A Bargaining Theory of Trade Invoicing and Pricing

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What They Do

- Risk averse importers and exporters (CRRA over total profits)

- Importer pays lcu-denominated log price p:

$$p(p^f, s) = p^f - (1 - \beta)s,$$

  where p^f is fixed price and s is log nominal exchange rate.

- $\beta = 1$ equals LCU, $\beta = 0$ equals PCP

- Nash bargaining between individual ex-im pair over p^f and β

What They Do

- A large set of (exogenous) things matter:
  - Size of the importer and exporter
  - Price elasticity of demand
  - Reference price (industry's price index)
  - Elasticity of reference price to exchange rate
  - Degree of returns to scale
  - Elasticity of input cost to exchange rate

- Due to curvature in importer's and exporter's utility, full distribution (loosely speaking) of above factors matters

- Little can be done analytically. Derive intuitions from numerical comparative statics and special cases.

Some Visual Intuition
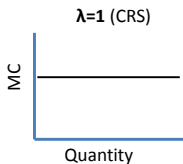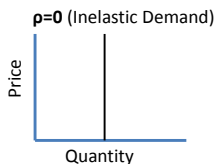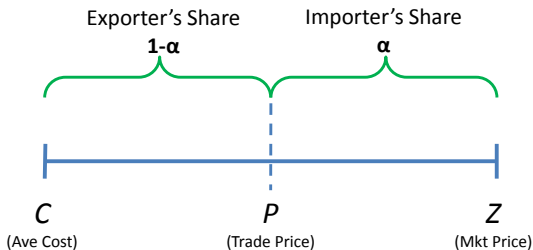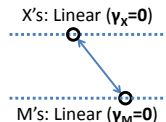
Then, profits per unit $(Z - C)$ divided according to:

$$\frac{1 - \alpha}{\alpha} \equiv \frac{P - C}{Z - P} = \left(\frac{1 - \delta}{\delta}\right),$$

where δ is exogenous Nash Bargaining weight of Importer.

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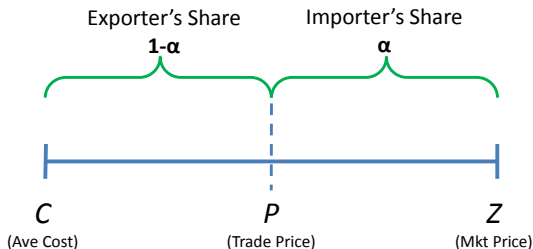
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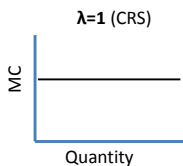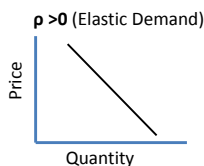

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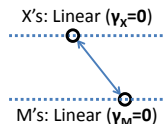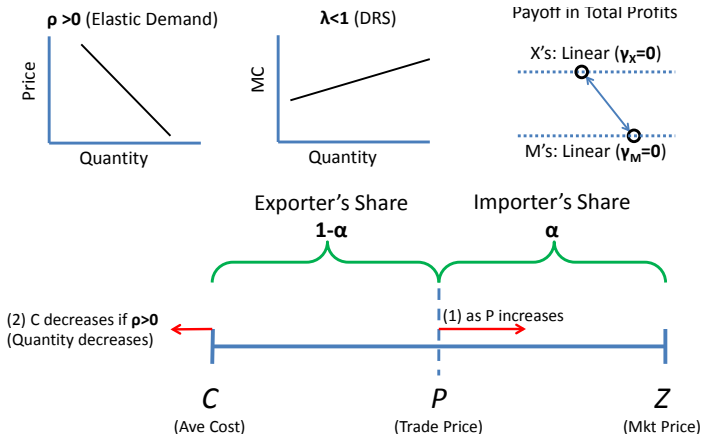# Some Visual Intuition
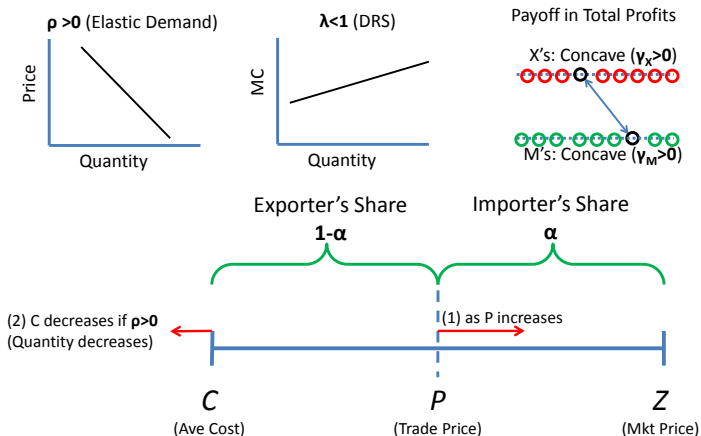

Then, profits per unit $(Z - C)$ divided according to:

$$\frac{1-\alpha}{\alpha} \equiv \frac{P-C}{Z-P} = \left(\frac{1-\tilde{\delta}}{\tilde{\delta}}\right)\left(\frac{P - \frac{\rho}{\rho-1}\frac{1}{\lambda}C}{P - \frac{\rho}{\rho-1}Z}\right),$$

where $\tilde{\delta}$ adjusts δ for *relative* importance of particular trade link

Asymetries in Risk Drive β

If we assume linearity in payoffs ($\gamma_M = \gamma_X = 0$) and equal "passthrough" of trade and reference price ($\beta = \eta$), β depends on:

- $\frac{E[\hat{z}\hat{s}]}{E[\hat{s}^2]}$: Covariance of final price and exchange rate only directly matters for importer.

