Building Resilience to External Shocks:
How Statistics Can Help

Xiaolan Fu

Oxford University

UNCTAD Multi-year Expert Meeting on Enhancing the Enabling Economic Environment at All Levels in Support of Inclusive and Sustainable Development, Geneva, 16-17th April 2013

- **China's Exports and the Evolution of Global Manufactures Prices** (Fu, Kaplinsky and Zhang, 2012)

- **Additional thoughts on the role of statistics in building resilience to external shocks**

The Trade Shock

Source: WDI (2013)

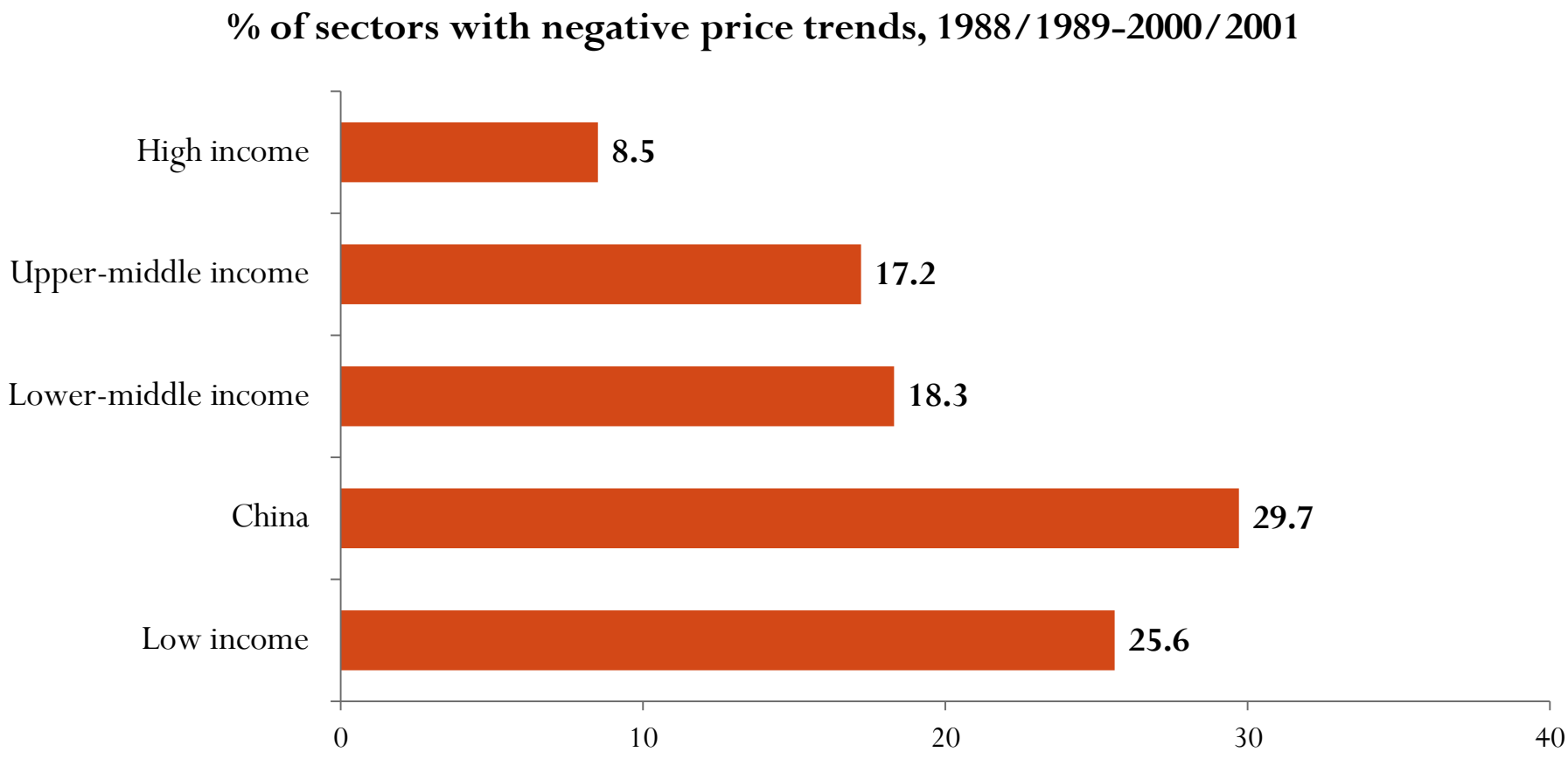
The Trade Shock

	1982	2010
Exports $bn.	24	1,816
Fuel and Ores as percentage of		
Imports	6.0	28.8
Exports	25.2	3.1
Reserves $bn.	17	3,255

China implied a 8-15% increase in world unskilled labour abundance.
Everybody's comparative advantage changed.

