

Quality Differentiation and Trade Intermediation

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How are goods actually traded?

- A large fraction of global trade is handled by trade intermediaries (middlemen, trading firms, wholesalers, etc.).
 - US 1993: 21% non-service exports; 31% imports (Bernard et al., 2009)
 - Germany 1993: 28% of exports
 - Japan, 1990s: sogo shosha intermediated 40% exports, 70% imports
 - Hong Kong, 1988-1998: 53% of China's exports (Feenstra et al., 2003); equivalent to 52% of H.K.'s GDP
- The literature in international trade has largely abstracted from how sellers meet foreign buyers.

Recent Research on Trade Intermediation

- Theoretical
 - Rauch and Watson (2004)
 - Antras and Costinot (2010)
 - Dasgupta and Mondria (2011)
- Empirical
 - Felbermayr and Jung (2009) - USA
 - Akerman (2010) - Sweden
 - Ahn, Khandelwal and Wei (2010) - China
 - Bernard, Jensen, Redding, and Schott (2010) - USA
 - Bernard, Grazzi, and Tomasi (2010) - Italy
 - Bernard, Van Beveren, and Vandebussche (2010) - Belgium
- Focus: Cross-country variation; little has been said on the roles of trading companies.

Specific roles of intermediaries

- Spulber (1996, 1999, 2009): intermediaries play 4 main roles
 1. Assure Quality
 2. Match and broker
 3. Provide liquidity and immediacy
 4. Monitor contract enforcement
- In practice, trading firms may do even more than these (e.g. management consulting, etc.)

Do trade intermediaries really provide better quality verification?

- *“The idea is that maybe foreigners don't know which factory to go to, so you perform an introductory role, maybe a quality-control role and there it stops,”* - managing director of Li & Fung's
- *“I was fed up with middlemen and poorly run factories distorting pricing, failing to control quality and allowing intellectual property (IP) to be knocked off, so I decided to do something about it,”* - the founder of Passage Maker.

Quality Verification View

- Biglaiser (1993): Middlemen can solve the “lemon ” problem by investing in inspection technology.
- Biglaiser and Friedman (1994): intermediaries can serve as guarantors of product quality due to reputation concerns.
- Li (1998): an intermediary serves as a specialized quality-testing firm
- Feenstra and Hanson (2004): a larger share of exports was reexported through Hong Kong in sectors with a higher degree of product differentiation.
- Feenstra, Hanson and Lin (2008): gains in foreign buyers’ welfare due to information provided by the Hong Kong trade intermediaries are higher for differentiated products.

Hold-up View

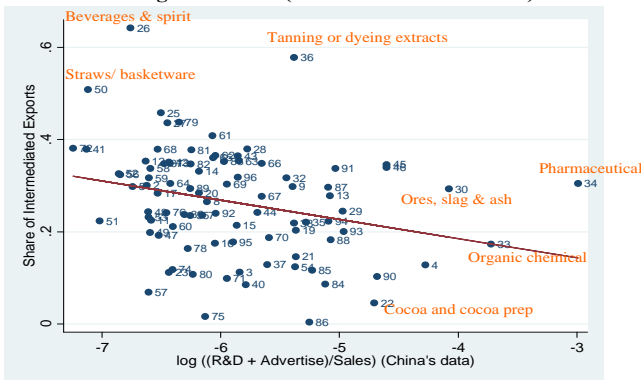
- Trabold (2002): evidence from France, products of higher commodity contents are more likely to be intermediated;
- Peng, Zhou, and York (2006): R&D-intensive exports are less likely to be intermediated;
- Yoshino and Lifson (1986): anecdotal evidence that intermediation is more prevalent in homogeneous-good sectors in Japan.
- Peng and Ilinitch (1998): middlemen undertake costly investments in specialized physical and human capital to intermediate exports, especially for highly differentiated products.
- Peng and York (2001): misaligned incentives between the producer and the export intermediary;

What we do?

