
“Dynamics of Firms and Trade in General Equilibrium”

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Summary

- Ingredients

The Mechanism

Broader Facts

Conclusions

What this Paper is About

- Document the **exchange rate disconnect** in Japan:
 1. Firm-level exports co-move more with exchange rate depreciations than aggregate exports, and
 2. Aggregate imports co-move with exchange rate depreciations.
- Develop a dynamic GE model:
 - that is able to replicate the exchange rate disconnect;
 - whose micro-foundations are built to replicate features of Japanese firm-level data:
 - strong correlation between total sales and export status
 - weak correlation between total sales and export shares
 - presence of firms reporting negative profits.

A Lot of Moving Parts

VERY rich model, with several ingredients:

- **To generate the exchange rate disconnect:** heterogeneous firms, selection into export, imports of intermediate goods only (by assumption).
- **To match features of the Japanese micro-data:** “amoeba”-like multi-product firms.
- **To embed the trade model in an RBC macro model:** government purchases, bond holdings, elastic labor supply.

Exchange Rate Disconnect in the Melitz Model

Exchange rate disconnect in the export data:

$$\frac{\partial \log s^F(a)}{\partial \log \varepsilon} > \frac{\partial \log S^F}{\partial \log \varepsilon} > 0$$

where:

$$s^F(a) = \varepsilon p^F(a) q^F(a) = \varepsilon \left(\frac{\vartheta}{\vartheta - 1} \frac{w}{a\varepsilon} \right)^{1-\vartheta} P^F{}^\vartheta Q^F$$

$$S^F = \varepsilon P^F Q^F$$

Elasticity of firm-level exports to exchange rate:

$$\frac{\partial \log s^F(a)}{\partial \log \varepsilon} = \vartheta \left(1 + \frac{\partial \log P^F}{\partial \log \varepsilon} \right) + \frac{\partial \log Q^F}{\partial \log \varepsilon}$$

Elasticity of aggregate exports to exchange rate:

$$\frac{\partial \log S^F}{\partial \log \varepsilon} = 1 + \frac{\partial \log P^F}{\partial \log \varepsilon} + \frac{\partial \log Q^F}{\partial \log \varepsilon}$$

To generate disconnect, we need that $\frac{\partial \log P^F}{\partial \log \varepsilon} \in (-1, 0)$.

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Exchange Rate Disconnect in the Melitz Model (contd.)

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Is trade-induced selection necessary and sufficient to generate the disconnect in exports?

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Is trade-induced selection necessary and sufficient to generate the disconnect in exports? **YES!**

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Exchange Rate Disconnect in the Melitz Model (contd.)

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- Without selection (\equiv if all firms export):

$$P^F = N^{\frac{1}{1-\vartheta}} \frac{\vartheta}{\vartheta - 1} \frac{w}{\varepsilon \bar{a}} \Rightarrow \frac{\partial \log P^F}{\partial \log \varepsilon} = -1$$

Firm-level exports and aggregate exports respond equally to changes in exchange rates (no disconnect).

Exchange Rate Disconnect in the Melitz Model (contd.)

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- With selection (\equiv only firms with $a \geq \underline{a}_X$ export):

$$P^F = N^{\frac{1}{1-\vartheta}} \frac{\vartheta}{\vartheta-1} \frac{w}{\varepsilon \bar{a}} \underline{a}_X^{\frac{\alpha-\vartheta+1}{\vartheta-1}}$$

where $N = L / \left[(\vartheta \kappa + \vartheta \phi \underline{a}_X^{-\alpha}) \cdot \left(\frac{\alpha}{\alpha-\vartheta+1} \right) \right]$.

Assume that κ is negligible, so that all firms produce in the domestic market as in DJK: $\frac{\partial \log N}{\partial \log \underline{a}_X} \approx \alpha$ and $\frac{\partial \log P^F}{\partial \log \varepsilon} = -1 - \frac{\partial \log \underline{a}_X}{\partial \log \varepsilon} > -1$ since $\frac{\partial \log \underline{a}_X}{\partial \log \varepsilon} < 0$.

Exchange Rate Disconnect in the Melitz Model: the Intuition

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WHY is trade-induced selection necessary and sufficient to generate the disconnect in exports?

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- Import Disconnect

Exchange Rate Disconnect in the Melitz Model: the Intuition

WHY is trade-induced selection necessary and sufficient to generate the disconnect in exports?

An exchange rate depreciation affects the export price index both on the intensive and the extensive margin:

- On the **intensive margin**, the effect of a depreciation hits all the firms in the same way and is reflected into the price index proportionally.
- On the **extensive margin**, a depreciation reduces the exporting threshold \underline{a}_X . New exporters are on average less productive than the incumbents (charge higher prices) and this increases the price index so that the total change is smaller than the one due to the extensive margin only.

- Export Disconnect
- Import Disconnect

Exchange Rate Disconnect in the Melitz Model: Imports

The standard Melitz model is NOT able to generate the disconnect in **imports**:

- an exchange rate depreciation makes foreign exporters less competitive: the prices of foreign exports increase and the threshold to enter the domestic market increases \Rightarrow the import price index increases (less than due to intensive margin only) and import quantities fall, opposite to what the data show.
- **DJK solution:** imports are only of intermediate goods, so they move together with domestic sales and exports. This a good approximation to Japanese data, where the share of imported intermediates is very high. (What about other countries?)

Japanese Data versus Broader Facts

- The exchange rate disconnect is a phenomenon that interests many countries: Canada, France, Germany, Italy, the UK, and the US.
- DJK's model has several features that are specific to Japanese data. Are these features present in other countries?
 1. Strong correlation between total sales and export status
 2. Weak correlation between total sales and export shares
 3. Presence of firms reporting negative profits
 4. "Amoeba-like" multi-product firms

¹Moments computed by Lindsay Oldenski using merged BEA-Compustat-CRSP data.

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 4. "Amoeba-like" multi-product firms
 - **Not true** in the US and Brazil, at least : positive empirical relationship between firm sales and number of products (BRS11, AM11).

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Some Amendments to fit Other Countries' Data

How to apply use DJK to explain the exchange rate disconnect in other countries?

- Drop the interpretation of multi-product firms and restore the correspondence “*one firm* \equiv *one product*”;
- Add shocks to fixed costs to obtain weak correlation between sales and profitability and negative profits.

In conclusion, minor changes to the model make the framework broadly applicable to other countries with possibly different features of the firm-level data.

Conclusions

- A great paper. Integrates insights from new trade theory and macro theory to give a comprehensive picture of the economy, matching both firm-level and aggregate empirical patterns.
- Micro-structure of the model motivated by observations in the Japanese economy, but overall applicable to other countries exhibiting possibly different patterns in their firm-level data.

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