

Discussion of

# **How Firms Accumulate Inputs: Evidence from Import Switching**

by

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# Standard Static Model of Imported Intermediates

- Firm  $i$  Production Cobb-Douglas:

$$Y_i = A_i K_i^{\alpha_K} L_i^{\alpha_L} X_i^{\alpha_X},$$

where  $\alpha_K + \alpha_L + \alpha_X = 1$ .

- Intermediate bundle  $X$  is CES in domestic input  $H$  and imported input  $M$ .
- For now, ignore quality  $b$ .

# Standard Static Model of Imported Intermediates

- We either have Halpern, Koren, Szeidl (AER 2015):

$$\ln X_i = \int_{j=0}^1 \ln \left[ H_{i,j}^{\frac{\sigma-1}{\sigma}} + M_{i,j}^{\frac{\sigma-1}{\sigma}} \right]^{\frac{\sigma}{\sigma-1}} dj,$$

- or Gopinath and Neiman (AER 2014):

$$X_i = \left[ H_i^{\frac{\sigma-1}{\sigma}} + \int_{j_i=0}^1 M_{i,j}^{\frac{\sigma-1}{\sigma}} dj \right]^{\frac{\sigma}{\sigma-1}}$$

- In either setup, role of imports is simple – given love-of-variety in aggregation, reduce unit cost of input bundle.

## Standard Static Model of Imported Intermediates

- To what extent is unit cost of  $X$  reduced by importing?
- In HKS style:

$$\begin{aligned}\ln \left( \frac{P_{X_i}^{\mathcal{I}=1}}{P_{X_i}^{\mathcal{I}=0}} \right) &= \int_{j=0}^1 \mathcal{I}_{i,j} \ln \left[ 1 + \left( \frac{P_M}{P_H} \right)^{1-\sigma} \right]^{\frac{1}{1-\sigma}} dj \\ &= \int_{j=0}^1 \ln \left[ \frac{p_H H_{i,j}}{p_H H_{i,j} + p_M M_{i,j}} \right]^{\frac{1}{\sigma-1}} dj \\ &= \frac{1}{\sigma-1} \int_{j=0}^1 \ln \gamma_{i,j} dj\end{aligned}$$

- In GN style:

$$\begin{aligned}\ln \left( \frac{P_{X_i}^{\mathcal{I}=1}}{P_{X_i}^{\mathcal{I}=0}} \right) &= \frac{1}{1-\sigma} \ln \left( 1 + \int_{j=0}^1 \mathcal{I}_{i,j} \left( \frac{P_M}{P_H} \right)^{1-\sigma} dj \right) \\ &= \frac{1}{\sigma-1} \ln \gamma_i\end{aligned}$$

# Standard Static Model of Imported Intermediates

- So key metric is what's sometimes called “home share”  $\gamma$  , coupled with an elasticity  $\sigma$
- Arkolakis, Costinot, Rodriguez-Clare (AER 2012): at country level  $\gamma$  is key for welfare gains in gravity model
- Costinot, Donaldson, and Komunjer (ReStud 2012): at sector level  $\gamma$  gap in “observed” vs. “fundamental” productivity

# Standard Static Model of Imported Intermediates

- Fixing  $w$ ,  $p_H$ , and  $A$  (continue to ignore  $b$ ), log unit cost in Lu, Mariscal, and Mejia is:

$$\ln \lambda \propto \int_{j=0}^1 \ln \gamma_{i,j} dj$$

so very much in same spirit (suggestion: replace  $B$  with  $\gamma$ ).

- Static work on joint distribution of size and  $\gamma_{i,j}$ :
  - HKS (2015): Structural estimation and counterfactuals
  - GN (2014), Ramanarayanan (2015): Response to shocks; Mismeasurement from add/drop
  - Blaum, Peters, Lelarge (2015): Much richer I/O, disciplined with French data

# Dynamic Model of Imported Intermediates

- But Lu, Mariscal, and Mejia is dynamic.
- Firms state is productivity  $A$  and measure of “searched” suppliers is  $n$
- Firms decide if want to spend resources looking for new foreign suppliers, with convex cost of search
- Cool, intuitive, realistic features this generates:
  - Firms grow imports slowly (convex cost)
  - Add and drop inputs simultaneously (find better exporter)
  - Eventually can't find better suppliers ( $n$  is state variable)

