"Exports-at-Risk": the Effect of Multi-Market Contact in International Trade

Robert M. Feinberg
American University
April 2012

- Long IO literature on possible impacts on competition from multi-market contact (MMC) among diversified firms ("Mutual Forbearance")
- Recently, trade theorists have begun to apply similar approach to trade, where MMC among exporters can limit (or reverse) anticipated pro-competitive role of imports

- But no empirical work to date
- This is a first effort to test the empirical importance of a measure of this MMC, called "exports-at-risk," on traded-goods prices (import-unit values)
- Look at 10 highly-traded 4-digit HS products within the broad category of "fats and oils" – 20 leading import markets, 5 major exporters to each, and their MMCs

- Corwin Edwards (1955) first to raise the concern that firms meeting in multiple markets would have incentive to refrain from vigorous competition, coining term “mutual forbearance.”
- Some empirical work in late 70s, early 80s in support
- On theory front, Feinberg (1984) showed how cross-market “conjectures” can influence firm behavior
- My econometric (1985) and experimental (1988, with Roger Sherman) work supportive of MMC

- Bernheim and Whinston (1990), with repeated Bertrand models of MMC, find that MMC can increase tacit collusion (by restraining deviation incentives which often limit this)
- Empirical work usually supportive in domestic markets; Evans & Kessides (1994), Ciliberto & Williams (2010), Bilotkach (2011) for airlines, Parker & Roeller (1997) for mobile telephones, Jans & Rosenbaum (1997) for cement, Waldfogel & Wulf (2006) find little impact in radio advertising

- More recently, trade theorists have extended analysis of MMC to the international trade
- Bond & Syropoulos (2008), based on Brander & Krugman (1983) and Bernheim/Whinston (1990), focus on deviation incentives in a two-firm two-market model
- Choi and Gerlach (2012) bring international antitrust enforcement into their model, collusion incentives in one market are affected by competitive conditions in another --national antitrust authorities may free ride on enforcement in other countries.

- A little more on theoretical motivation
- Feinberg (1984) --generalized conjectural variations quantity-setting model, MMC leads firm to hold not only the familiar within-market conjectures (Cournot, Stackelberg, or other) but also anticipate response by rivals across markets
- If firms expect an output increase in market 1 to be met by a rival's increase in market 2 (and vice versa), equilibrium output in each market will be closer to the monopoly level
- And, as number of multimarket rivals (and markets)

- Bernheim and Whinston (1990) investigate repeated multi-market Bertrand game, optimal punishments for deviations from a collusive equilibrium
- MMC can allow pooling of incentive constraints across all markets where the firms meet, relaxing deviation incentives, enhancing the likelihood of collusive behavior being sustained
- MMC may not promote collusion if identical firms meet in identical markets, but it may where market shares, costs, or discount rates (which may proxy growth prospects) differ across firms and markets

- Bond and Syropoulos (2008) extend Bernheim/ Whinston-type model to international arena, examining implications of MMC of firms in a home and foreign market, and role of trade costs

- Benchmark (non-cooperative equilibrium) is "reciprocal dumping" model of Brander/Krugman (1983), but bringing in the possibility of tacit collusion in both markets

- They find cross-hauling (each firm selling in the other's market) of homogenous goods consistent with tacit collusion and low trade costs

- Intuition is that low trade costs make threatened expansion of output abroad more credible

- More importantly, they determine that mutual reductions in trade costs (from a level already sufficiently low) can enhance collusion by further

Data Issues

- Ideally would like a dataset of exporting firms from all major producing nations of a group of related products, with firm-specific exports and prices in all major destination markets; such data do not exist.
- Instead, I use bilateral country-to-country export data (for 2007) on ten major 4-digit categories within a single HS Section – Animal or Vegetable Fats and Oils -- which consists of a single (2-digit) HS chapter, 15
- Implicit assumption that the same firm (or small group of firms) in a country is responsible for all of that country's exports within this HS Section, and does not export in any other HS Section (otherwise there would be other MMCs that are missed)

- Ten 4-digit categories with 94 percent of global exports of fats & oils, each over $1 Billion
- For each, examine 20 largest import markets, top 5 exporting countries into each
- Following Ferrantino et al (2012), I then seek to explain import unit values (c.i.f.) of the resulting 1000 observations by importer income, exporter income, and a measure of multi-market contact (Exports at Risk), with product fixed effects

4-digit Product Categories Included in Analysis

HS Code	Title
1504	Fish Oil
1507	Soybean Oil
1509/1510	Olive Oil
1511	Palm Oil
1512	Sunflower Oil
1513	Coconut Oil
1514	Rapeseed (Canola) Oil
1515	Other Vegetable Oils (including Corn Oil)
1516	Animal & Vegetable Fats and Oils, hydrogenated or interesterified
1517	Margarine

- Intuitively, XAR captures the export sales that exporter A to import market B has in *other* markets where that exporter faces the *same other exporters*
- These export sales are thus “at risk” from retaliation by these exporters – as punishment for competitive actions A may make in B; as they are greater relative to exports A has in B, the less likely A is to aggressively price in market B
- To normalize, RXAR weights MMCs by the exports at stake in the markets in which MMCs occur

- For exporter j to a particular market, say Soybean Oil in Australia (i) $XAR_{ij} = \sum_{k \neq i}(M_{ki} - l)S_{kj}$

  where M_{ki} = number of countries exporting to both market k (Soybean Oil in the UK, or Olive Oil in Germany, e.g.) and market i, and S_{kj} = exporter j's sales in market k. As an example, Germany exported $5.2 million worth of fish oil (HS1504) to Belgium, but its "exports at risk" – its exports in other related product and export markets subject to retaliation from other leading fish oil exporters to Belgium – totaled $913 million, or 175 times its exports in that market
- German exporters might consider whether aggressive competition in selling fish oil to Belgium might induce

- In explaining bilateral import unit values, Ferrantino et al. (2012) employ importer and exporter per-capita income and population, as well as measures of distance (and other variables intended to capture trade costs)
- To focus on variables of interest, I exclude population and distance measures
- Ferrantino et al (2012), in more than 3500 regressions within 6-digit HS categories explaining pairwise import-unit values, find that distance, contiguity, and land-locked status of exporter and importers generally had little impact. Even at the very low threshold of one-tail 10% significance, well under half of these coefficients were found to have an effect. Population was even less likely to matter.