- Examine (theoretically and empirically) whether export intermediaries provide better quality verification, and thus prevail in exports of quality (vertically) differentiated products
- Using China's transaction-level trade data: the share of intermediated exports is
 1. decreasing in **vertical differentiation** of the product (against the quality-verification view)
 2. increasing in **horizontal differentiation** (consistent with existing literature).
- To rationalize these facts, we build a model that features hold-up.

Vertical differentiation and the share of intermediated exports

Figure 1: Share of Intermediated Exports and R&D and Advertising Cost Share (Chinese-based Measures)



$$\text{Share} = .018 - 0.0417 * (\text{R\&D_Adv/Sales})$$

(0.19) (-2.57); N=90

Preferences

- Each country j has a mass of L_j consumers with identical preferences:

$$U = Q_0 + \frac{1}{\mu} \sum_{s=1}^S Q_s^{\frac{\mu}{\alpha_s}}$$

where Q_s is the consumption index of product s

$$Q_s = \int_{\omega \in \Omega_s} (a_s(\omega) q(\omega))^{\alpha_s} d\omega$$

- 1 homogeneous good (0), S products (s), a brand (ω) from Ω_s

Quality as a Demand Shifter

$$a_s(\omega) = (\lambda_s(\rho_\omega) \rho_\omega)^{\beta_s}$$

- ρ_ω Melitz's productivity term (i.e., Pareto distributed);
objective quality.
- $\lambda_\omega(\rho_\omega)$ is *the subjective quality*, which depends on producers' or intermediaries' investments in quality verification (broadly defined, including marketing, quality assurance, etc.); depends on the trading mode.
- $a_s(\omega)$ is product-specific (subscript s).
- β_s is increasing in s

Technology and Market Structure

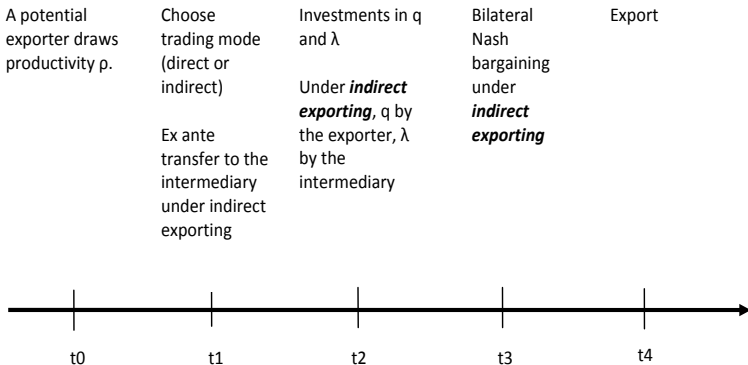
- Market structure and technology are standard as in the heterogeneous-firm literature (Melitz, 2003; Chaney, 2008)
- Firms draw productivity (objective quality in our model) ρ from a Pareto distribution
- Product markets are monopolistically competitive. Each firm produces a variety, facing its own demand $q = D_s \rho^{-\frac{1}{1-\alpha_s}}$, where D_s is a product-level demand factor.

Direct Exporting

- Producers can choose one of the two modes to export
 1. direct exporting – higher fixed costs
 2. indirect exporting through intermediaries – lower fixed costs (e.g. economies of scale, existing foreign buyers)
- If a producer chooses direct exporting, she would choose
 1. quantity exported and
 2. the level of quality verification.

Indirect Exporting

- Under indirect exporting and **incomplete contracts**, agents engage in symmetric Nash bargaining ex post (Antras, 2005).
- Result: standard hold-up – both the producer and the intermediary under-invest under indirect exporting.



Non-cooperative Investments

- The problem for the intermediary:

$$\max_{\lambda} \left\{ \frac{1}{2} (x(q, \lambda) - \delta w \lambda) - w \lambda \right\}$$

- The problem for the producer:

