

Exports and Exchange Rate Risk: Analysing Emerging Market Sectoral Exports

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Introduction

- End of Bretton Woods system led to era of more flexible exchange rate regimes
- Trade contracts often denominated in currency other than domestic economy
- Volatility in/ uncertainty of relative values of international currencies impact on volume of international trade – exported exposed to currency risk
- Developed markets greater levels of financial development, more access to exchange rate risk hedging instruments; not always true for emerging markets
- Objective of paper thus to examine the response of emerging market exports to exchange rate risk on sectoral level
- Empirical evidence limited for emerging/ developed markets and most studies focus on exports in general, not per sector (Cote, 1994; McKenzie, 1999; Bahmani-Oskooee and Hegerty, 2007)



Literature review: Theory

- Exchange rate risk negative impact on trade (Ethier 1973). Firms risk-averse, volatility increases risk, reduce demand for traded goods
- To reduce exchange rate risk, firms reduce production and exports (Clark 1973)
- Exports depend on attitude to risk, firm adverse or tolerant to export revenue uncertainty (De Grauwe 1988, Dellas and Zilbarfarb 1993) and even decision to engage in exports (Sercu and Vanhulle 1992)
- Full functioning financial markets: negartive effect on trade balanced out by positive impact (Viaene and de Vries 1992)
- No consencus

Literature review: Empirical studies

- In the aggregate trade study of Arize, Osang and Slottje (2008) the view that exchange rate risk negatively impacts on the levels of international trade originating in developing market economies; and aggregate exports of 13 Least Developed Economies (2000)
- Positive relationship are mainly found for developed markets: OECD countries (Bailey *et al.* 1987); trade between the United States and Germany (McKenzie and Brooks 1997)
- Australian and New Zealand exports positive long-term relationship and a negative short-term relationship with exchange rate volatility (Arize & Malindretos 1998)
- In panel data analysis Sauer and Bohara (2001) revealed that developing regions are generally impacted more severely by exchange rate risk in terms of their levels of exports



Empirical studies: Sectors

- Various export sectors should exhibit varying responses to exchange rate risk given their divergent characteristics (Broda and Romalis 2011)
- Bini-Smaghi (1991) notes the contribution of sectoral studies to control for the differences across different industries (homogeneous vs more differentiated export goods)
- Broda and Romalis (2011) conjecture that exchange rate risk should exert a more negative impact on product lines populated with more differentiated goods
- Chou (2000): exchange rate risk has a more negative impact on China's manufactured exports and mineral fuel exports compared to other sectors; total Chinese exports negative response; no significant responses are for tobacco, foodstuff and beverage exports
- Maskus (1986) and Klein (1990) for United States exports; and Byrne *et al.* (2008) and Verheyen (2012) for developed markets: differentiated goods are more negatively impacted by exchange rate risk than is homogenous goods exports
- Chipili (2013): Zambia's non-traditional export sectors (mainly differentiated goods) – are more negatively affected by the presence of exchange rate risk than its traditional homogeneous exports sectors
- Some studies in the sectoral literature also report no significant trends and patterns (Maskus, 1986; Klein, 1990; McKenzie, 1998; Doyle, 2001; De Vita & Abbott, 2004; Bahmani-Oskooee & 2008; Bahmani-Oskooee, Harvey & Hegerty, 2013)

Data and method

- Most studies consider single-country or bilateral trade dealing with sectoral export flows
- This paper fills this void by employing panel data analysis to the exports of various export product lines of selected emerging market economies to the world
- Includes emerging market economies selected on data availability and relatively equal presentation of different geographic regions: Brazil, Bulgaria, Hungary, Indonesia, Malaysia, Mexico, Poland, Romania, South Africa, and Turkey
- Top ten largest exported goods at HS2 level (product lines with largest average international export flows of the 10 countries over the last ten years)
- Model at a quarterly frequency level, 2007Q1 up until 2015Q4 :

