Exchange rate pass-through: Evidence from sectoral data

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Research question

Can disaggregated data help us understand exchange rate pass-through to import prices?

- Import prices at the sectoral level
  - Many series of import prices and exchange rates to exploit
    - Exchange rates might differ across groups $\Rightarrow$ more variation
    - Divergent exchange rate pass-through across groups
  - New lens to study asymmetry (appreciations vs depreciations), non-linearity (big vs small), vehicle currency pricing (outsize role for dollar)

Related Literature

- Papers looking at microdata: regress bilateral exchange rate on shipment import prices.
  - Modern literature starts with Gopinath and Rigobon (2008), Gopinath, Itskhoki and Rigobon (2010).
  - Devereux et al (2017), find similar results for Canada
- Papers à la Campa-Goldberg (2005), regressing aggregate exchange rate index on aggregate import price index...
  - Emphasis often on understanding determinants of ERPT
  - Monetary policy (Gagnon & Ihrig, 2004); Exchange Rate volatility (Berger and Vavra, 2013); Trade integration (Gust et al 2010)

This Paper

- Use sectoral import price data for 55 sectors
- Compute sector-specific exchange rate index using weights from COMTRADE data on UK imports
- Estimate set of sector-specific ECMs where long run coefficients, short run lag lengths and short run coefficients are allowed to differ across sectors
- Aggregate these up to produce ”Impulse response functions” at the aggregate level
- Test for non-linearities and asymmetries in the short-run coefficients
- Analyse role of third currency invoicing effects (“Dollar currency pricing”)

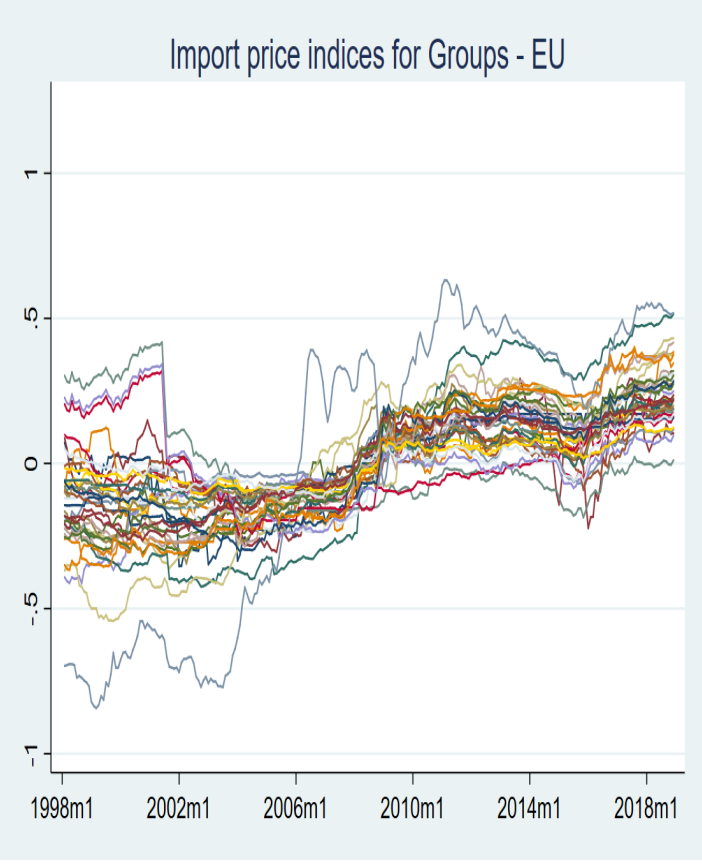
Key takeaways

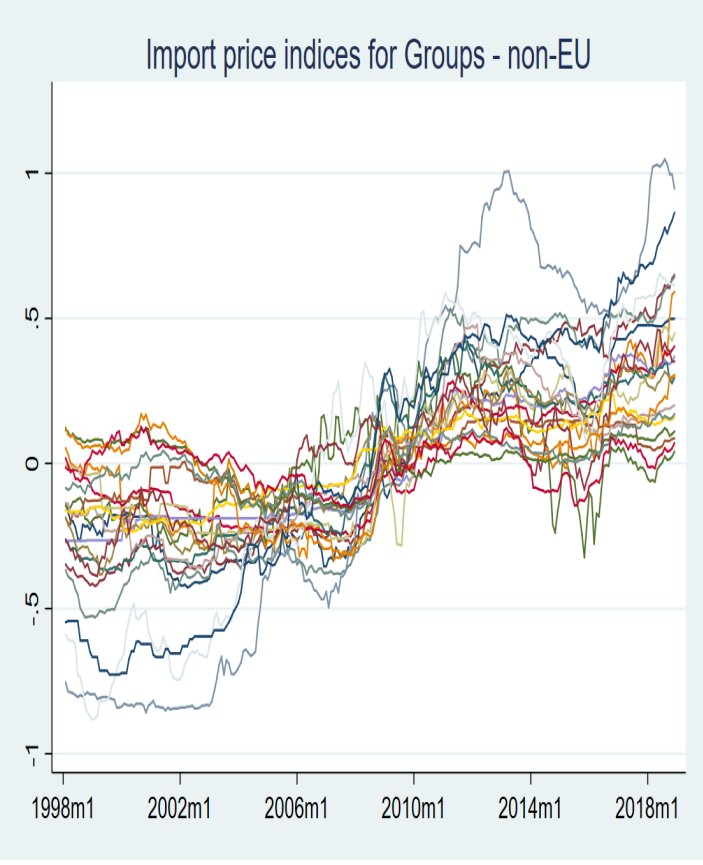
- Significant heterogeneity across sectors
- Aggregate long run passthrough is 0.74
- Bulk of passthrough occurs within 12 months
- Asymmetries at sector level, but largely cancel out in aggregate
- Larger changes have quicker passthrough
- Quicker and fuller passthrough for US-dollar driven changes (double on impact, a fifth higher after 12 mobths)

