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EUROSYSTEM

Non-Price Competitiveness of Exports from Asian Countries

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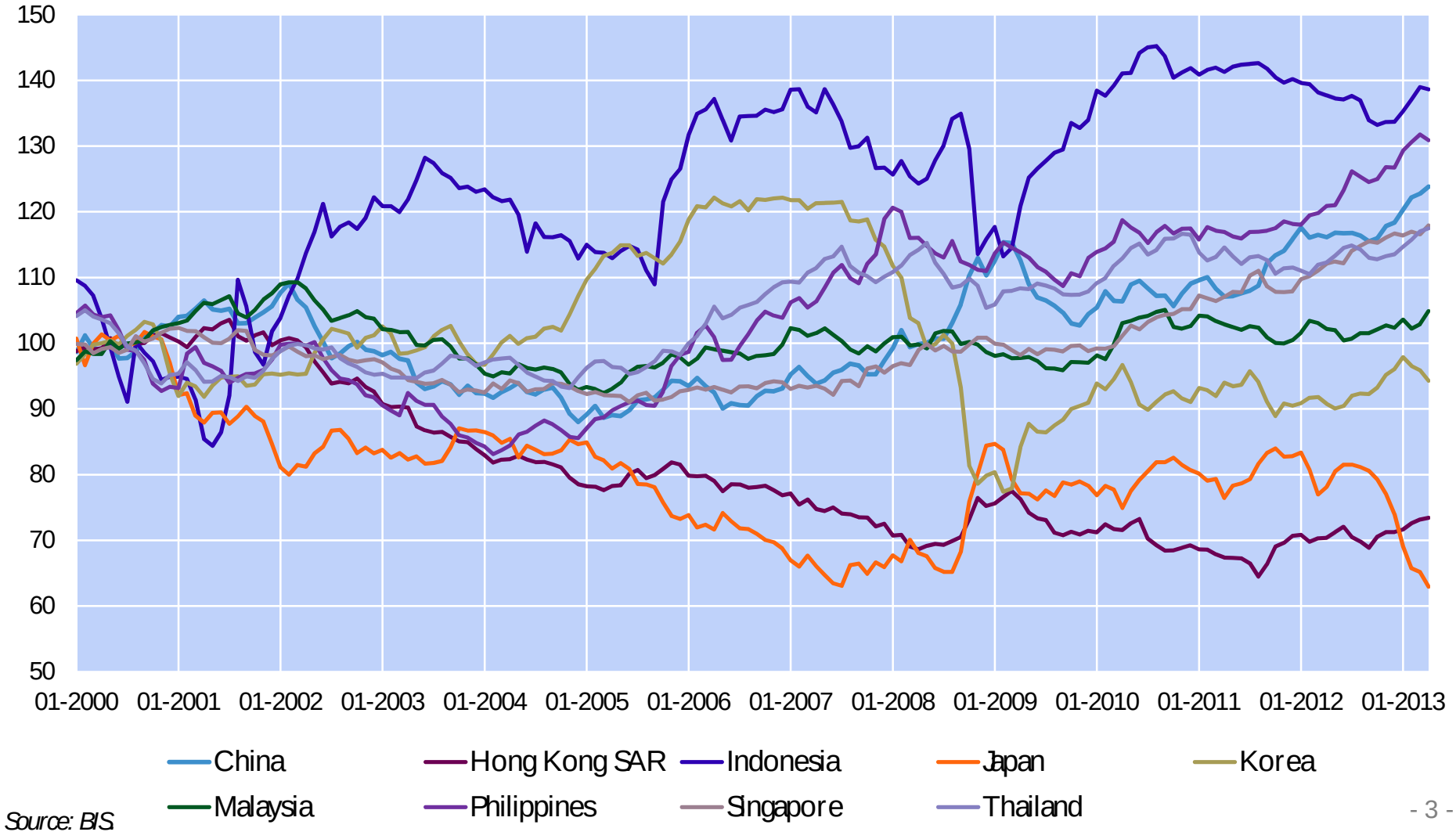
General motivation

- **Drawbacks of traditional REER indicators**
- **Theoretical framework to measure non-price factors (disaggregated approach)**
- **From import to export prices**
- **Dynamics in price and non-price competitiveness in ASEAN+3**
- **Contribution of non-price factors in selected product groups**
- **Conclusions**

Real Effective Exchange Rate Index

2000 = 100



Source: BIS.