Source: Winters (2012), WDI (2013); Wood and Mayer (2009)

- One potential consequences – impact on global prices and terms of trade for some countries
- China has provided the world with low cost products



Source: Kaplinsky and Santos Paulino, 2006

- There is a widely-stated claim that China's growing exports have *caused* a fall in the global prices of many manufactures (+ / -)
- But little empirical evidence

- What has happened to global manufactures prices?
- What is the impact of China's exports on these price changes?
- Variations by sectors and by country characteristics?

Proposition

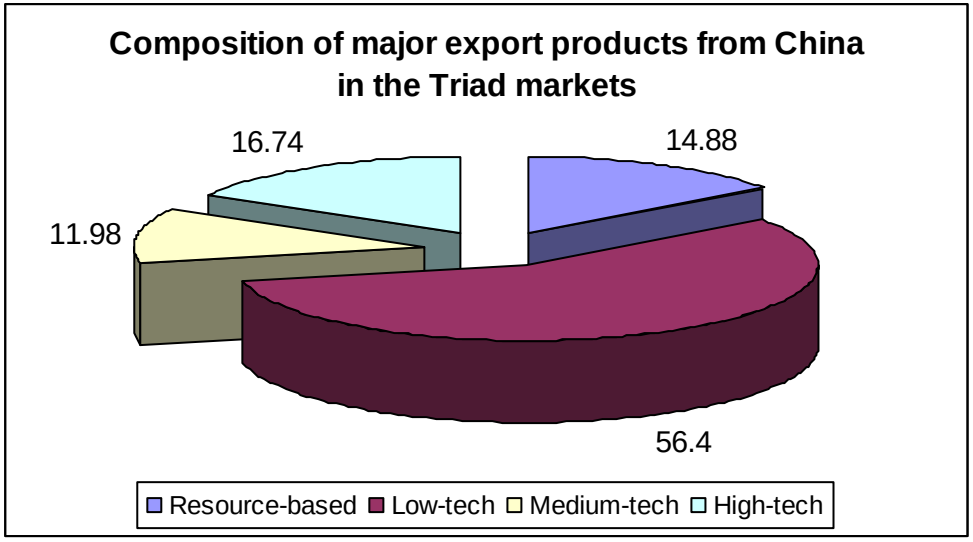
- As a consequence of China's export growth, there will be a **differentiated** impact on the prices of traded manufactures in **sectors** of differential technological intensity, and such impact varies **over time** and across different groups of exporting **countries**.