Data & Methodology

Import prices

- 54 sectoral indices from UK's ONS. Incomplete coverage due to missing data + structural breaks
- Drop series with $>$ 2 SBs. Correct for 1 or 2 SBs





Group-specific exchange rate indices

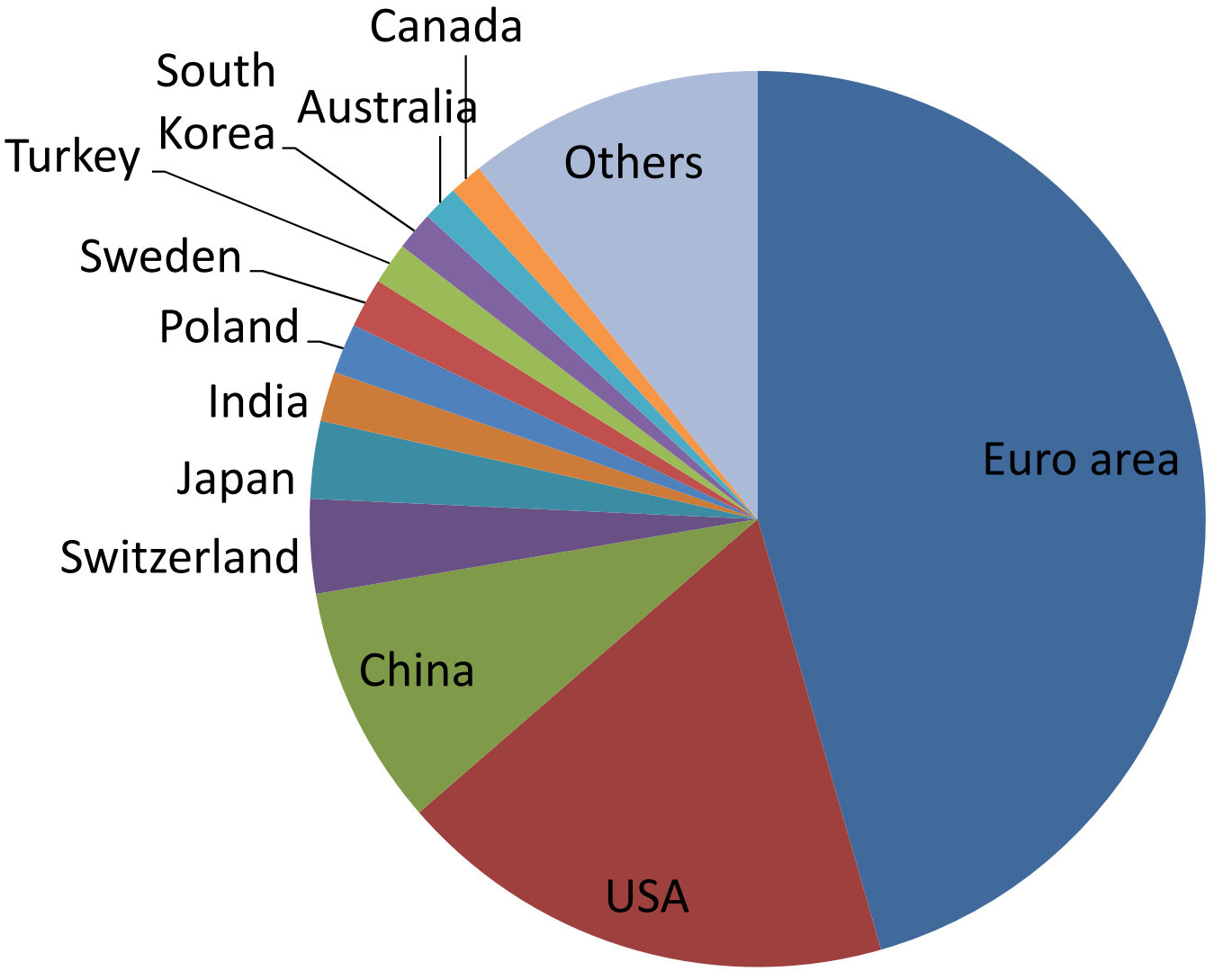
$$\Delta ER_t^i = \sum_j \left[w_t^{i,j} \Delta S_t^j \right]$$

- 42 bilateral exchange rates
- Defined European style: Increase=Appreciation
- $w^{i,j}$: share of group i imports from country j
- Weights computed using UN Comtrade import data, matching similar sectoral classificaiton