Why do we need a new index?

REERs are a poor approximation for competitiveness:

- **Whole economy is covered, no distinction between domestic and external markets**
- **Profit margins are ignored**
- **Structural issues are not captured (different export structure across countries)**
- **Important factors are omitted (e.g. taste, image of brands)**

Importance of prices for competitiveness is decreased by:

- **Greater variety**
- **Larger set of imported products**
- **Higher valuation for / quality of traded products**

Aim of the paper

- **Evaluate the price and non-price competitiveness of important Asian countries:**
  - **ASEAN members + China, Japan, South Korea**

- **We develop a new index that adjusts export prices for non-price factors**

Literature review

- **Feenstra (AER 1994) and Broda and Weinstein (QJE 2006) incorporate changes in variety into a CES aggregate of import prices.**
- **Benkovskis and Wörz (OeNB WP 2011) extend this to incorporate:**
  - **Changes in the number of traded products;**
  - **Changes in non-price factors (quality / taste).**
- **Relative quality becomes a function of observable unit values and volumes as well as unobservable elasticities of substitution between varieties and products.**
- **In this application we move further to apply this methodology to export prices.**

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Theoretical framework – Consumer's utility function

- **First-level CES utility function (imports and domestic good)**

$$U_t = \left(D_t^{\frac{\kappa-1}{\kappa}} + M_t^{\frac{\kappa-1}{\kappa}} \right)^{\frac{\kappa}{\kappa-1}}; \quad \kappa > 1$$

- **Second-level CES utility function (different imported goods)**

$$M_t = \left(\sum_{g \in G} M_{gt}^{\frac{\gamma-1}{\gamma}} \right)^{\frac{\gamma}{\gamma-1}}; \quad \gamma > 1$$

set of goods

elasticity of substitution between products

- **Third-level CES utility function (different varieties of a good)**

$$M_{gt} = \left(\sum_{c \in C} d_{gct}^{\frac{1}{\sigma_g}} m_{gct}^{\frac{\sigma_g - 1}{\sigma_g}} \right)^{\frac{\sigma_g}{\sigma_g - 1}}; \quad \sigma_g > 1$$

set of countries

quality or taste

elasticity of substitution between varieties

Theoretical framework – Minimum unit-cost function

- **After solving the utility maximization problem:**

$$\phi_{gt} = \left(\sum_{c \in C} d_{gct} \, p_{gct}^{1-\sigma_g} \right)^{\frac{1}{1-\sigma_g}}$$

  - **minimum unit-cost depend on price, quality or taste parameter and set of partner countries (variety)**

- **The exact import price index for good *g* is defined as:**

$$P_g = \frac{\phi_{gt}}{\phi_{gt-1}}$$

Theoretical framework – Adjusted price index

- **Conventional price index:**

$$P_g^{conv} = \prod_{c \in C_g} \left(\frac{p_{gc,t}}{p_{gc,t-1}} \right)^{w_{gc,t}}$$

- **Variety adjusted price index (Broda&Weinstein, 2006):**

$$P_g^{var} = \prod_{c \in C_g} \left(\frac{p_{gc,t}}{p_{gc,t-1}} \right)^{w_{gc,t}} \left(\frac{\lambda_{gt}}{\lambda_{gt-1}} \right)^{\frac{1}{\sigma_g - 1}}$$

$$\lambda_{gt} = \frac{\sum_{c \in I_g} p_{gc,t} x_{gc,t}}{\sum_{c \in I_{gt}} p_{gc,t} x_{gc,t}} \qquad \lambda_{g,t-1} = \frac{\sum_{c \in I_g} p_{gc,t-1} x_{gc,t-1}}{\sum_{c \in I_{g,t-1}} p_{gc,t-1} x_{gc,t-1}}$$

- **Non-price factors adjusted price index (Benkovskis&Wörz, 2011):**

$$P_g^{adj} = \left(\frac{\sum_{c \in C_{g,t}} d_{gc,t} p_{gc,t}^{1-\sigma_g}}{\sum_{c \in C_{g,t-1}} d_{gc,t-1} p_{gc,t-1}^{1-\sigma_g}} \right)^{\frac{1}{1-\sigma_g}} = P_g^{conv} \left(\frac{\lambda_{gt}}{\lambda_{gt-1}} \right)^{\frac{1}{\sigma_g - 1}} \prod_{c \in C_g} \left(\frac{d_{gc,t}}{d_{gc,t-1}} \right)^{\frac{w_{gct}}{1-\sigma_g}}$$