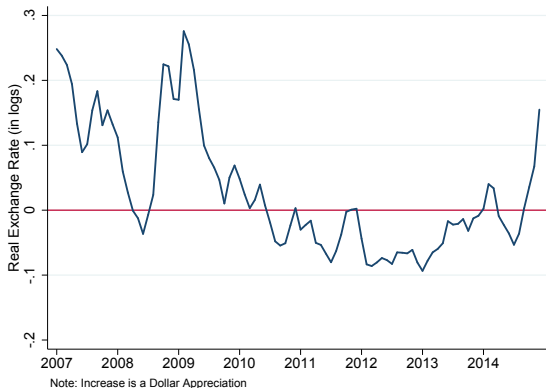
# Dynamic Model of Imported Intermediates

- Good news: Model is very nice! Real step forward. Clean analytical expressions, good intuitions, etc.
- Bad news: What do we need it for? The authors stop far too soon and never really put it to use.
- Model is used only to generate relatively subtle comparative statics such as:
  - “Switching” increases with size conditional on age
  - “Switching” decreases with age conditional on size
  - etc.



# Were Sourcing Dynamics Important To Understand 2007-2014?

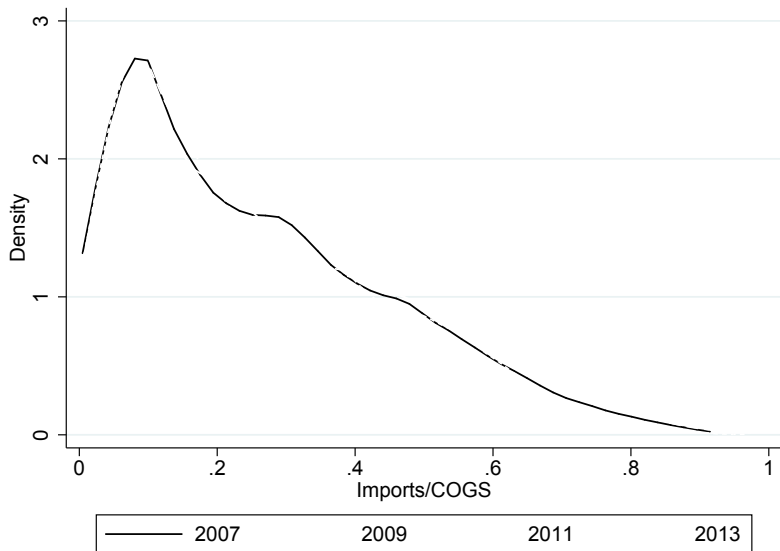
- If we care about aggregate imports and productivity, when do we need to think about these dynamic considerations?
- 2007-2014 were relatively normal times for Colombian RER



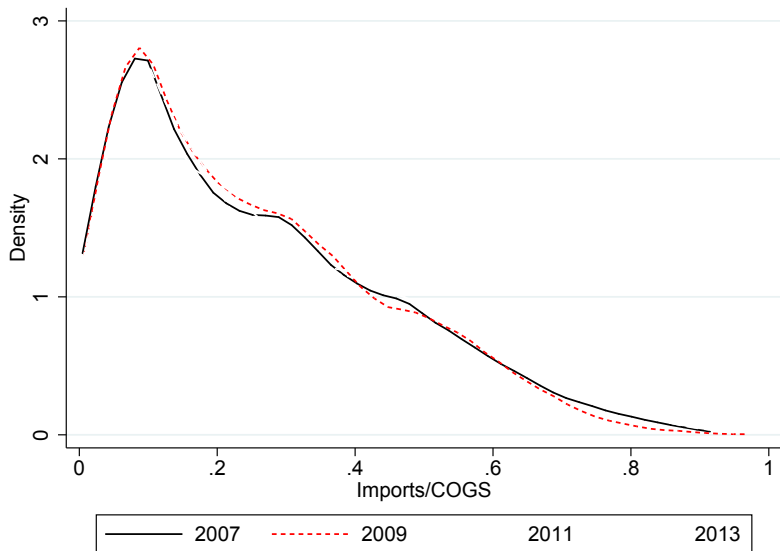
# Were Sourcing Dynamics Important To Understand 2007-2014?