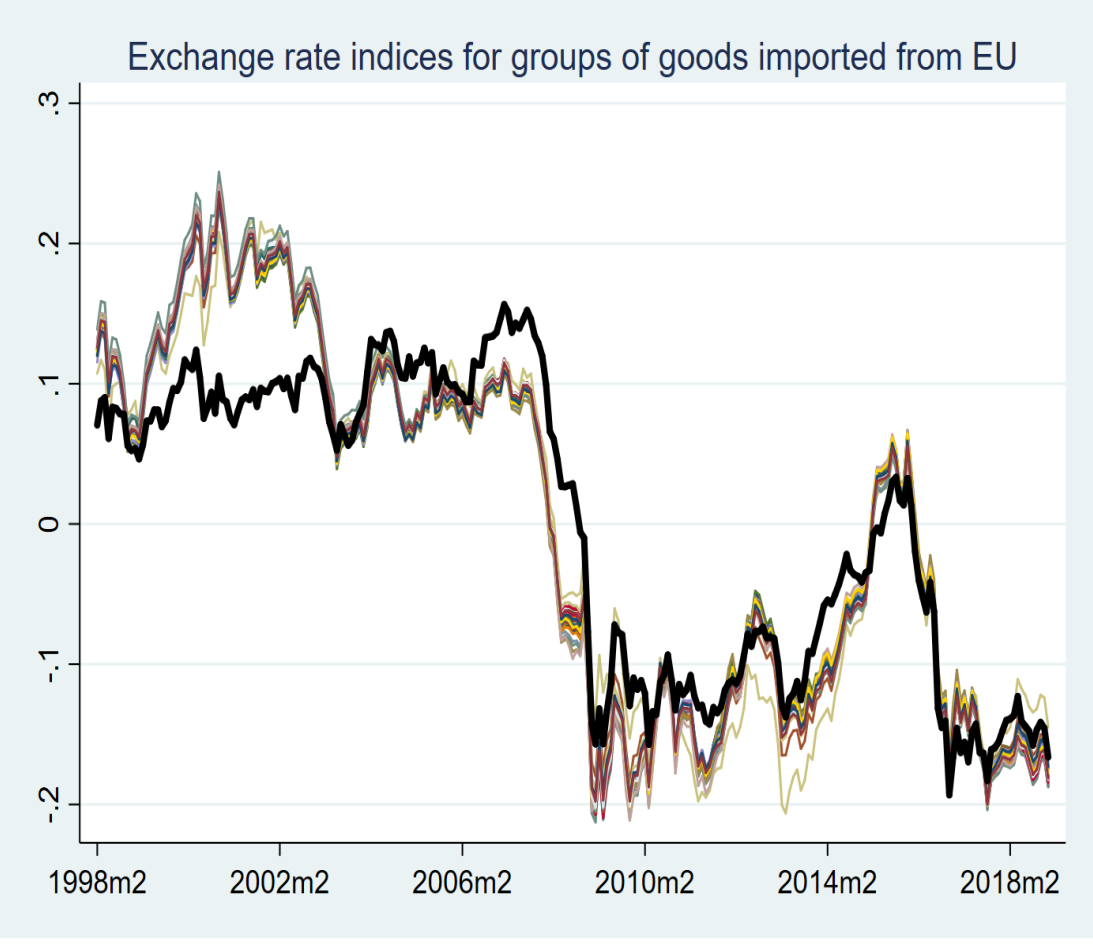
$\Rightarrow$ group-specific origin-weighted exchange rate indices