Theoretical framework – How to estimate non-price factors

- **Non-price parameters (i.e. quality/taste) are unobservable**
- **But they can be decomposed into relative prices and relative quantity (=observable)**
- **It is possible to assess quality within the same theoretical framework – consumer utility maximisation:**

relative prices (UVX) **relative quantities (kg)**

$$\ln\left(\frac{d_{gct}}{d_{gkt}}\right) = \sigma_g \ln\left(\frac{p_{gct}}{p_{gkt}}\right) + \ln\left(\frac{x_{gct}}{x_{gkt}}\right)$$

← **benchmark country (k)**

- **Relative quality of variety depends on relative prices, volumes and the elasticity of substitution between varieties**

Theoretical framework – Estimation of elasticities

- **Elasticity of substitution between products calibrated: $\gamma = 2$**
- **Elasticity of substitution between varieties estimated from system of equations (Broda&Weinstein, 2006):**
  - **Relative demand equation:**

$$\frac{\Delta \ln s_{gc,t}}{\Delta \ln s_{gk,t}} = -(\sigma_g - 1)\frac{\Delta \ln p_{gc,t}}{\Delta \ln p_{gk,t}} + \varepsilon_{gc,t}$$

  - **Relative supply equation:**

$$\frac{\Delta \ln p_{gc,t}}{\Delta \ln p_{gk,t}} = \frac{\omega_g}{1+\omega_g}\frac{\Delta \ln s_{gc,t}}{\Delta \ln s_{gk,t}} + \delta_{gc,t}$$

Data

- **Full UN Comtrade database**
- **6-digit HS96 classification level (5132 products)**
- **Highly disaggregated data to calculate UV's**
- **Volumes proxied by kg or other units**
- **Exclusion of outliers**
- **Import data for 188 importers (reporters) and 236 exporters (partners)**
- **Export share analysis based on import data**
- **1996 to 2011, annual data**

Elasticities of substitutions between varieties (σ's) for top 20 importers

	No. of estimated elasticities	Mean	Minimum	Maximum	25th percentile	**Median**	75th percentile
United States	3725	19.97	1.0010	6442	1.64	**2.00**	3.13
China	3951	26.33	1.0021	46325	1.74	**2.23**	3.53
Germany	4708	13.39	1.0037	41612	1.68	**2.01**	2.83
Japan	4126	6.41	1.0015	3038	1.65	**2.08**	3.04
France	4899	4.75	1.0022	3698	1.68	**2.03**	2.84
United Kingdom	4846	7.70	1.0014	12862	1.63	**1.95**	2.74
Italy	4861	7.32	1.0029	7908	1.65	**2.02**	2.86
Korea	4260	17.55	1.0012	36421	1.69	**2.22**	3.35
Hong Kong (China)	3243	48.16	1.0016	75165	1.80	**2.49**	5.00
Netherlands	4126	24.31	1.0016	64064	1.69	**2.15**	3.25
Belgium	4679	10.24	1.0021	22747	1.73	**2.20**	3.41
India	3610	28.20	1.0032	21899	1.85	**2.66**	5.54
Canada	3308	29.33	1.0073	17279	1.83	**2.51**	4.91
Singapore	2823	45.70	1.0010	49488	1.79	**2.55**	5.76
Spain	4776	8.18	1.0011	16343	1.68	**2.07**	2.98
Mexico	3664	12.08	1.0010	1113	1.69	**2.17**	3.38
Russia	4070	5.84	1.0052	1617	1.68	**2.11**	3.10
Turkey	4000	18.15	1.0035	38896	1.69	**2.21**	3.46
Australia	2698	6.31	1.0014	1935	1.75	**2.27**	3.56
Thailand	3497	47.67	1.0020	68239	1.77	**2.48**	4.76