What happened to prices? -Data & methods

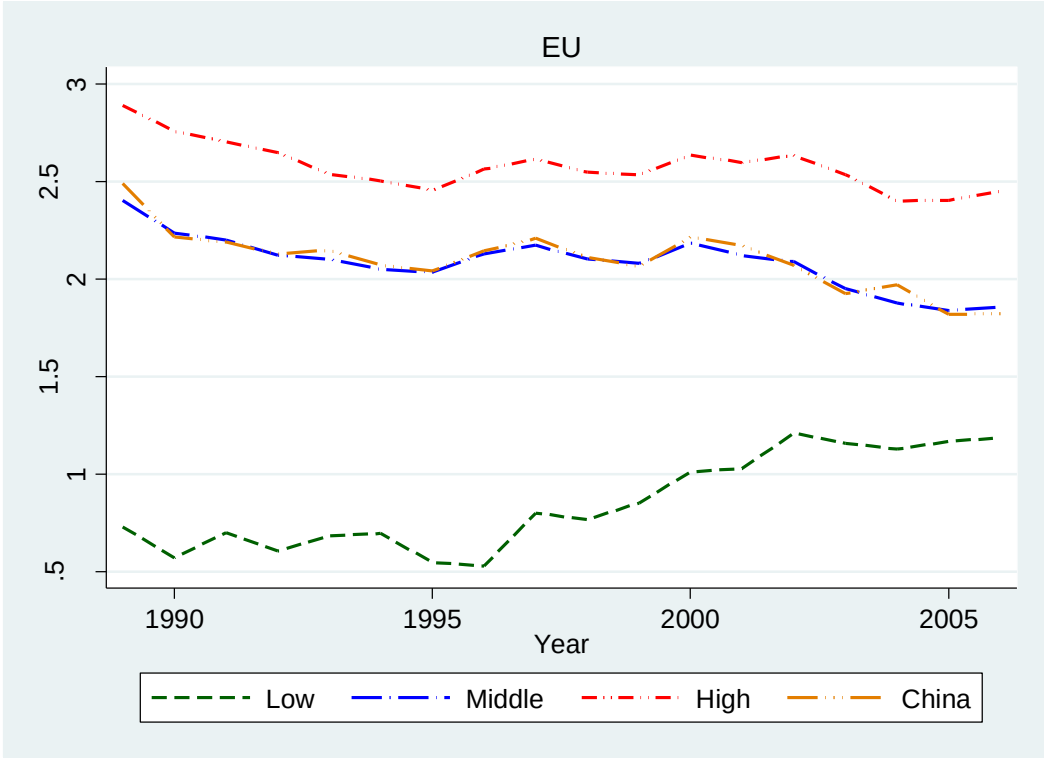
1. US, EU & Japan 1989-2006

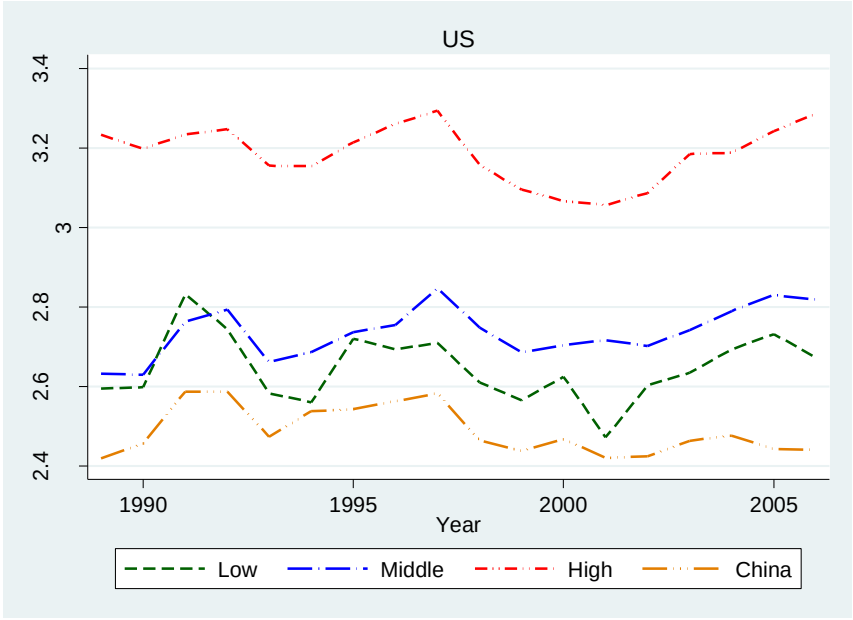
2. Top 300 products from China (China lens)

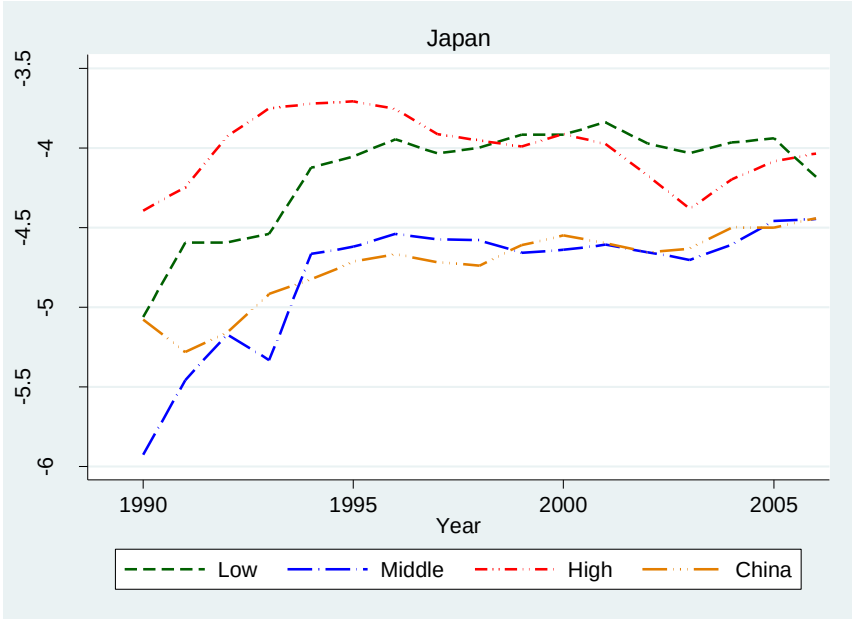
3. HS 8 digit (EU & US) & 6 digit (Japan)