$\Rightarrow$ relevant ER for pricing imports, for each group of good

Intermezzo: UK ERI weights EU

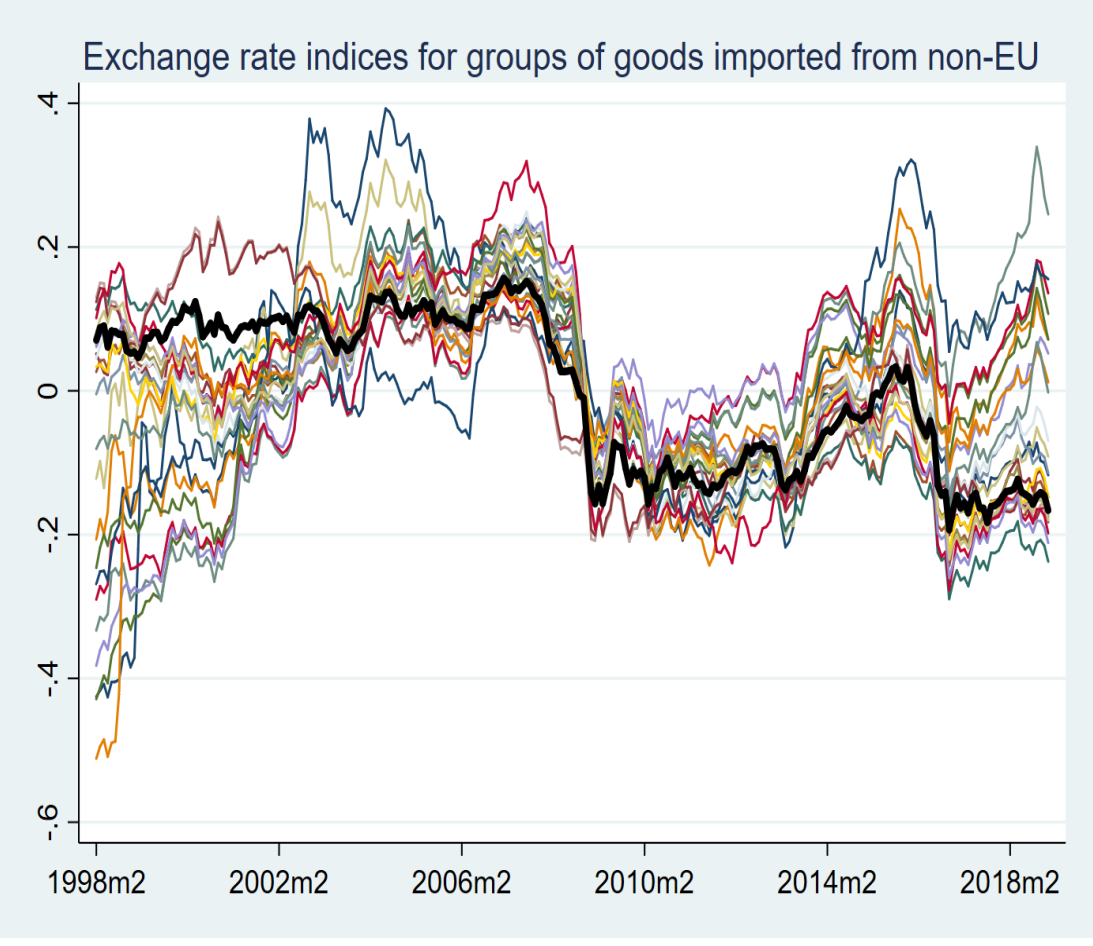


Exchange rate indices EU



Note: The black line is the BoE ERI

Exchange rate indices non-EU



Note: The black line is the BoE ERI

Other variables

- World export prices: $\Delta WP_t^i = \sum_j w_t^{i,j} \Delta P_t^j$
  - control for foreign costs of production (according to country of origin)
- Oil prices and non-energy commodity prices
  - control for specific costs of production
- PPI output prices, for groups
  - control for domestic competitive pressures and global changes in group-specific costs
- Index of production, for industries
  - control for domestic demand conditions

Error correction model

Most groups: co-integrated exchange rate, import price and foreign export price series $\Rightarrow$ ECM

SR dynamics, LR equilibrium between exchange rates and prices

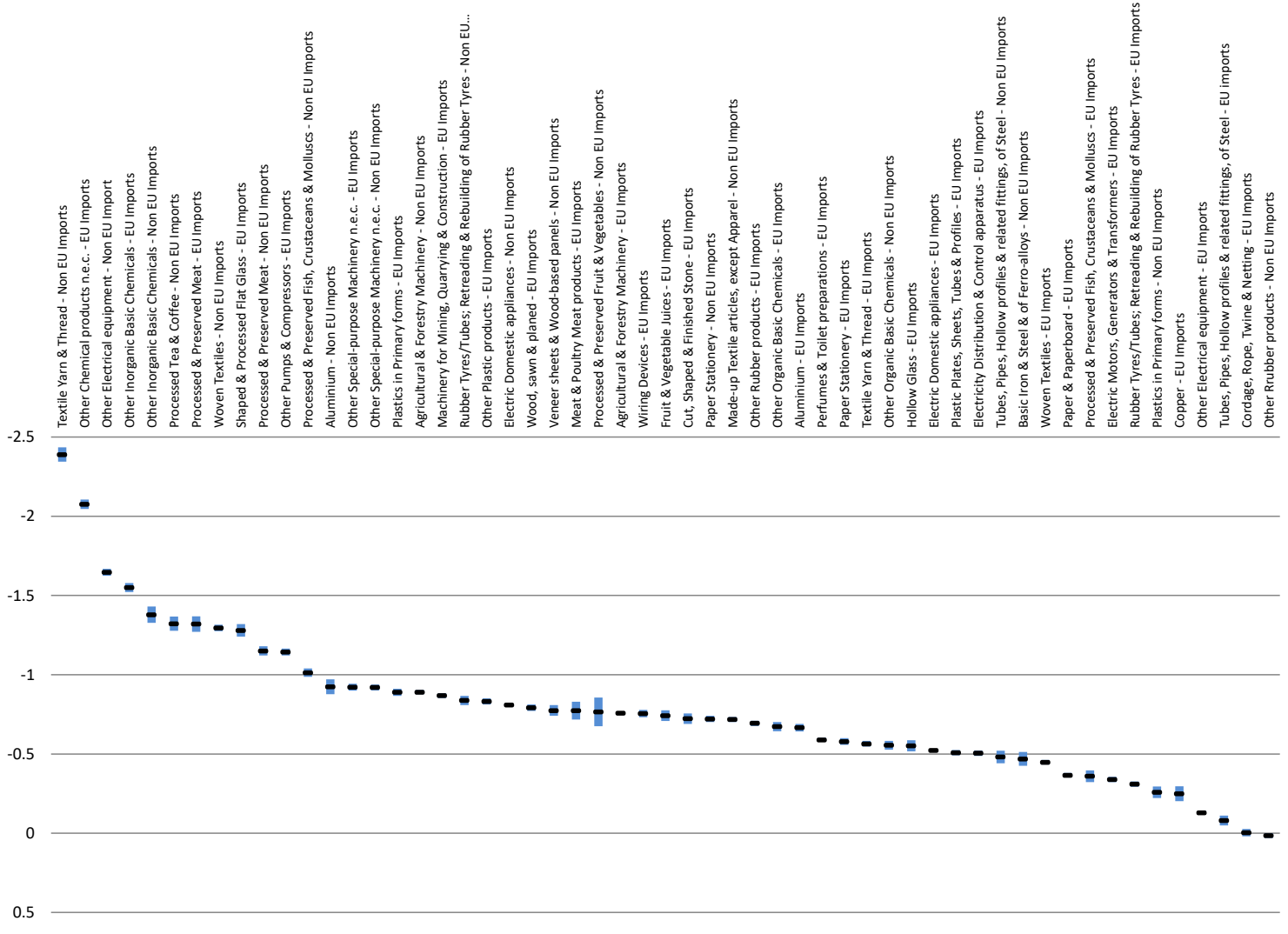
$$\begin{aligned}\Delta P^M_{i,t} =& \beta^0_i + \beta^1_i [P^M_{i,t-1} - (\alpha^1 S_{i,t-1} + \alpha^2 P^F_{i,t-1})] \\ &+ \sum_{p=0}^{Le1_i} \beta^2_{p,i} \Delta S_{i,t-p} + \sum_{p=0}^{Le2_i} \beta^3_{p,i} \Delta P^F_{i,t-p} + \sum_{p=1}^{Ld_i} \beta^4_{p,i} \Delta P^M_{i,t-p} \\ &+ \sum_{n=1}^{Nex} \sum_{p=0}^{Lex(n)_i} \beta^{4+n}_{p,i} \Delta X^n_{i,t-p} + \epsilon_{i,t}\end{aligned}$$