NWU

- $X_{ijt} = \alpha_1 C + \alpha_2 Y_t + \alpha_3 E_{jt} + \alpha_4 V_{jt,GARCH} + \varepsilon_t$ (1)
- $X_{ijt} = \gamma_1 C + \gamma_2 Y_t + \gamma_3 E_{jt} + \gamma_4 V_{jt,MASD} + \varepsilon_t$ (2)
- Three estimators: fixed effects, random effects and PDOLS

Selected HS2 product lines analysed

Code	HS2 Product Line Name	Classification
'08	Edible fruit, nuts, peel of citrus fruit, melons	Primary/ homogenous
'15	Animal, vegetable fats and oils, cleavage products, etc.	Primary/ homogenous
'26	Ores, slag and ash	Primary/ homogenous
'29	Organic chemicals	Differentiated?
'39	Plastics and articles thereof	Differentiated?
'71	Pearls, precious stones, metals, coins, etc.	Primary/ homogenous
'72	Iron and steel	Primary/ homogenous
'84	Machinery, nuclear reactors, boilers, etc.	Final/ differentiated
'85	Electrical, electronic equipment	Final/ differentiated
'87	Vehicles other than railway, tramway	Final/ differentiated





Data considerations

- 396 observations (quarterly 2007Q1-2015Q4)
- Variables either I(0) or I(1) in panel unit root tests
- Empirical literature does include stationary V in long-run equations
- Cointegration tests with intercept no trend confirm cointegration in 6 sectors; intercept and trend in all sectors
- Fixed effects estimation best for most sectors



Random/ Fixed effects estimations

Product Line	Risk Proxy GARCH/MASD	G7 GDP	Real Exchange Rate	Risk Proxy	Fixed/ Random
	GARCH	4.82*** (0.34)	0.68*** (0.09)	0.69 (0.72)	R
08: Edible fruit, nuts, peel of citrus fruit, melons	MASD	4.80*** (0.36)	0.68*** (0.09)	0.20 (0.64)	R
15: Animal, vegetable fats and oils, cleavage products,	GARCH	7.08*** (0.63)	0.22 (0.18)	1.46 (0.27)	F
etc.	MASD	6.78*** (0.67)	0.27 (0.19)	-0.83 (1.19)	F
	GARCH	8.39*** (0.98)	-1.45*** (0.28)	-0.13 (2.06)	F
26: Ores, slag and ash	MASD	8.91*** (1.03)	-1.59*** (0.30)	2.57 (1.84)	F
	GARCH	3.08*** (0.50)	-0.67*** (0.14)	-1.65 (1.05)	F
29: Organic chemicals	MASD	3.13*** (0.53)	-0.65*** (0.15)	-0.48 (0.94)	F
	GARCH	5.25*** (0.29)	0.32*** (0.08)	-1.15* (0.60)	F
39: Plastics and articles thereof	MASD	5.19*** (0.30)	0.35*** (0.09)	-0.84 (0.54)	F
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Random/ Fixed effects estimations

Product Line	Risk Proxy GARCH/MASD	G7 GDP	Real Exchange Rate	Risk Proxy	Fixed/ Random
	GARCH	5.17*** (0.81)	0.68*** (0.16)	4.55*** (1.74)	R
71: Pearls, precious stones, metals, coins, etc.	MASD	4.32*** (0.84)	0.76*** (0.17)	-2.88* (1.52)	R
	GARCH	-2.06*** (0.58)	0.13 (0.17)	-1.17 (1.21)	F
72: Iron and steel	MASD	-2.37*** (0.61)	0.23 (0.18)	-2.06* (1.08)	F
	GARCH	2.55*** (0.26)	0.75*** (0.06)	-1.93*** (0.56)	R
84: Machinery, nuclear reactors, bollers, etc.	MASD	2.50*** (0.28)	0.71*** (0.08)	-1.77*** (0.50)	F
	GARCH	2.16*** (0.30)	0.44*** (0.09)	-1.07* (0.63)	F
85: Electrical, electronic equipment	MASD	2.16*** (0.32)	0.46*** (0.09)	-0.49 (0.56)	F
	GARCH	5.30*** (0.43)	0.52*** (0.12)	0.44 (0.91)	F
87: Vehicles other than railway, tramway	MASD	4.75*** (0.44)	0.77*** (0.10)	-1.78** (0.79)	R