What happened to prices? -Levels







What happened to prices? - Changes

		Growth rate	
VARIABLES	1	2	3
Low-income	0.0818***		0.0818***
	0.0315		0.0311
Middle-income	**0.0102**		**0.0102**
	0.0315		**0.0311**
High-income	0.124***		0.124***
	0.0315		0.0311
Resource-based		-0.0321	0.0225
		0.0326	0.0336
Medium-tech		-0.011	0.0305
		0.0355	0.0356
High-tech		-0.0426	-0.0095
		0.0311	0.031
Observations	1936	1936	1936
	Arimac	Arimac	Arimac

What's the impact of China's exports? -Model

- A simple partial equilibrium framework of price formation

$$d_t = m + Ay_t - Bp_t + EX_t + \xi_t^d$$

$$s_t = n + Fp_t + Gp_t^e + KZ_t + \xi_t^s$$

  - Heterogeneity of exporting countries & difference in quality of products from different countries
  - Possible substitution between products

$$d_t = m + Ay_t - Bp_t^H - Cp_t^C - Dp_t^O + EX_t + \xi_t^d$$

What's the impact of China's exports? -Model

- Heterogeneity of exporting countries & different responses to China's export expansion & price expectation

$$p_t^e = H\sum_j p_{t-j} + Ip_t^C + Jp_t^O + \varepsilon_t$$

1. **Response to price competition: reduce mark-up or innovate**
2. **Expectation based on price trend**

Substitute into (2):

$$s_t = n + Fp_t + H\sum_j p_{t-j} + Ip_t^C + Jp_t^O + KZ_t + \varepsilon_t + \xi_t^s$$

- Reduced-form single equation model

$$p_t = \alpha + \sum_j \beta_{j,t} p_{t-j} + \delta y_t + \gamma p_t^C + \phi p_t^O + \eta s_t^C + \lambda X_t + \sigma Z_t + \xi_t$$

China's exports price

China's exports volume

What's the impact of China's exports? -Empirical Model

$$P_{it} = \alpha + \sum_j \beta_{j,it} P_{i,t-j} + \delta \ln Y_{it} + \eta S^c_{it} + \sum_j \gamma_{j,it} P^c_{i,t-j} + \sum_j \varphi_{j,it} P^o_{i,t-j} + \lambda E^c_t + \zeta D + \sigma T + \mathrm{e}_{it}$$

REER WTO Tech

- Distributed lag structure to capture dynamism
- Test of stationary of the variables – transform to ln(P)
- Endogeneity between China's and other's prices: Use IV and System GMM
- Robustness check using limited lags
- Data: top 300 Chinese exports, 3 markets, 4 country groups, 1989-2006 – 16,200 obs
- Data cleaning – compare the like with like

Results

- The impact of Chinese export – whole sample
- Effects by technology groups
- Effects by destination markets
- Evolution of the effects over time: pre-1997 and post-1997

	1 P_{Low}	2 P_{Middle}	3 P_{High}
P_{China}	-0.086 (0.037)**	**0.144** **(0.000)***	**0.040** **(0.035)**
S_{China}	**-0.037** **(0.040)**	0.005 (0.549)	**-0.022** **(0.000)***
GDP_{market}	0.447 (0.005)***	0.308 (0.000)***	0.249 (0.001)***
E_{China}	0.001 (0.638)	**-0.003** **(0.010)**	-0.001 (0.421)
asficrisis	0.055 (0.063)*	-0.009 (0.525)	-0.007 (0.629)
WTO	-0.021 (0.594)	**-0.079** **(0.000)***	**-0.047** **(0.040)**
boom	0.010 (0.789)	0.003 (0.801)	-0.005 (0.812)
tech	-0.085 (0.043)**	0.067 (0.000)***	0.014 (0.200)
P_{Low}		0.135 (0.000)***	-0.005 (0.724)
L. P_{Low}	0.613 (0.000)***		
P_{Middle}	0.350 (0.000)***		0.122 (0.000)***
L. P_{Middle}		0.615 (0.000)***	
P_{High}	0.019 (0.584)	0.098 (0.000)***	
L. P_{High}			0.812 (0.000)***
Constant	-4.009 (0.007)***	-2.589 (0.001)***	-2.061 (0.003)***
Obs	8126	8314	8316

