

Discussion of "Putting the Parts Together: Trade, Vertical Linkages, and Business Cycle Comovement"

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Study trade-comovement relation at sector level; Relate sectoral trade-comovement to aggregate trade-comovement

- Trade-Comovement is a robust fact at aggregate level
 - Intra-industry trade important in driving trade-comovement relation
- But, there is a large gap between fact and what standard international RBC model would imply
- Sectoral analysis may shed light on what is driving the aggregate relation
 - Develop a correlation decomposition linking sectoral comovement to aggregate comovement
- Focus on:
 - Comparing effects of within sector linkages to effects of cross sector linkages
 - Assessing importance of vertical linkages

Main Results

- Trade-comovement relation exists at sector level
 - ① Effect of within-sector trade is about five times greater than the effect of cross-sector trade
 - ② Vertical linkages amplify sectoral trade-comovement relation
- Aggregating the sectoral trade-comovement effects
 - ① Aggregated sectoral effect is about $2/3$ of the aggregate trade-comovement
 - ② Cross-sector trade accounts for $4/5$ of the aggregated sectoral effect
 - ③ Vertical linkages account for 30% of the aggregated sectoral effect
- Conclusion: vertical linkages help, but will probably not resolve the gap between models and data

Look at important sectoral cases and confirm trade-comovement

- Motor vehicle industry in U.S. and in Canada
 - 25% of total U.S.-Canada trade, and almost half of it is vertical.

Vertical linkages measure

- IO_{ij} captures "potential" international vertical linkage
- Using imported inputs matrices can capture actual international vertical linkage
- Inverting $M(I - A^D)$ matrix will also give indirect+direct international vertical linkage

Run regressions on level, not logs, of trade intensity

- Absolute increase, not percentage increase, in trade intensity seems more plausible in mattering for comovement

What does a benchmark international RBC model imply?

Kose and Yi (2006) examines whether a three-country, international RBC model can quantitatively replicate the Frankel-Rose (1998) findings.

- The key feature of the calibration is that two countries represent particular OECD countries, like Finland and Portugal, while the third country is the aggregate of all other OECD countries.
- We do this for 4 "representative" country-pairs.
- Our framework does not have vertical linkages.

Results

- Model delivers qualitative result, but magnitudes are off by a factor of 8 to 150.
 - Bilateral pairs of countries do not trade much with each other. One of our pairs is Belgium and the U.S. Trade intensity quadruples, but it is only an increase in trade from 0.13% of GDP to 0.5% of GDP.
 - Under complete markets, "resource-shifting" channel works in the opposite direction as the standard trade-demand channel.
 - Financial autarky helps, but gap between data and model is still a factor of 3.5 to 30
- Low elasticity of substitution also helps, because it implies that as trade increases, the relative price of exports falls by more in response to a positive technology shock, which raises the productivity and output of the other country by more.

Omitted variable?

- We run an exercise in which we raise trade between all three countries simultaneously, but attribute all of the change in the bilateral correlation to the change in the bilateral trade. This can explain about 100% of the effect.
- Do the empirical counterpart of this exercise by creating a "third-party" trade variable: the sum across both countries of each country's trade with all countries other than its bilateral partner, and re-doing the Frankel-Rose regressions. The coefficient on (levels) bilateral trade falls from 11.3 to 7.5.
 - Unlike the theoretical result, the empirical version of omitted variable bias helps only a little.
 - Part of the reason is that correlation of bilateral trade with multilateral trade is only 0.3 instead of 1, the correlation implicitly assumed in the simultaneous transport cost exercise above.

Burstein, Kurz, and Tesar (2008)

- Develop a two-country RBC model with vertical linkages (production sharing). Model has:
 - a standard Backus, Kehoe, and Kydland (BKK) sector that combines intermediates produced by each country
 - a production sharing sector whose key feature is a low elasticity of substitution (0.05) between inputs provided by each country
- BKT demonstrate that the greater the importance of production sharing in overall trade, the higher the comovement – consistent with GL results.
- However, BKT is a reduced form approach to vertical linkages
 - Production sharing sector is essentially same as the "horizontal" sector, except for the elasticity of substitution
 - Value-added occurs only at one level

Vertical effect is subtle

- In explaining trade patterns over time and across space (border effect), including for vertical linkages basically acts like a force that *raises* elasticities of substitution – on the effects of trade barriers.
 - $(1 + \tau)^{(\sigma-1)\left(\frac{1+\theta_2}{1-\theta_2}\right)}$
- But, a key ingredient in this is a production setting in which tires are used only as inputs to cars, i.e., there is specificity in matching inputs to outputs, which is like a low elasticity of substitution.
 - So low elasticity in BKT is likely capturing an important feature of vertical linkages and co-movement

Horvath (1998), Dupor (1999), and V. Carvalho (2007)

Sectoral connectivity/interactions and aggregate fluctuations

- Horvath (1998, 1999) and Dupor (1999) develop models of sectoral interactions and assess their importance in driving business cycles.
 - Reach different conclusions
 - Tradeoff: Sectoral sparsity/specialization versus law of large numbers
- Carvalho (2008) asserts that to reconcile both sets of results and also show that as long as there exists a sufficiently small number of sectors that link to all other sectors, (sectoral "hubs"), then it is possible to generate considerable aggregate volatility.
- It would be useful to extend this framework to an open economy setting.

Combine sectoral empirical work with model that includes both sectors and vertical linkages