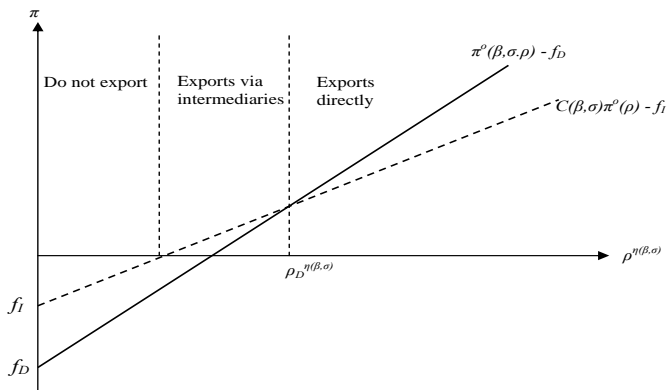
$$\max_q \left\{ \frac{1}{2} (x(q, \lambda) - \delta w \lambda) - w \tau \rho^{\phi-1} q \right\}$$

Main Insights

- Under-investment in quality verification is more severe for more quality-differentiated products.
- \implies The share of intermediated exports is *decreasing* in **vertical differentiation**
- More horizontal differentiated products (low elasticity of substitution σ) \implies less competitive product markets \implies lower quality (less productive) firms can export, but use intermediaries
- \implies The share of intermediated exports is *increasing* in **horizontal differentiation**
- but this is *not* due to quality verification (i.e., the standard argument)

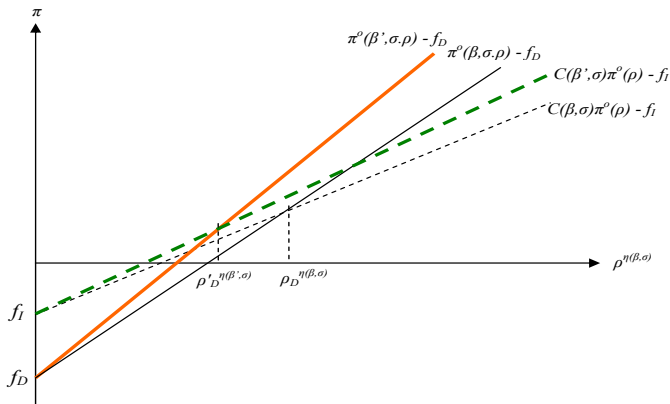
Productivity cutoffs for different trade modes

Figure 1: Exporter profits under different trading mode in a product market



More vertically differentiated products (higher β)

Figure 2: Exporter profits under different trading mode in products with different quality differentiation



Testable Hypotheses

Claim 1 – Vertical Differentiation

- The share of intermediated exports is *decreasing* in the degree of quality differentiation (β) across products.

Claim 2 – Horizontal Differentiation

- The share of intermediated exports is *increasing* in the degree of horizontal differentiation ($1/\sigma$) across products.

Dependent Variable: Share of Intermediated Trade

- Transaction-level trade data set; covers the universe of all Chinese exporters and importers in 2005. (similar to Manova and Zhang, 2009 and Ahn, Khandelwal and Wei, 2010)
- WTO agreements: the Chinese government committed to fully liberalize trading rights by the end of 2004. We use data from 2005.
- Identify intermediary firms by the presence of the words related to the meanings of "importer/exporter" or "trading" in Chinese firm names. ("mao yi", "wai mao", "wai jing", "jin chu kou", "jing mao", "gong mao", and "ke mao")
- Compute the share of intermediated exports at the HS6-country level

Patterns of Trade Intermediation in China

Intermediaries in China's Exports (2002-2006)

Year	Export Value (billion USD)	Share (%)	Nb. of intermediaries	Share (%)
2002	90.1	27.7	9646	12.3
2003	109.8	25	12670	13.2
2004	130.5	22	16767	13.9
2005	151.4	19.9	19866	13.4
2006	204	21.1	37024	21.5

Patterns of Trade Intermediation in China

	Mean	Median	St. Dev.	Min	Max
Direct Exporters					
Number of destination countries	6.9	3	10.2	1	152
Number of products	10.6	3	37	1	2455
Number of products per destination	3.66	1	13.12	1	1732
Export sales per destination (USD)	197609	21445.2	2543245	1	6.55E+08
Export sales per product (HS6) (USD)	102115.8	5837.667	1852768	1	7.85E+08
Intermediaries					
Number of destination countries	14.5	6	19.7	1	169
Number of products	43	11	90.5	1	1454
Number of products per destination	7.09	2	18.53	1	1316
Export sales per destination (USD)	88187.81	17452.8	1337737	1	4.28E+08
Export sales per product (HS6) (USD)	52525.21	6566	720910.4	1	3.05E+08