Some descriptive statistics

- XAR, normalized by the exporter's sales in the market in question (RXAR), varies from zero (where exporter either does not sell in another market or does not face any of the 4 rivals from this market elsewhere) to 135,282 -- Indonesia's XAR relative to its exports of palm oil to Japan
- Indonesia has 62 multimarket contacts in the context of its exports in that market, i.e., the other related markets where it faces rivals for the Japanese market for palm oil (maximum possible would be 796, if Indonesian exporters faced all 4 rivals from that market in each of the other 199 markets)
- However, the maximum number of multimarket contacts in the sample is 131, for the Netherlands in the exports of HS 1516 to the United Kingdom

- Further describing the sample, the nature of exporters range from El Salvador and Namibia, each one of the top 5 exporters in just one product and to one country, to Germany and the Netherlands, each top-5 exporter (to some leading import market) in all ten product categories and for at least one of these in 20 and 26 destination countries, respectively
- Germany sells to 73 of the maximum 200 product/ country markets considered, the Netherlands to 100 of these product/country markets

- Econometric specification is quite simple:
- (1) $ln P_{ij} = a + b\ ln RXAR_{ij} + g\ ln$Importer Income + d lnExporter Income + Product Fixed Effects + e ,

  where P_{ij} represents the import unit value (price) in product/country market i charged by exporter j, RXAR is as defined above, and Importer and Exporter Income are percapita Income.
- OLS with robust standard errors on the pooled sample of 990 observations (10 datapoints were dropped for Australia where no quantity measure was reported, so no import unit value could be calculated)

Table 3. Pooled Regression Results, Dependent Variable = *ln* Import Unit Value

--Robust Standard Errors and Product Fixed Effects (N=990)

(t-statistics in parentheses next to coefficient estimates)

	(1)	(2)
ln Importer Income	0.08 (2.51)*	0.09 (2.75)**
ln Exporter Income	0.15 (6.99)**	0.16 (7.32)**
ln RXAR	0.03 (3.66)**	
ln RXAR-mkt-avg		0.03 (2.96)**
R-squared	0.42	0.42

- Effects of importer and exporter income are as expected, both positive and statistically significant
- As found in Ferrantino et al (2012), considerably larger exporter income effects (consistent with "quality-ladder" theories of trade by heterogeneous firms) than importer income effects (consistent with pricing-to-market views of trade price determination)

- Of more interest here, impact of relative XAR is statistically significant, though small
- Doubling of trade-weighted MMCs would lead to a 3% increase in import prices (note that wide variance in MMC suggests doubling is quite feasible)
- To examine whether individual exporters respond to their own RXAR or to the market average of this variable, I use the latter variable in column (2), with similar results

- Some robustness exercises:

- Outliers? Cut top and bottom 5% unit values for each product
- --- results virtually identical

- Replace exporter and importer incomes with country fixed effects?
- -- slightly larger XAR coefficient estimate

- Are “cross-hauling” markets different? Drop markets where importing country is also a ”top-5” exporter to another market
- -- again results virtually unchanged (though sample size cut in half)
- Adding two more products, 1502 and 1518 (Fats Of Bovine Animals, Sheep Or Goats; and Animal Or Vegetable Fats And Oils and Their Fractions, Boiled, Oxidized, Dehydrated, Sulphurized)
- -- very similar patterns

- While these results are highly suggestive of MMC impacts in trade, likely that MMC effects may vary across products
- To address this issue, I estimate the equation separately for each of the ten 4-digit products via a “seemingly unrelated regression” (SUR) model

- Strong evidence of exporter-income effects on bilateral import prices, but little support here for importer-income effects
- In terms of MMC, RXAR has a significant positive impact (with estimated elasticities ranging from 0.04 to 0.07) for four of the ten products, and no statistically significant negative effects
- The market average RXAR measure also has a significant positive impact for four products (and some weak suggestion of positive effects at considerably lower levels of statistical significance for two other products) – again, no negative impacts of

- In Feinberg (1985) MMC effects were stronger in more-concentrated markets; examined here a simple correlation between the average (truncated) Herfindahl Index for the top 5 exporters to each market within the ten 4-digit product categories and the estimated RXAR (and RXAR-mkt-avg) elasticities
- These correlations (for n=10) are positive, +0.34 (and +0.19), suggestive of concentrated market structures allowing for MMC impacts to exist
- Where elasticity estimates not significantly different from zero are set to zero, these correlations are

Conclusions

- Despite data limitations, results suggest that multimarket contact among exporters may be a problem in international trade
- Top exporters in fats and oils seem to price higher in markets where they meet rivals who have the ability to retaliate against their "exports at risk"
- Further empirical study of this issue seems called for – but where to go next? 6-digit HS categories (e.g., there are 21 within "fats and oils" with 2007 trade value over $500 million)? Other HS Sections? Company data?

- Looking for ideas on where to go next with this

- Thanks