	Resource based & Low technology			Medium- & High technology		
	1	2	3	4	5	6
	P_{Low}	P_{Middle}	P_{High}	P_{Low}	P_{Middle}	P_{High}
P_{China}	-0.055	**0.076**	**0.098**	-0.102	**0.216**	-0.026
	(0.207)	**(0.000)*** **	**(0.001)*** **	(0.151)	**(0.002)*** **	(0.416)
S_{China}	-0.011	0.0005	**-0.027**	**-0.061**	-0.004	0.005
	(0.561)	(0.957)	**(0.011)** **	**(0.094)***	(0.832)	(0.647)
E_{China}	**-0.002**	-0.001	0.0001	0.001	**-0.009**	-0.003
	(0.094)*	(0.238)	(0.904)	(0.822)	**(0.003)*** **	(0.182)
WTO	0.034	**-0.065**	**-0.045**	-0.069	**-0.097**	-0.026
	(0.344)	**(0.000)*** **	**(0.081)***	(0.505)	**(0.006)*** **	(0.609)
Obs	5960	6061	6063	2166	2253	2253

	Japan			EU			US		
	1	2	3	4	5	6	7	8	9
	P_{Low}	P_{Middle}	P_{High}	P_{Low}	P_{Middle}	P_{High}	P_{Low}	P_{Middle}	P_{High}
P_{China}	-0.037	**0.077**	-0.027	-0.189	**0.083**	0.007	**0.221**	**0.163**	0.024
	(0.252)	**(0.012)****	(0.320)	(0.044)**	**(0.004)*****	(0.804)	**(0.025)****	**(0.000)*****	(0.551)
S_{China}	-0.012	**0.054**	**-0.056**	**0.031**	-0.008	0.015	**-0.033**	-0.001	0.006
	(0.646)	**(0.013)****	**(0.003)*****	**(0.091)***	(0.485)	(0.121)	**(0.055)***	(0.903)	(0.388)
E_{China}	**-0.009**	**-0.019**	-0.003	0.003	-0.0004	0.001	0.001	-0.0003	**-0.002**
	(0.017)**	**(0.000)*****	(0.389)	(0.148)	(0.373)	(0.141)	(0.642)	(0.721)	**(0.034)****
WTO	**-0.210**	**-0.090**	**-0.101**	0.052	-0.017	0.047	**0.122**	-0.021	0.0004
	(0.001)***	**(0.002)*****	**(0.045)****	(0.518)	(0.321)	(0.108)	**(0.024)****	(0.348)	(0.984)
Obs	2358	2484	2485	3352	3375	3376	2416	2455	2455

	<=1997			>1997		
	1	2	3	4	5	6
	P_{Low}	P_{Middle}	P_{High}	P_{Low}	P_{Middle}	P_{High}
P_{China}	-0.118	**0.263**	**0.068**	-0.068	**0.105**	-0.014
	(0.057)*	**(0.000)*** **	**(0.087)***	(0.136)	**(0.000)*** **	(0.564)
S_{China}	**-0.047**	0.023	-0.006	-0.021	-0.005	-0.007
	(0.011)**	(0.260)	(0.517)	(0.246)	(0.409)	(0.323)
E_{China}	-0.0003	0.0002	**0.001**	0.001	**-0.005**	-0.001
	(0.777)	(0.740)	**(0.015)****	(0.870)	**(0.013)****	(0.647)
WTO				-0.016	**-0.032**	**-0.064**
				(0.697)	**(0.035)****	**(0.008)*****
Obs	3098	3248	3249	5028	5066	5067

Conclusions (1)

- Prices of China's exports are coupling with those of middle-income countries in levels and changes
- They have grown slower than those of low- and high-income countries
- China's exports have imposed significant pressure on middle income countries. This effect is robust across technology groups and markets.