X^1_i: Oil prices
X^2_i: Non-energy prices
X^3_i: Domestic producer prices in sector i
X^4_i: Industrial production in industry I

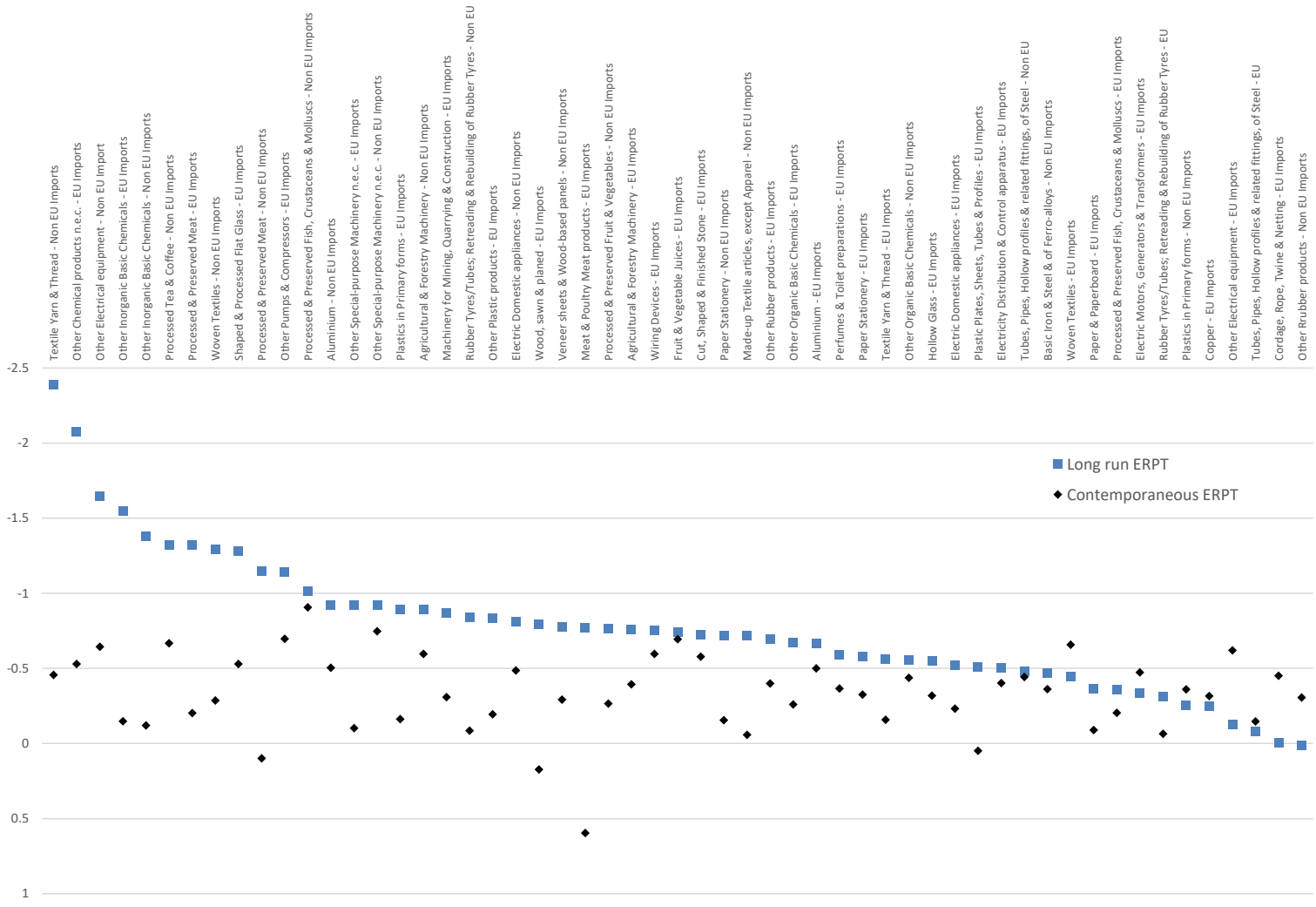
Lag length determined by Akaike criterion, differs across groups