- $\frac{E[\hat{W}_x\hat{s}]}{E[\hat{s}^2]}, \zeta$: Covariance of marginal cost and exchange rate only directly matters for exporter.

- $\frac{1-\lambda}{\lambda}\frac{E[\hat{q}\hat{s}]}{E[\hat{s}^2]}$: Covariance of quantities and exchange rate only matters asymmetrically if DRS results in changing costs.

Approximation yields nice intuitive expressions relating β to these exogenous shocks.

Comment 1: Where Does Contract Structure Come From?

Some distinguished economists would be skeptical...

- Robert Barro, *JME 1977*
    - Why would firms contract this way?
    - Why not contract on quantities?
    - Nonlinear stuff, two part tariffs, etc.?

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    - Analyze contract-related info in BLS microdata
    - Half of prices observed are not customer-specific

But, some less distinguished non-economists offer some support...

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But, some less distinguished non-economists offer some support...

- Bill Neiman (my dad), *Fuzzy recollections, Unpublished*
  - Worked for Pioneer Screw & Nut in Chicago in the late 1980s
  - Purchased steel from O&K in Osaka
  - He claims that, in practice, contracts looked a lot like this

Comment 1: Where Does Contract Structure Come From?

- Key point: Very interesting theoretical results, but they rest entirely on the assumed structure of the contract, which isn't discussed or justified at all.

- Is this what is done in the world? Reconcile with BLS surveys? Even some anecdotal evidence?

- Can they derive that this deviation from non-state-contingent pricing is far more important than others?

Comment 2: Motivate/Defend Key Assumptions

- Impressive that with so many features they can make some headway analytically (even using approximation).

- But, basically zero motivation/discussion for several key assumptions including:

    1. Concave payoff on profits is essential. Is this reasonable? In which settings?

    2. Why is intermediate price relevant at all for quantities?

    3. Reasonable for final downstream and reference prices to be exogenous? Those prices are perhaps most interesting ones.

- Authors are admirably clear about key assumptions, but more time should be spent motifying them.

Comment 3: Anything to do with "Invoicing" or LCP?

- "Trade invoicing" or "LCP" appear prominantly (and in title).

- But paper is about how prices respond ex-ante and ex-post to exchange rates without any rigidity.

- Invoice currency has a natural interpretation when $\beta = \{0, 1\}$, but these cases never obtain.

- Theory eqully consistent with any currency use.

Comment 3: Anything to do with "Invoicing" or LCP?

- If not (in my opinion) a theory of Invoicing Currency, is it a theory of exchange rate pass-through?

- Yes, but more structure needed to connect this to pass-through, at least as typically measured empirically.

- If contract is chosen, and applies without re-negotiation for multiple periods in the future, then $1 - \beta$ maps to coefficient in standard pass-through regressions. But this requires modification to think about multiple periods.

- If new contract every period, then difficult to connect to either Invoicing Currency or Pass-through.

Comment 4: Macro Implications?

- Paper emphasizes some cool new micro intuitions.

  - For example, bargaining over these two objects means most powerful importer bears *more* exchange rate risk.

  - Why? Get lower price level, care less about *variability*.

  - (Question for authors: β is rarely above 0.5. Can you give better intuition for this interesting asymmetry?)

- But less emphasis on aggregate implications.

  - Largest importers/exporters matter in aggregate. Fig 11 does some, but more focus and intuition for those cases.

  - Hard to think much about aggregate without some final good price elasticity.

  - Two-firm special case implied biggest players have very low β. Theory cannot generate large aggregate β?

Comment 4: Macro Implications?

- Challenge for theory: Many environments appear to lack heterogeneity in currency choice.

  - Goldberg and Tille (2008): 95 percent of U.S. exports in USD, 85 percent of U.S. imports in USD.

  - Gopinath and Neiman (2013): Nearly all Argentine imports and exports in USD.

  - Goldberg and Tille show more mixed cases. Can they generate some testable predictions?

- Challenge for theory: Goldberg and Tille (2008) show Rauch classification doesn't greatly alter share of PCP. Is β highly insensitive to ρ in this current theory? I don't think so.

Comment 5: Unexplored Implications?

- Cross-country Differences in price levels

- Evolution of industry price level with entry exit

- Differential sectoral sensitivity to cost shocks

Conclusion

- Nice paper!

- Paper makes some particular and unusual assumptions and requires numerical solution

- But impressively includes many influences of the pricing problem and generates some very nice intuitions. Given complexity, surprisingly elegant and well-articulated theory.

- For me, critical to:
  - Better justify/motivate several special assumptions
  - Better define the mapping of model objects to observables