant welfare/revenue implications**
- Policy prescription: **Take production chain into account in determining optimal threshold**

Further Research

- Solve the model under **calibrated parameters**
- Provide a thorough **sensitivity analysis** for the results
- Extend the model to account for **non-compliance behavioural response**

Thank you!!!

Questions?

For more information, please contact me at:
D.Gamannossis@exeter.ac.uk

@DuccioGama
@TARC2013