Results

Long-run pass-through

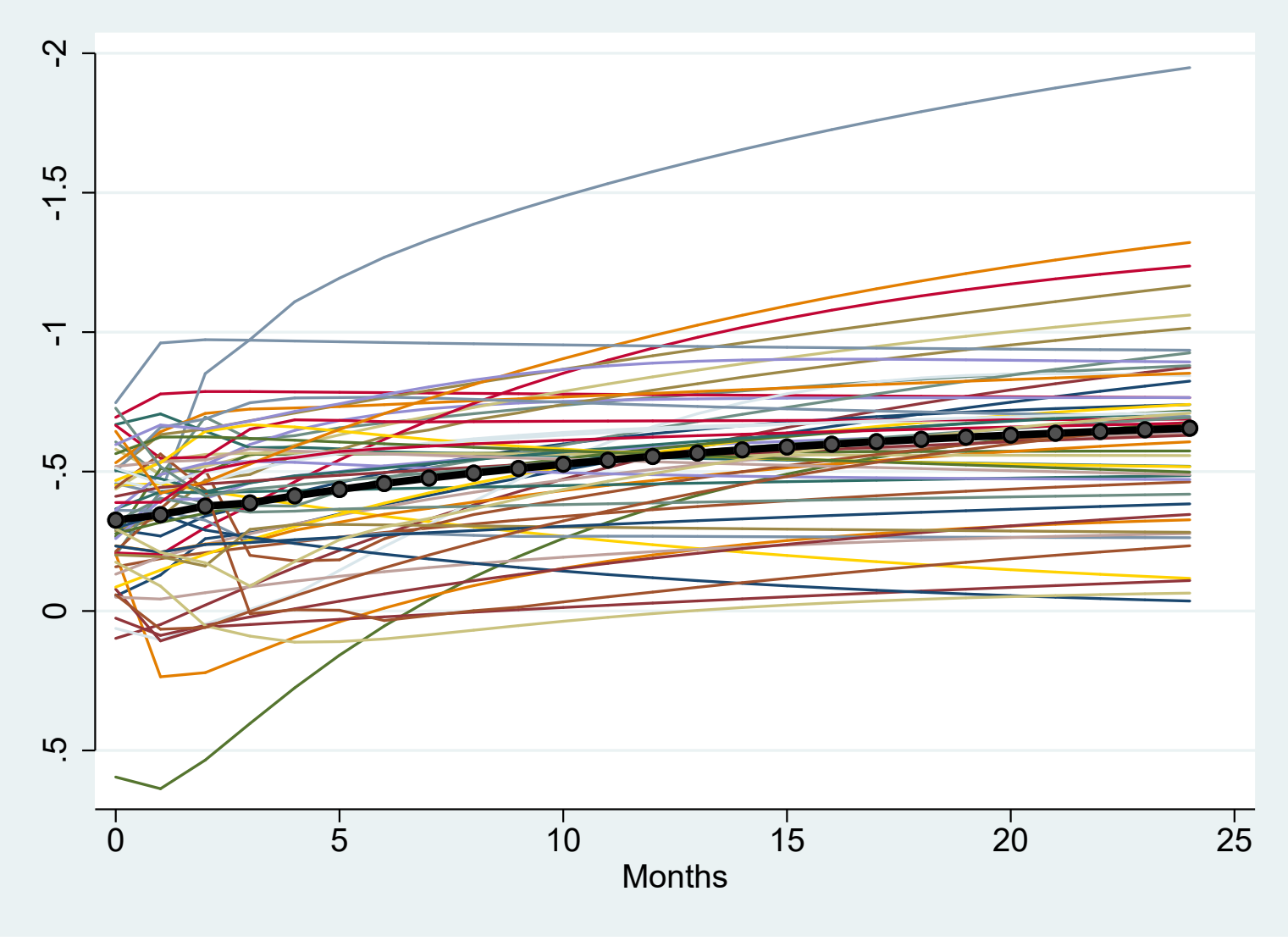


Contemporaneous vs Long-run passthrough



Impulse responses of import prices

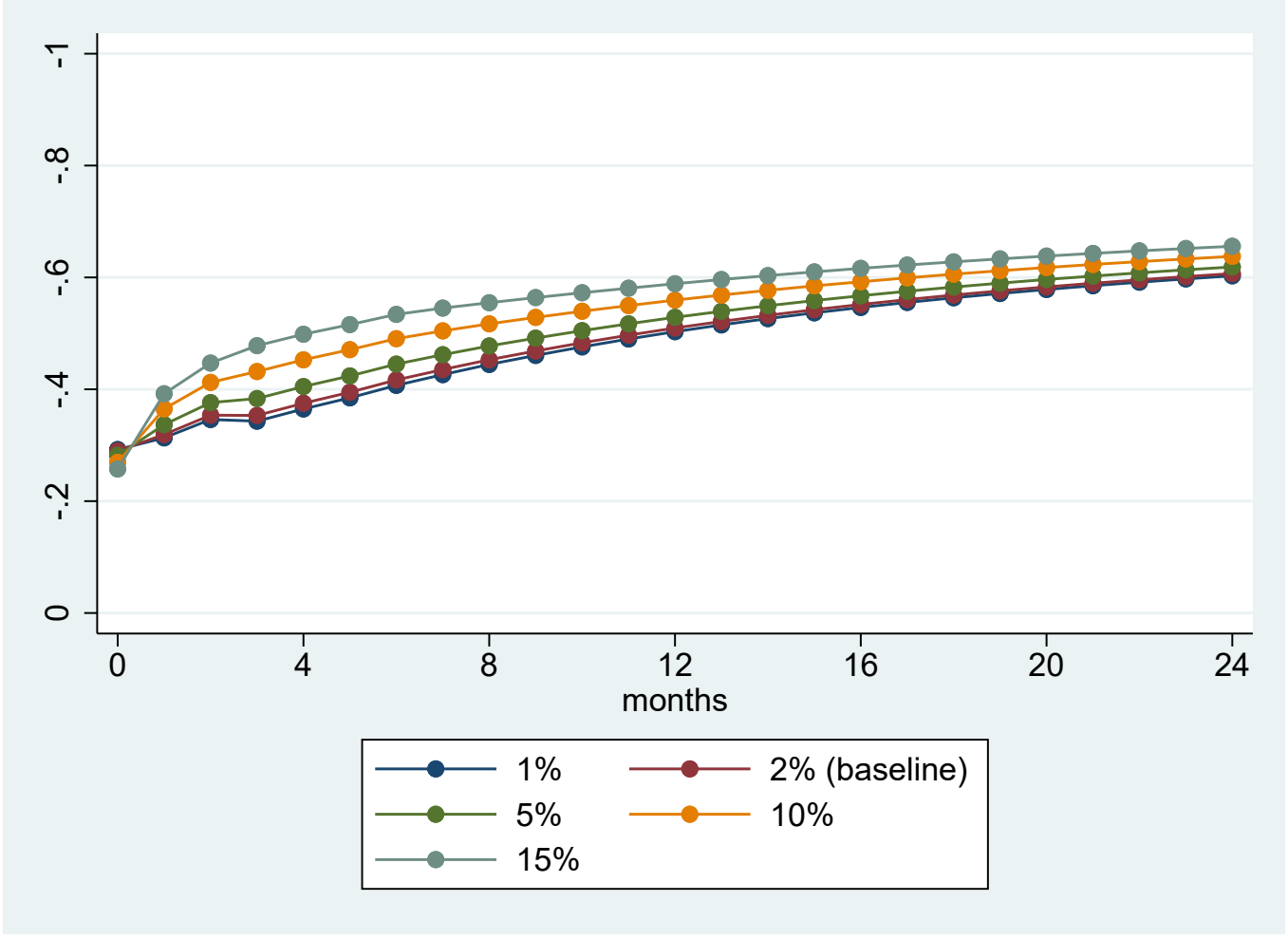
% change in import prices after 1% appreciation of group-specific ER