From import to export prices

- **Our goal, however, is to evaluate a quality-adjusted relative *export* price index**
- **We work with mirror image trade flows: expenditure for imports of good $g_{c,t}$ = exports of good $g_{c,t}$ by partner country**
- **Competitiveness is a relative concept: compare price index of a particular exporter k to all competitors:**

$$RXP_{gkt} = \frac{\phi_{gt}^{k} / \phi_{gt-1}^{k}}{\phi_{gt}^{-k} / \phi_{gt-1}^{-k}} = \frac{\left(p_{gkt} / p_{gkt-1}\right)\left(d_{gkt} / d_{gkt-1}\right)^{\frac{1}{1-\sigma_g}}}{\phi_{gt}^{-k} / \phi_{gt-1}^{-k}}$$

  - **ϕ_{gt}^{k} – minimum unit-cost of *g*, exported only by country *k***
  - **ϕ_{gt}^{-k} – minimum unit-cost of *g*, exported by all countries except *k***

From import to export prices

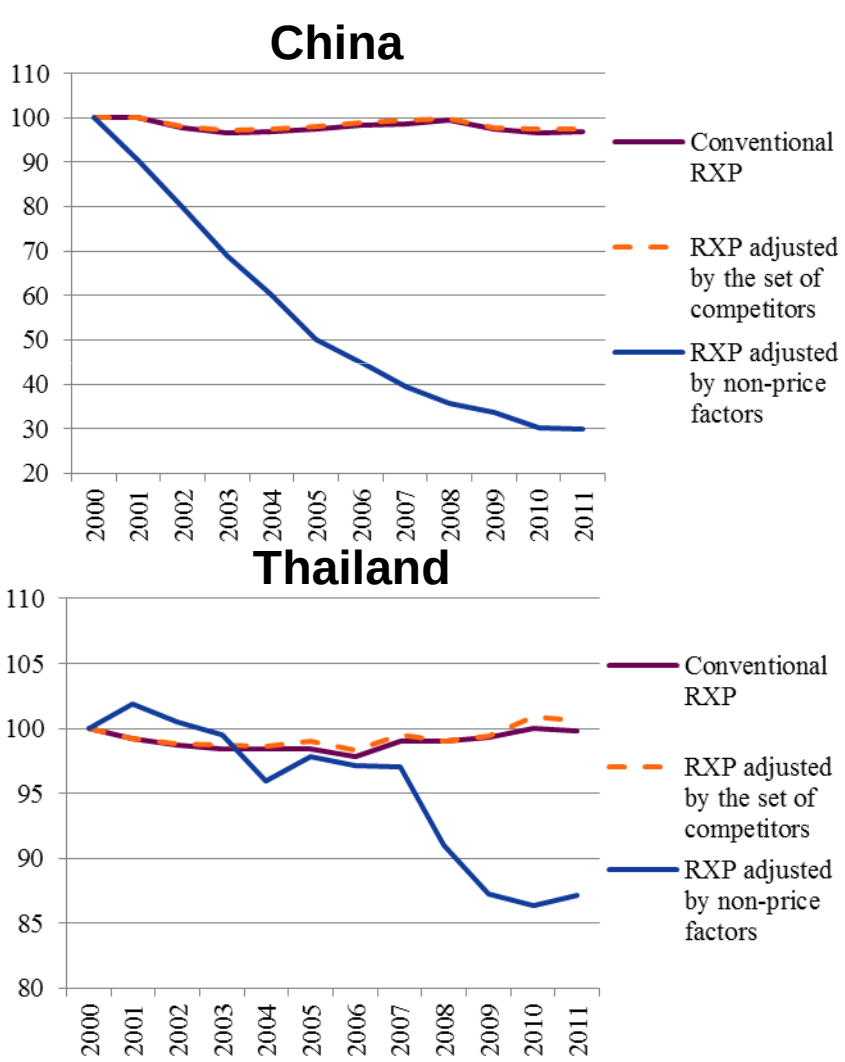
- **Plugging our non-price factors adjusted import price index into the relative export price index, we get:**