PDOLS estimations

Product Line	Risk Proxy GARCH/MAS D	G7 GDP	Real Exchange Rate	Risk Proxy
	GARCH	5.78***	0.57***	3.33***
08: Edible fruit nuts neel of citrus fruit melons		(0.54)	(0.15)	(1.36)
	MASD	5.04***	0.53***	1.22
		(0.61)	(0.18)	(1.70)
	GARCH	7.47***	-0.37	2.09
15: Animal, vegetable fats and oils, cleavage		(0.82)	(0.25)	(3.28)
products, etc.	MASD	7.17***	-0.28	-1.66
		(0.97)	(0.28)	(2.54)
	GARCH	7.57***	-1.59***	-0.08
26. Orea also and ash		(0.98)	(0.28)	(2.61)
	MASD	7.77***	-1.83***	1.75
		(1.20)	(0.32)	(3.35)
	GARCH	2.64***	-0.30***	-3.02
29: Organic chomicals		(0.44)	(0.11)	(1.93)
	MASD	2.56***	-0.29***	-1.74
		(0.47)	(0.12)	(1.19)
	GARCH	5.03***	0.24***	-1.10
20. Disting and articles thereof		(0.34)	(0.10)	(1.33)
55. Plastics and articles thereof	MASD	4.92***	0.23***	-1.04
		(0.42)	(0.11)	(0.96)

PDOLS estimations

Product Line	Risk Proxy GARCH/MASD	G7 GDP	Real Exchange Rate	Risk Proxy		
	GARCH	2.83***	-0.38	5.41		
71: Pearls precious stopes metals coins etc		(1.06)	(0.24)	(5.15)		
71: Pearis, precious stones, metais, coins, etc.	MASD	2.72***	-0.36	1.05		
		(1.01)	(0.27)	(3.22)		
	GARCH	0.18	-0.39*	-3.16		
72: Iron and steel		(0.82)	(0.21)	(2.47)		
72: Iron and steel	MASD	-0.91	0.16	-7.20***		
		(0.90)	(0.21)	(1.08)		
	GARCH	3.67***	0.40***	-1.83*		
94: Machinery nuclear reactors beildrs ats		(0.36)	(0.08)	(1.05)		
o4. Machinery, nuclear reactors, boners, etc.	MASD	3.19***	0.45***	-2.02**		
		(0.46)	(0.11)	(0.99)		
	GARCH	1.96***	0.44***	-0.77		
95: Electrical electronic equipment		(0.27)	(0.09)	(1.04)		
	MASD	1.74***	0.50***	-0.38		
		(0.37)	(0.09)	(0.85)		
	GARCH	5.29***	0.26**	2.40		
		(0.43)	(0.12)	(1.57)		
87: Venicies other than railway, tramway	MASD	4.75***	0.43***	-3.49***		
		(0.54)	(0.13)	(1.32)		

Discussion of results

- Log G7 GDP positive and significant (not iron and steel); impact of global demand conditions
- Price competitiveness (real forex price adjusted exchange rate) mostly positive ; local currency depreciates and/ or foreign prices increase
- Varying signs and level of significance of risk proxies: exchange rate risk NOT main determinant of exports of most product lines
- Negative and significant for both estimations: iron and steel; machinery, nuclear reactors, boilers; vehicles other than railway, tramway
- Except for iron and steel, a negative risk proxy coefficient found for differentiated goods
- Composition of export basket determine level of exposure to exchange rate risk/ volatility