Non-linearities and asymmetries

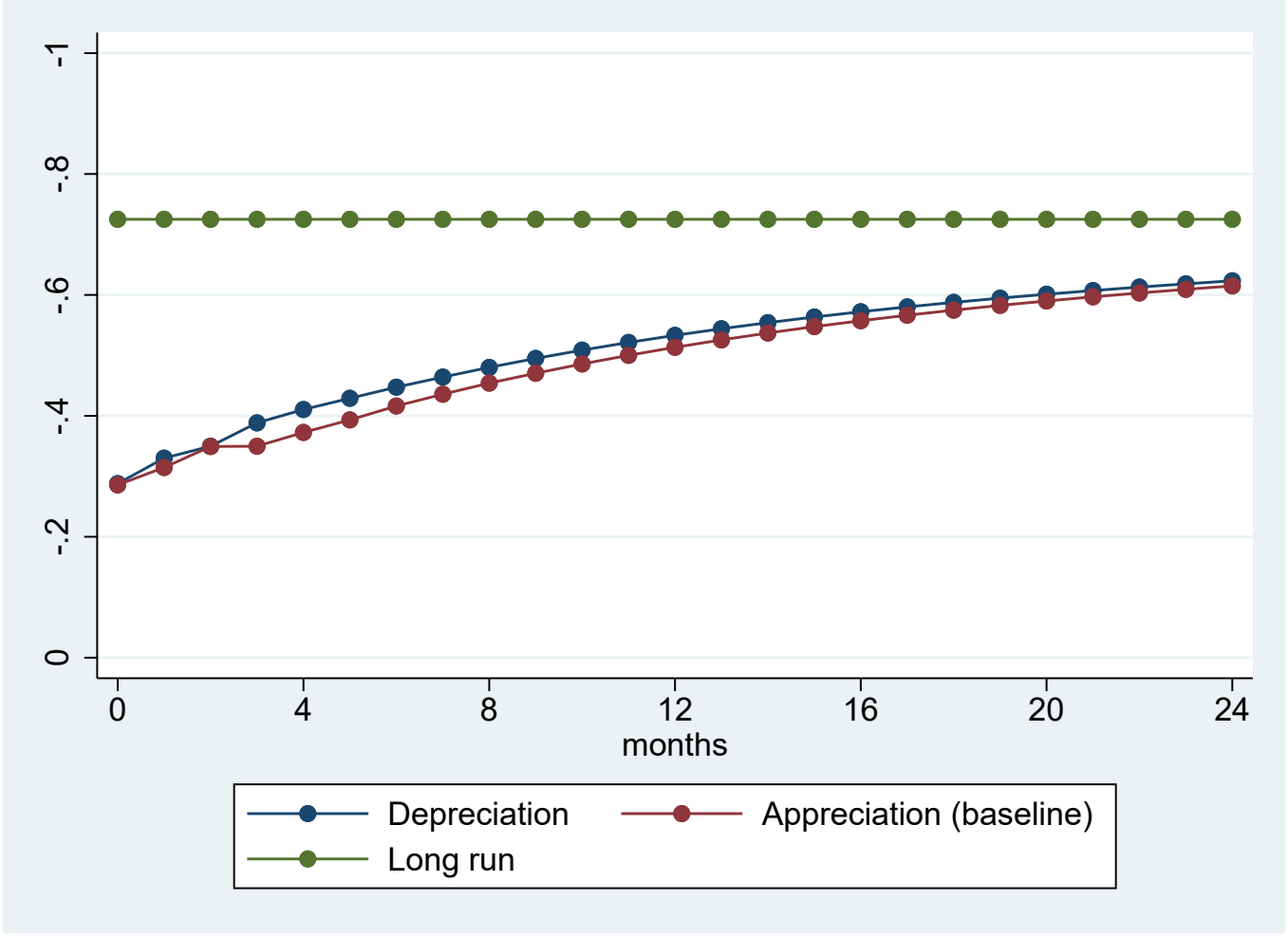
Non-linear ERPT

- SR: Include extra term $\Delta s * |\Delta s|$
- NL terms significant in 32/55 sectors