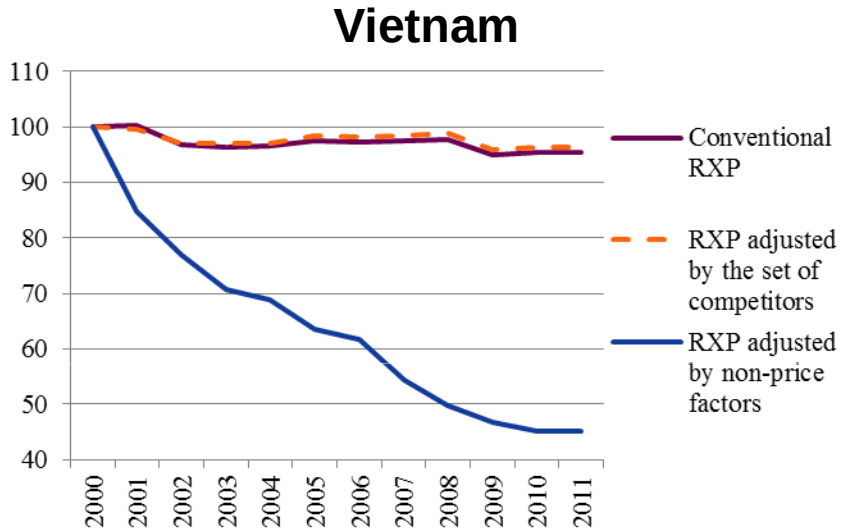
$$RXP_{gct} = \prod_{c \in C_g^{-k}} \left(\frac{p_{gkt}}{p_{gct}} \frac{p_{gct-1}}{p_{gkt-1}} \right)^{w_{gct}^{-k}} \left(\frac{\lambda_{gt}^{-k}}{\lambda_{gt-1}^{-k}} \right)^{\frac{1}{1-\sigma_g}} \prod_{c \in C_g^{-k}} \left(\frac{d_{gkt}}{d_{gct}} \frac{d_{gct-1}}{d_{gkt-1}} \right)^{\frac{w_{gct}^{-k}}{1-\sigma_g}}$$

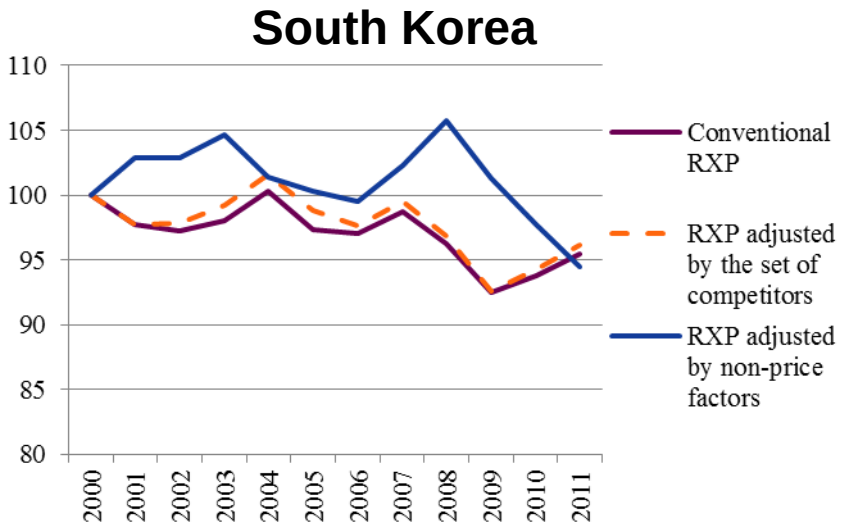
1 2 3

1. **Traditional relative price index, *increase = worsening price competitiveness***
2. **Changes in monopoly power of exporters ('variety'), *increase = more partner countries***
3. **Changes in non-price factors (quality / taste), *increase = fall in relative quality / taste***

Relative export price index – 'Winners'

