

Demand Propagation Through Traded Risk Factors

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This Discussion

The price impact of flows

- Simple example
- What do you need to estimate a multiplier?

This paper

- How to find the factors? a flow-based approach
- How to estimate the factors?
- What do we learn?

Estimating impact: an example

What happens if I decide to purchase a trillion of dollars worth of Yen?

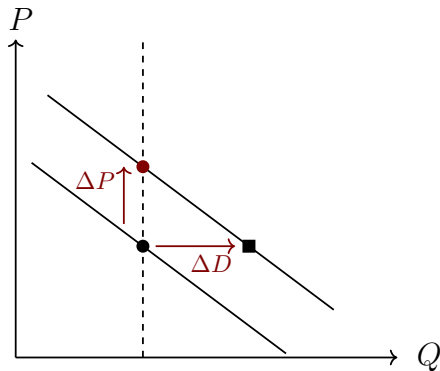
- Ask an intermediary — say Goldman Sachs (GS)
- Make sure their overall demand for assets and the price accomodate this trade
- Effects on ... price of Yen but also on other currencies and all the other assets held by GS

Estimating impact: an example

Toyota needs to buy FX swaps from GS Yen-USD

- Exchange rates adjust based on GS balance sheet
 - They need to be willing to take in the flow

Supply (Toyota) $_{\text{USD}} = \text{Demand (GS)} (S_{\$}, S_{¥}, S_{€}, S_{£}, \dots, \text{other stuff})_{\text{USD}}$



Estimating impact: an example

It's all connected

- When Toyota gets the Yen swap ...
- GS wants to change its Euro position
 - Yen takes balance sheet space
 - Yen comoves with the Euro
- To understand the effect we need to understand the whole demand curve of GS

$$\underbrace{\left(\frac{\partial \text{Demand}^{\text{GS}}}{\partial \mathbf{S}} \right)}_{\text{elasticity } \mathcal{E}} \begin{bmatrix} \Delta S_{¥} \\ \Delta S_{€} \\ \vdots \end{bmatrix} = \begin{bmatrix} f_{¥} \\ f_{€} \\ \vdots \end{bmatrix} \iff \begin{bmatrix} \Delta S_{¥} \\ \Delta S_{€} \\ \vdots \end{bmatrix} = \underbrace{\mathcal{E}^{-1}}_{\text{multiplier } \mathcal{M}} \begin{bmatrix} f_{¥} \\ f_{€} \\ \vdots \end{bmatrix}$$

This paper

What this multiplier \mathcal{M}

- Inverse of aggregate demand curve ... same information $\mathcal{M} = \mathcal{E}^{-1}$
- How do prices adjust for a given flow?

Standard asset pricing approach to the multiplier

- Demand for assets is mean-variance: $D = -\frac{1}{\gamma} \Sigma^{-1} P + \dots$
- Multiplier comes from covariance matrix $\mathcal{M} = \gamma \Sigma$
- Factor decomposition of variance

$$\mathcal{M} = \gamma \begin{pmatrix} \sigma_{\text{idio}_1} & & & \\ & \sigma_{\text{idio}_2} & & \\ & & \ddots & \\ & & & \sigma_{\text{idio}_N} \end{pmatrix} + \gamma \underbrace{\sum_k b_k b_k^\top}_{\text{factor weights } b_k}$$

- Answer simple questions about flows on prices

$$\Delta S_{\nexists}$$

An equivalence result

General matrix multiplier

$$\begin{bmatrix} \Delta S_{\forall} \\ \vdots \\ \vdots \end{bmatrix} = \mathcal{M} \begin{bmatrix} f_{\forall} \\ \vdots \\ \vdots \end{bmatrix}$$

Simple multiplier decomposition

A decomposition result in HHHKL (Causal Inference for Asset Pricing, 2025)

- Define *exchange rates factors*: $\Delta S_k^{\text{factor}} = b_k^\top \mathbf{S}$
- Idiosyncratic or “relative” flow ΔS_{idio}
- Simple set of K **meso-multiplier** and 1 **relative multiplier** to evaluate price impact:

$$\Delta S_{\text{idio}}^{\text{factor}} = \widehat{\mathcal{M}} f_{\text{idio}}$$

$$\Delta S_1^{\text{factor}} = \mathcal{M}_1 f_{S_1^f}$$

$$\vdots$$

$$\Delta S_K^{\text{factor}} = \mathcal{M}_K f_{S_K^f}$$

The important question

What are these factors?

- What are these factors? How do we find the b_k weights?
- This is what Goldman Sachs cares about!
- Factor risk, leverage, duration, regulatory constraints ...

How do we find these factors?

- **Lustig, Roussanov, Verdelhan:** Microfounded macro model to uncover the economically important risk in currencies
- **Chernov, Dahlquist, Lochstoer:** dimension of currencies is small enough that we can look at the whole matrix directly
- **This paper:** focus on component of risks that explain both the cross-section of returns and flows

The important question

Final Thoughts

Interesting Paper! Go read it.

Take away

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