Conclusions (2)

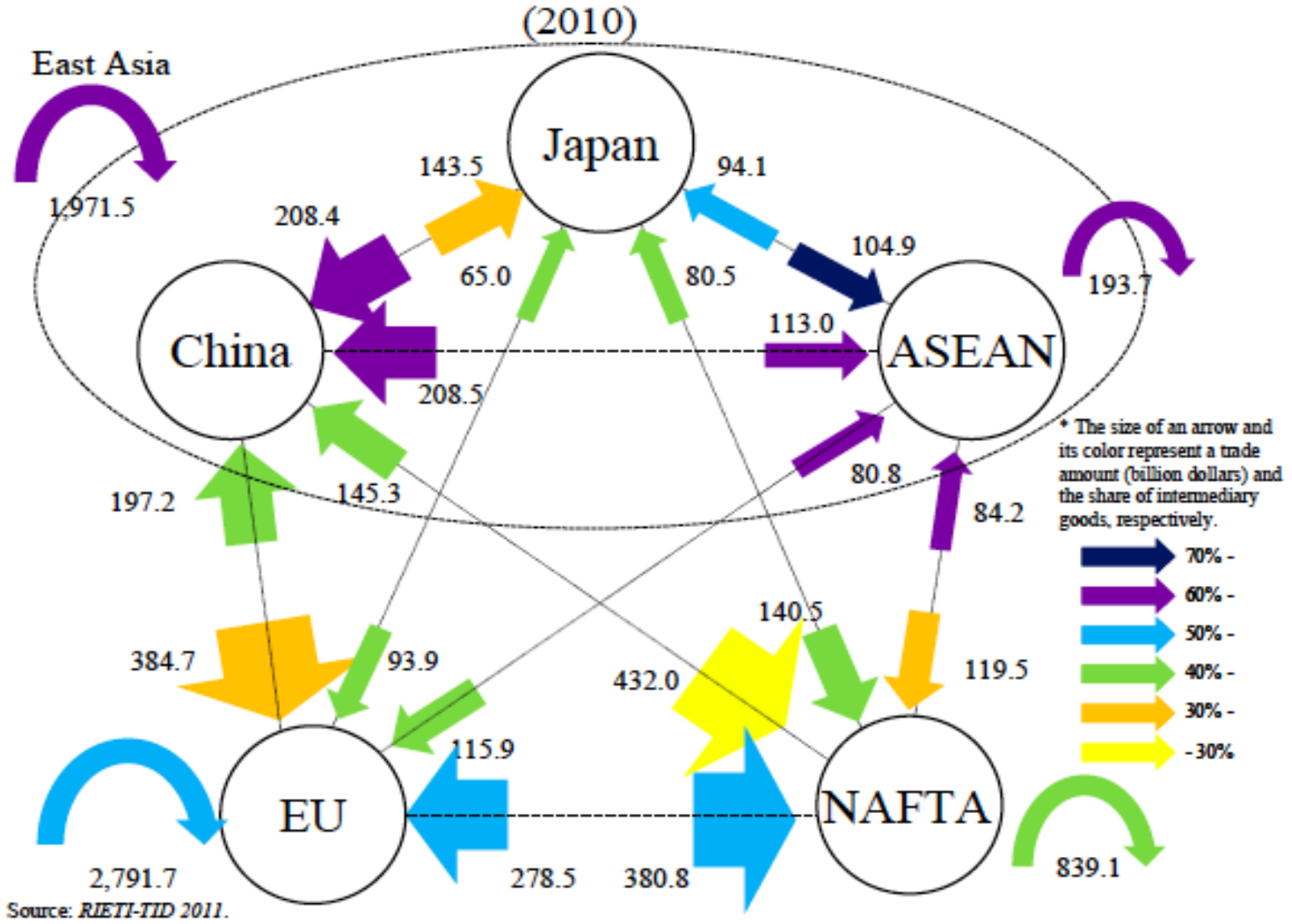
- Significant impact on prices of exports from high-income countries in low-technology sectors
- The impact on low-income countries was in the low-tech sector.
- The effect evolves with time. Price competition stronger in the 1980s and early 1990s, but the significance diminished since late 1990s.
- The Japan market felt the widest and strongest effect of China's exports expansion.