- Put together annual imports data from DANE for 2007-2014. Not as good as authors', but firm-level
- Combined with firm-level data from Colombia's corporate regulator. Used two variables:
  - ① Operating Revenues
  - ② Cost of Sales and Services (COGS)
- Match roughly 2,000-3,000 importing firms
- Are dynamics essential to understanding  $\gamma$ ?

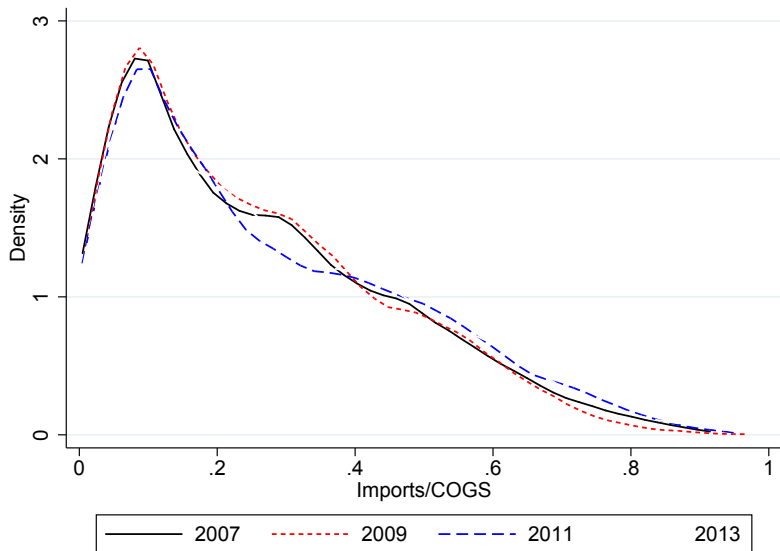
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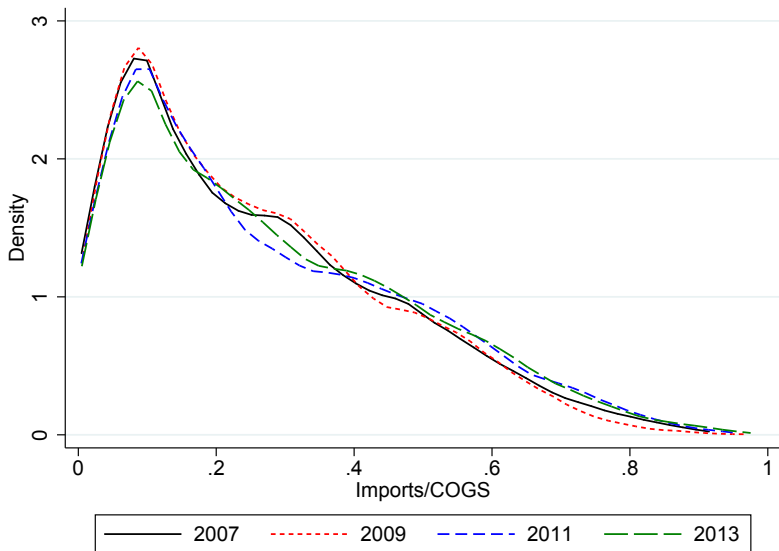
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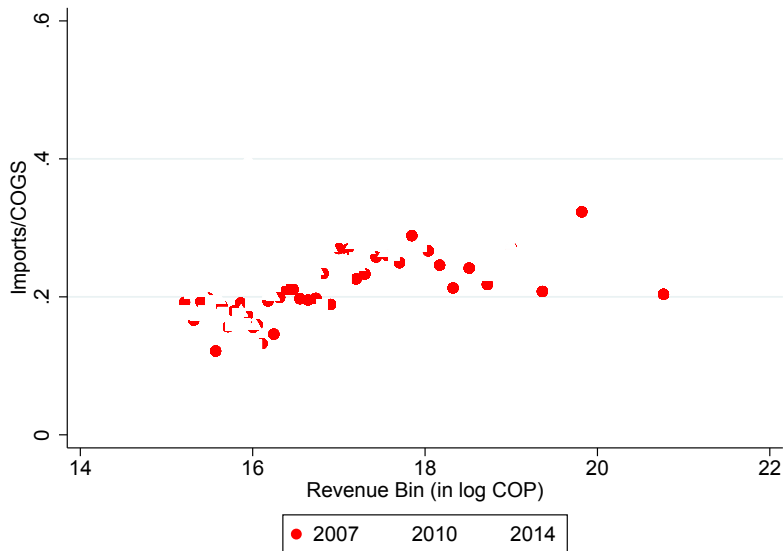
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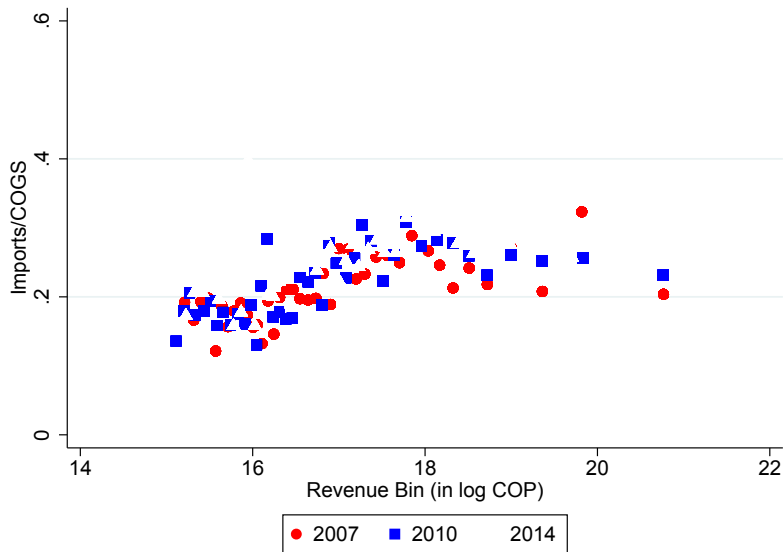
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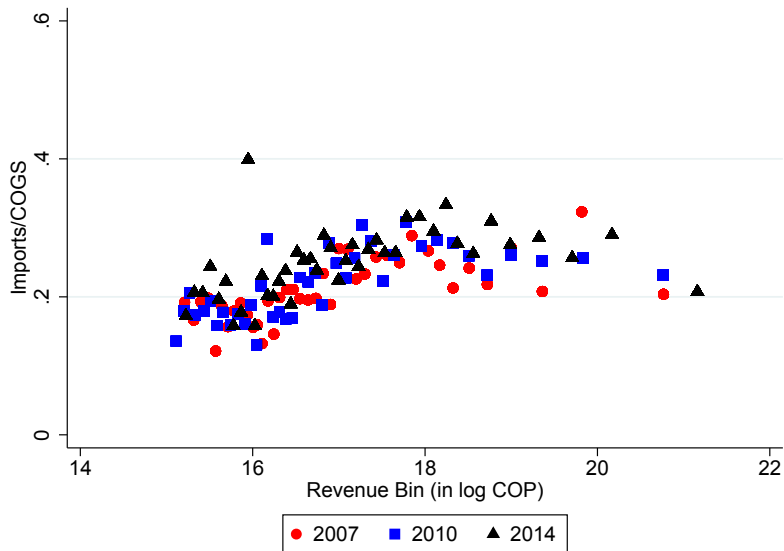


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- So, in “normal” times, distribution of  $\gamma$ 's looks largely stable, including its joint distribution with size
- My analysis was quite cursory, but it suggested relatively constant distribution of size/age/imports
- Authors should focus on situations where dynamics are key to understanding distribution of  $\gamma$  or its change

# For What Issues Are Dynamics First Order?

- Key benefit of dynamic model should be to teach us about:
  - ① Evolution of  $\gamma$  in big shock episodes/crises,
  - ② Growth of firms from small to big
  - ③ Relevance of expectations for firm investment in suppliers
  - ④ Cross-country differences in stable  $\gamma$  distribution
  - ⑤ Short- vs. Long-run trade elasticities
- Really exciting things the authors can and should do with this
- Next steps, I believe, is to add birth/death/productivity processes and try to solve for ergodic distribution (on computer). See how system responds to shocks.

# Conclusion

- Authors have cool data, do a great job writing innovative new dynamic sourcing model
- New mechanisms in model strike me as reasonable and interesting, and I agree their empirics go some way toward corroborating the model
- The exciting part will be to show what dynamic sourcing can deliver that our static models haven't yet been able to ... I hope this is what the authors turn to next