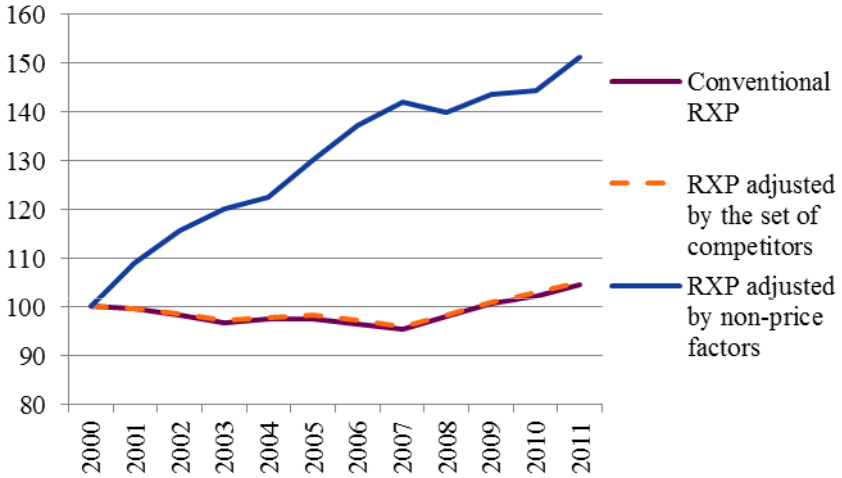




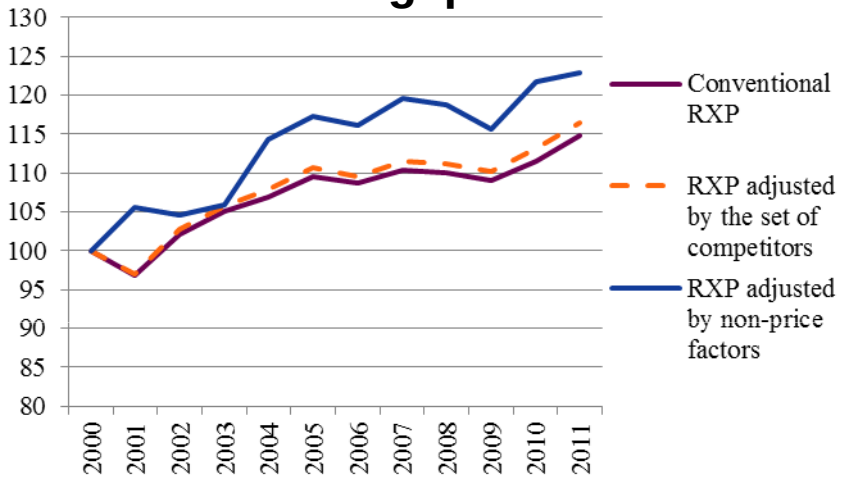


Relative export price index – ‘Loosers‘

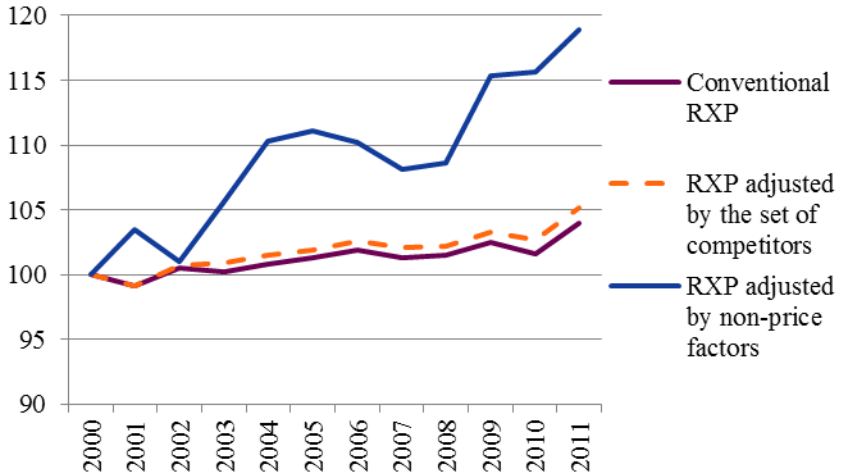
Japan



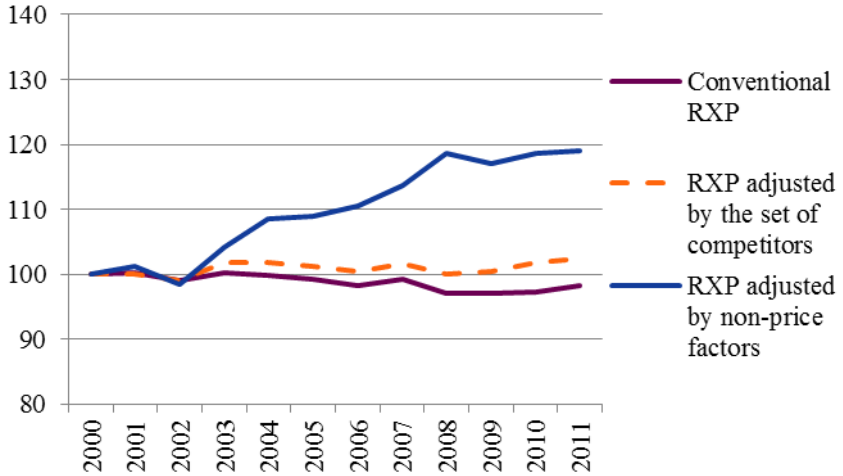
Singapore



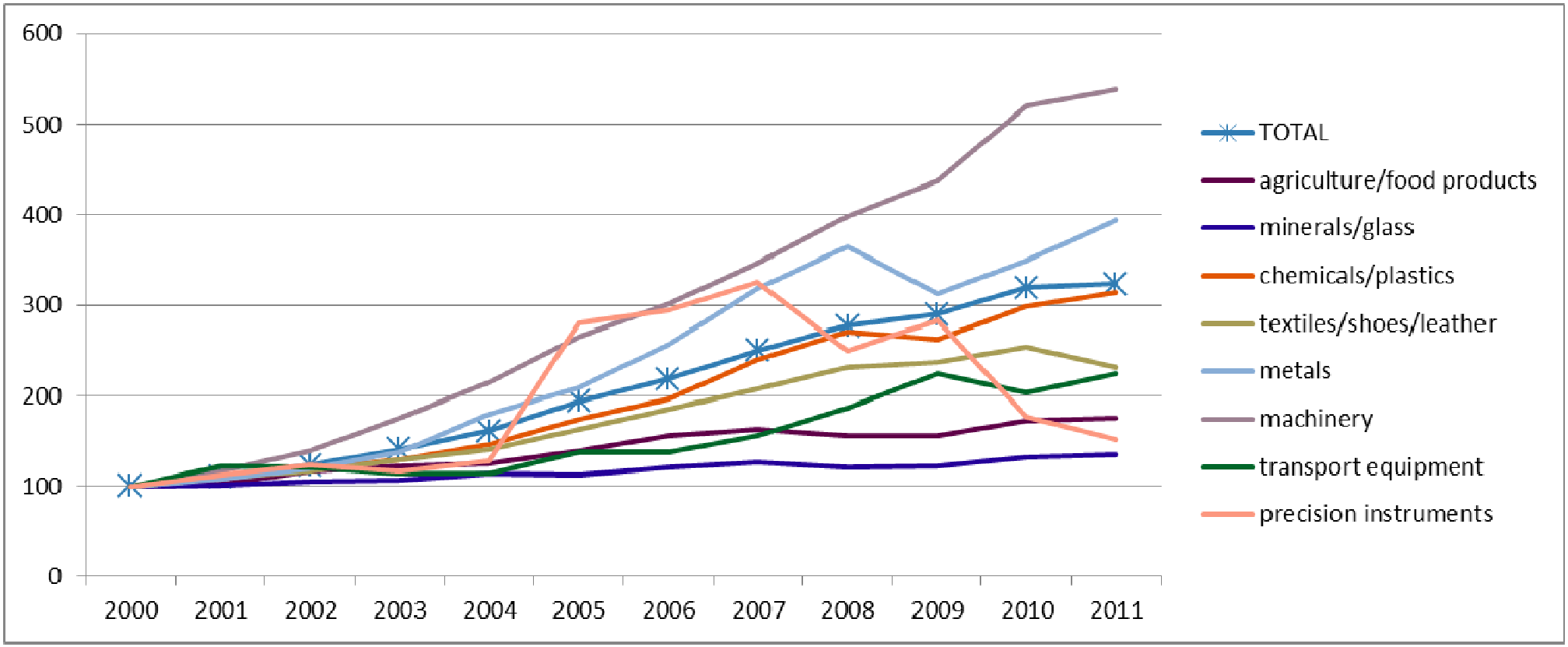
Malaysia



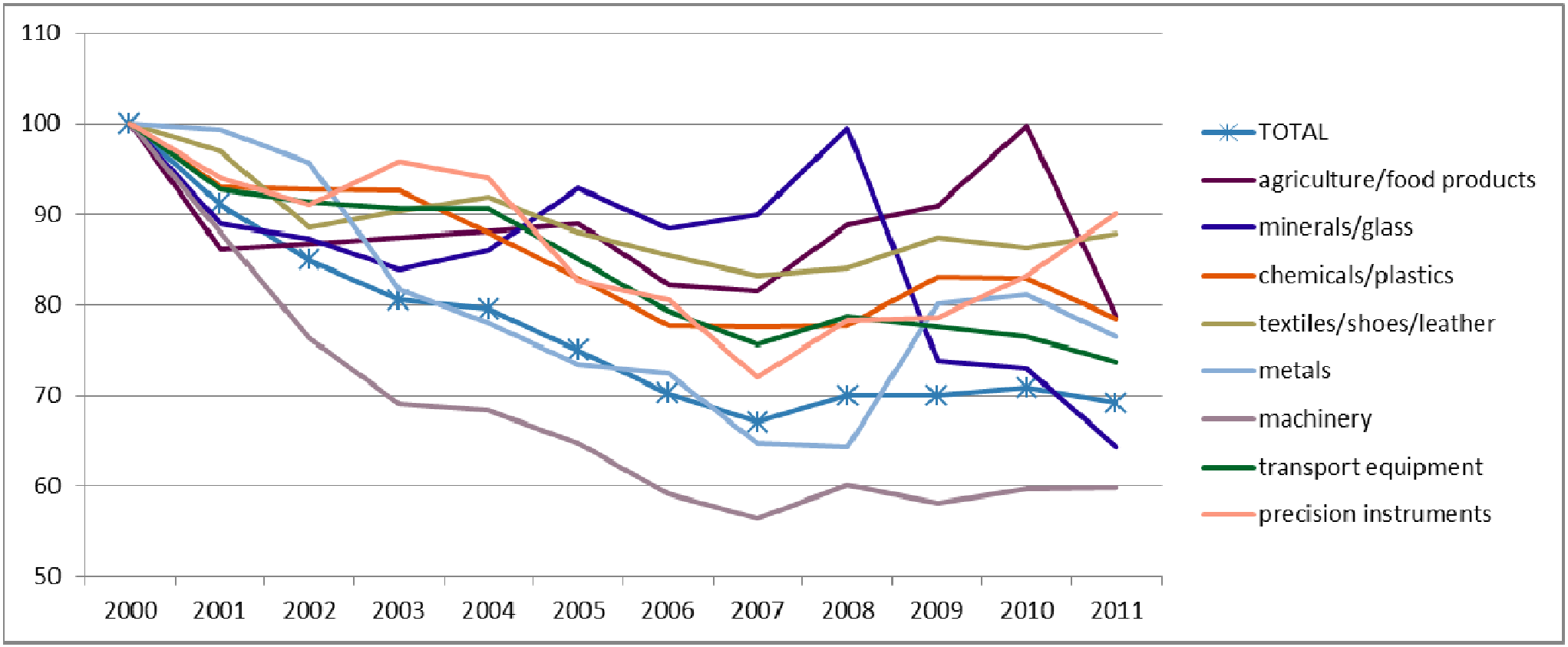
Indonesia



China: Contribution of non-price factors to competitiveness gains in individual sectors



Japan: Contribution of non-price factors to competitiveness losses in individual sectors



Summary – Unresolved questions so far

- **Competitiveness measures based on REER show improvements in price competitiveness for Japan, but losses for China.**
- **This may be explained by price convergence between these countries, but does it reflect their ”ability to sell”? Changes in market shares tell a different story.**
- **If we focus on export prices only, relative price changes are more in line with market share gains and losses.**
- **However, non-price factors (changes in quality and tastes) are likely to exert a substantially greater impact on competitiveness than prices.**

Summary – Proposing a new indicator

- We offer a new indicator that adjusts for changes in the number of competitors (‘variety’) and other non-price factors.
- Our export price index allows to assess the relative importance of price versus non-price factors.
- It can further be used to assess export performance within narrowly defined sectors.

Results

- **Within Asia, export performance has been highly mixed over the past decade. This is reflected in price and non-price adjusted indicators.**
- **Non-price factors were highly influential in boosting trade competitiveness of China, Vietnam and Thailand.**
- **They also played an important role in competitive losses in Japan and Malaysia.**
- **Indonesia: Large negative contribution of non-price factors to competitiveness in mineral products contrasts and dominates positive non-price contribution in precision instruments and transport equipment.**