Additional thoughts

- To use disaggregate trade data in analysis to avoid aggregation bias

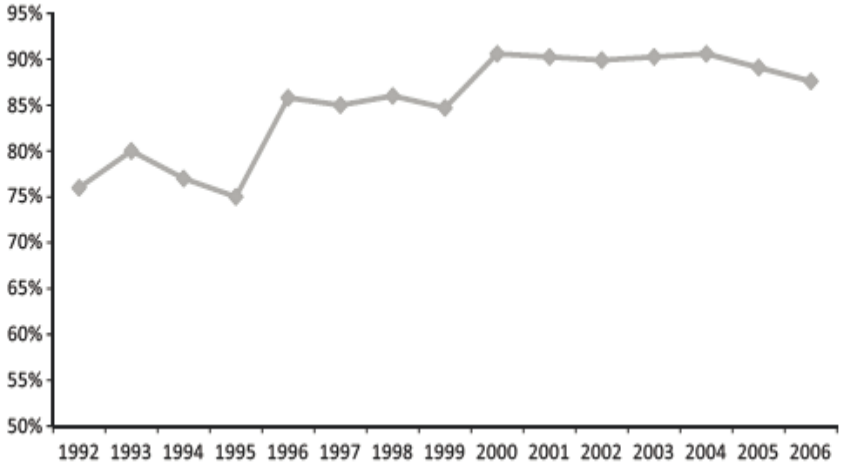
- To collect value-added based trade data to produce more accurate picture of global trade flow

Global value chain, intra-industry trade and the true picture of global trade



Source: Abe (2013)

Value-added in Assembly Activities: the iPhone Story



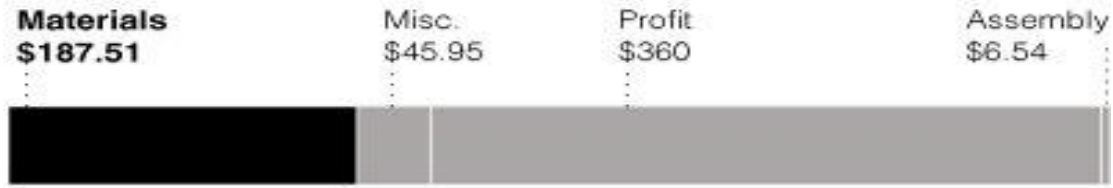
Share of processing exports in China's total high-tech exports

Source: Fu (2011), New York Times (2010)

Inside Your iPhone

The iPhone, designed by Apple engineers in the United States, is manufactured in China with parts from around the world. Apple won't reveal its suppliers, so experts at iSuppli sometimes have to guess a part's origins.

Breakdown of the iPhone 4 (Total paid to Apple = $600)



Materials Suppliers*

SOUTH KOREA		
LG (or possibly TMD) **	LCD display	$28.50
Samsung	Flash memory chip	27.00
Samsung	Applications processor	10.75
Samsung	DRAM memory	13.80
UNITED STATES		
Broadcom	Wi-Fi, Bluetooth, GPS chips	9.55
Intel	Radio frequency memory	2.70
Texas Instruments	Touch-screen control	1.23
Cirrus Logic	Audio codec pack	1.15
GERMANY		
Infineon	Receiver/transceiver	14.05
Dialog	Power management	2.03
ITALY / FRANCE		
STMicroelectronics	Accelerator and gyroscope	3.25
JAPAN		
AKM	Compass	.70
OTHER		
Wintek or TPK/Balda†	Touch screen	10.00

The importance of better trade statistics

- Better understanding of the channel and size of the shocks
- True picture of the evolving comparative advantage and identify the opportunities in global market
- Better understanding of an economy's income and job sensitivity to external shock

Reference

- Fu, Kaplinsky and Zhang (2012) 'The impact of China on low and middle income countries' export prices in industrial-country markets' *World Development*, v40 (8), 1483-96
- Fu, X. (2011) 'Processing-trade, FDI and Exports of Indigenous Firms: Firm-level Evidence from High-technology Industries in China', *Oxford Bulletin of Economics and Statistics*, v73(5), 792-817.
- Fu, Kale and Kaplinsky (2011) The evolution of global manufactures prices, 1989-2006, in Fu, X. (eds) *China's Role in Global Economic Recovery*, Routledge.

UNCTAD Multi-Year Expert Meeting

Geneva, April 16-17, 2013

Thanks

Comments and Suggestions are welcome!