Measure of Vertical Differentiation

Measure of Vertical Differentiation

1. R&D Intensity (e.g. Sutton 1991, Sutton 1998, Verhoogen, 2008)
 - R&D expenditure/total sales (China); Source: NBS Chinese industrial firm data set, 2005
 - R&D expenditure/total sales (USA); Source: ORBIS US Sample, 2005
2. (Advertising + R&D expenditure)/Sales
 - Source: NBS Chinese industrial firm data set, 2005
3. Quality Ladder
 - Khandelwal (2009); US import data at HS10

Measure of Horizontal Differentiation

Measure of Horizontal Differentiation at HS6 level

- (Inverse) Elasticity of Substitution.
 - Broda and Weinstein (2009); US import data at HS10
- Rauch (1999)'s differentiated-good classification

Regression Specification

$$S_{sc} = \beta_1 V_s + \beta_2 H_s + Z_s \gamma + F_{ic} + \epsilon_{sc}$$

- s = HS 6-digit product, i = industry (HS2), c = destination country
- S_{sc} is the share of exports handled by intermediaries for product market s .
- V_s – vertical differentiation
- H_s – horizontal differentiation
- F_{ic} – country-industry fixed effects
- Z_s Export share of state-owned enterprises, foreign firms, export-processing firms; Herfindahl indices of direct exporters, intermediaries; number of direct exporters to intermediaries; factor intensity

Vertical Differentiation and Trade Intermediation (by HS6)

Share of Intermediated Exports and Vertical Differentiation (by HS 6-digit)

Vertical Diff (V)	R&D Intensity	Adv + R&D Intensity	R&D Intensity (USA)	Quality Ladder
V	-0.086*** (-3.49)	-0.055** (-2.28)	-0.070*** (-3.17)	-0.001 (-0.06)
State Share	-0.162*** (-5.81)	-0.165*** (-5.94)	-0.160*** (-6.07)	-0.166*** (-5.53)
Foreign Share	-0.453*** (-16.54)	-0.456*** (-16.60)	-0.470*** (-18.36)	-0.495*** (-16.73)
HS 2-digit FE	Yes	Yes	Yes	Yes
N	3164	3164	3608	2732
R-squared	.262	.261	.26	.262

t stat in parentheses; beta coefficients reported; * $p < 0.10$; ** $p < 0.05$; *** $p < 0.01$

Vertical Differentiation and Trade Intermediation (by HS6-country)

Dependent Variable = Share of Intermediated Exports (by HS6-country)

Vertical Diff. (V)	R&D Intensity		Adv + R&D Intensity		R&D Intensity (USA)		Quality Ladder	
V	-0.025**	-0.024**	-0.027**	-0.025**	-0.043***	-0.044***	-0.008	-0.007
	(-2.24)	(-2.10)	(-2.41)	(-2.19)	(-4.92)	(-4.92)	(-1.17)	(-1.01)
1/σ	0.031***	0.031***	0.031***	0.031***	0.031***	0.030***	0.029***	0.029***
	(4.61)	(4.54)	(4.62)	(4.55)	(4.93)	(4.83)	(4.49)	(4.48)
HS 2-digit FE	Yes	No	Yes	No	Yes	No	Yes	No
Country FE	Yes	No	Yes	No	Yes	No	Yes	No
Country x HS2 FE	No	Yes	No	Yes	No	Yes	No	Yes
N	180584	180584	180584	180584	204399	204399	194304	194304
R-squared	.0595	.159	.0595	.159	.0583	.149	.0564	.142

t stat in parentheses; beta coeff reported; s.e. clustered at HS 6-digit; * p<0.10; ** p<0.05; *** p<0.01

Robustness checks

1. Herfindahl index of direct exporters
2. Herfindahl index of intermediaries
3. Ratio of producers to traders
4. With or without HS2 fixed effects
5. Exclude Hong Kong
6. Various definitions of shares of intermediated exports (e.g. exclude SOEs)
7. Use data from 2006