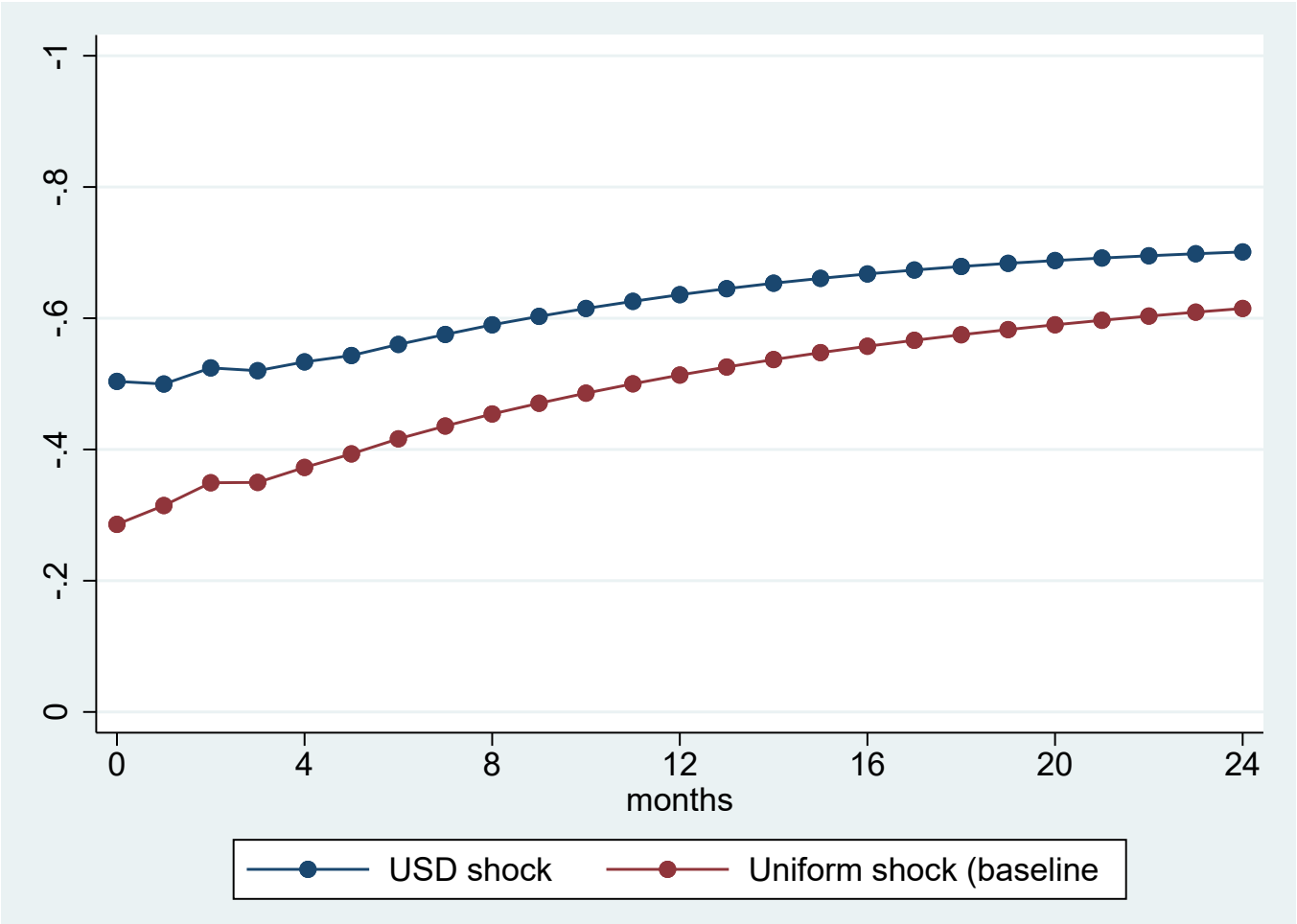
Asymmetric ERPT: Results

- SR : Include interaction terms $\Delta s * Depr$
- Term significant in 25/55 sectors with mixed signs: largely cancels out in aggregate



Dollar Currency Pricing: Results

- SR: Diff between exchange rate and USD move $\Delta S - \Delta S^{USD}$
- 1% change in ERI delivered entirely by USD movement (other currencies don't move)
- Instant PT is twice as much, about a fifth higher after 12 months



What have we learned?

- Heterogeneity across groups of goods
- Aggregate ERPT: SR: -0.28; LR: -0.74
- The larger the ER change, the higher is SR ERPT
- Sectoral variation in sign of asymmettry, cancels out when aggregating upwards
- Evidence of dollar currency pricing: faster passthrough of USD led changes

Product/Shipment Level Data

- The most disaggregated form of data, closest in spirit to individual goods
- Can be scraped from web or obtained from customs data if sufficiently granular or more creative sources!
- Need to be sure you have the "same" product each period
- Advantages:
  - Can yield large datasets
  - Good for testing hypothesis about firm behaviour
  - You can trace origin country (x-sectional variation in exchange rate good for identification)
- Disadvantages:
  - External validity: How do you know it applies to other goods/products
  - May be far removed from/difficult to map into aggregate indices used for macromodels + policy analysis

Unit Value Data

- Value divided by some measurement units: not a price! (e.g. value of a kilo of shoes)
- For UK, I used customs data split up into around 3000 goods types
- Very noisy, but you have a lots of datapoints and can pool over similar products (hierachical industry classification helps)
- Advantages:
  - Can aggregate back up into aggregate models
  - In theory covers “universe of imports”
  - You can trace origin country (x-sectional variation in exchange rate good for identification)
- Disadvantages:
  - Data are noisy
  - Doesn’t control for quality, varieties or other compositional effects.

General Tips

- Be creative: There is loads of interesting data out there in machine readable form!
- Don't be afraid of tradeoffs: No perfect dataset exists- think about goals of your analysis + potential empirical tools that can overcome weaknesses
- Remember data matching has big gains: Either combining two datasets (e.g. firm level with macro) to get additional variables/variation. Can use AI/ML/textual analysis to help match up data.
- Multi-dimensional data is really valuable: $o * i$ beats big n: country-product-firm variation is useful