Including Other Product Characteristics

Dependent Variable = Share of Intermediated Exports (by HS6-country)								
Vertical Diff. (V)	R&D Intensity		Adv + R&D Intensity		R&D Intensity (USA)		Quality Ladder	
V	-0.037*** (-3.27)	-0.024* (-1.82)	-0.033*** (-3.00)	-0.023* (-1.80)	-0.037*** (-4.37)	-0.038*** (-3.73)	-0.008 (-1.25)	-0.007 (-0.88)
1/ σ	0.023*** (3.55)	0.024*** (3.20)	0.023*** (3.61)	0.024*** (3.23)	0.022*** (3.72)	0.024*** (3.55)	0.020*** (3.35)	0.022*** (3.14)
Capital Intensity	-0.003 (-0.31)	-0.002 (-0.14)	-0.004 (-0.35)	-0.002 (-0.14)	-0.007 (-0.79)	-0.007 (-0.67)	-0.006 (-0.58)	-0.009 (-0.81)
Skill Intensity	0.022* (1.82)	0.026* (1.94)	0.021* (1.75)	0.025* (1.90)	0.017 (1.35)	0.020 (1.48)	0.011 (0.92)	0.018 (1.34)
Contract Dependence		-0.033** (-2.32)		-0.035** (-2.39)		-0.036*** (-2.96)		-0.021* (-1.66)
Controls	Herf. Intermed.; Herf. Direct Exporters; Nb. Exp./Nb. Intermed.; Foreign Exp Shr; SOE Exp Shr; Processing Exp Shr							
Country x HS2 FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	176311	136866	176311	136866	203985	159100	192993	147191
R-squared	.168	.185	.168	.185	.162	.177	.154	.168

t stat in parentheses; beta coeff reported; s.e. clustered at HS 6-digit; * p<0.10; ** p<0.05; *** p<0.01

Distance Effects

Dependent Variable = Share of Intermediated Exports (by HS6-country)

Country Measures	ln(GDP)	ln(Dist)	ln(Imp. Cost)	Legal Inst	Chn. Popn Share	ln(Gen. Dist)
Dest. Country Var.	-0.087*** (-28.15)	0.059*** (25.20)	0.004* (1.84)	-0.041*** (-10.13)	-0.031*** (-14.62)	0.061*** (25.56)
Controls			ln(GDP	per capita)		
HS 6-digit FE	Yes	Yes	Yes	Yes	Yes	Yes
N	228254	228254	221792	228254	179653	196411
R-squared	.137	.136	.134	.134	.147	.140

t stat in parentheses; beta coeff reported; s.e. clustered at HS 6-digit; * p<0.10; ** p<0.05; *** p<0.01

Weaker Distance Effects for Vertically Differentiated Products

Claim 3

The positive relationship between fixed direct export cost is weaker in markets that are characterized by higher v. diff. or lower h. diff.

Mitigation Effects

Dependent Variable = Share of Intermediated Exports (by HS6-country)

Product Measure (V or H)	R&D	Adv + R&D Intensity	R&D (USA)	Quality Ladder
In(dist) X V	-0.052 (-1.13)	-0.057 (-1.25)	-0.043 (-1.13)	-0.096** (-2.49)
In(dist) X H	0.038 (0.91)	0.035 (0.85)	0.068* (1.79)	0.048 (1.23)
Fixed Effects	HS6 and Country			
N	162153	162153	183707	174657
R-squared	.151	.151	.148	.142

t stat in parentheses; beta coeff reported; s.e. clustered at HS 6-digit; * $p < 0.10$; ** $p < 0.05$; *** $p < 0.01$

Summary of Results

1. **Vertical Differentiation** The share of intermediated exports is decreasing in vertical differentiation across products
 2. **Horizontal Differentiation** The share of intermediated exports is increasing in horizontal differentiation across products
 3. **Distance Effects** The share of intermediated exports is higher in markets that are harder to penetrate; the distance effect is weaker for more vertically-differentiated products
- These results are consistent with our model that considers hold-up in the relationship between producers and intermediaries.