JOHANNES KEPLER UNIVERSITÄT LINZ | JKU

OESTERREICHISCHE NATIONALBANK
EUROSYSTEM

Shifts in International Trade and Value Added: Insights into the Drivers of Growth

Joseph Francois

Johannes Kepler University Linz, Austria

wiiw – The Vienna Institute for International Economic Studies

CEPR, London

Julia Wörz

Oesterreichische Nationalbank
Economic Analysis and Research Department
Foreign Research Division

wiiw Seminar in International Economics , Nov. 11, 2010

The Rise and Fall of International Trade

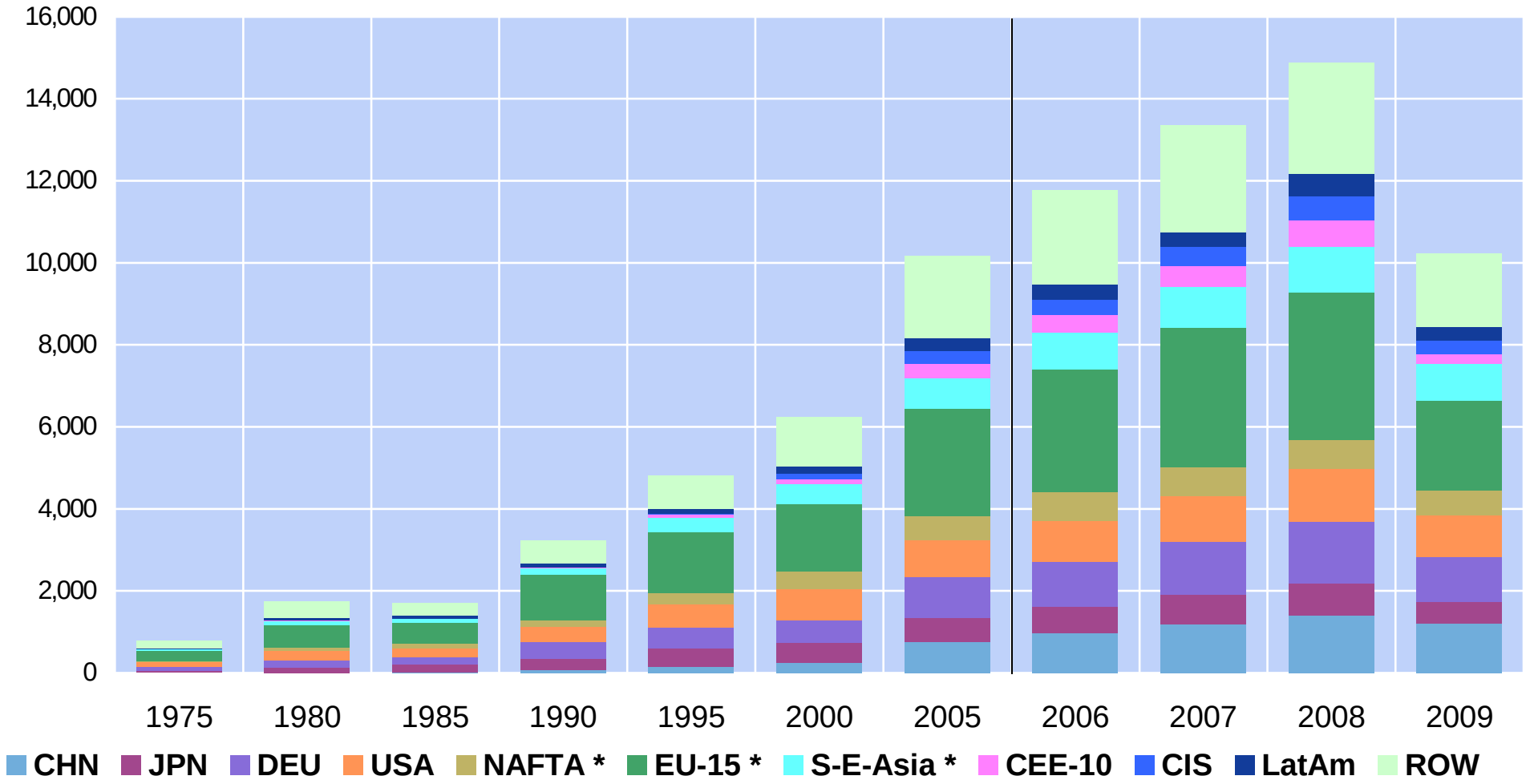
JOHANNES KEPLER UNIVERSITÄT LINZ | JKU

OeNB

Global Trade has Grown and Collapsed Impressively

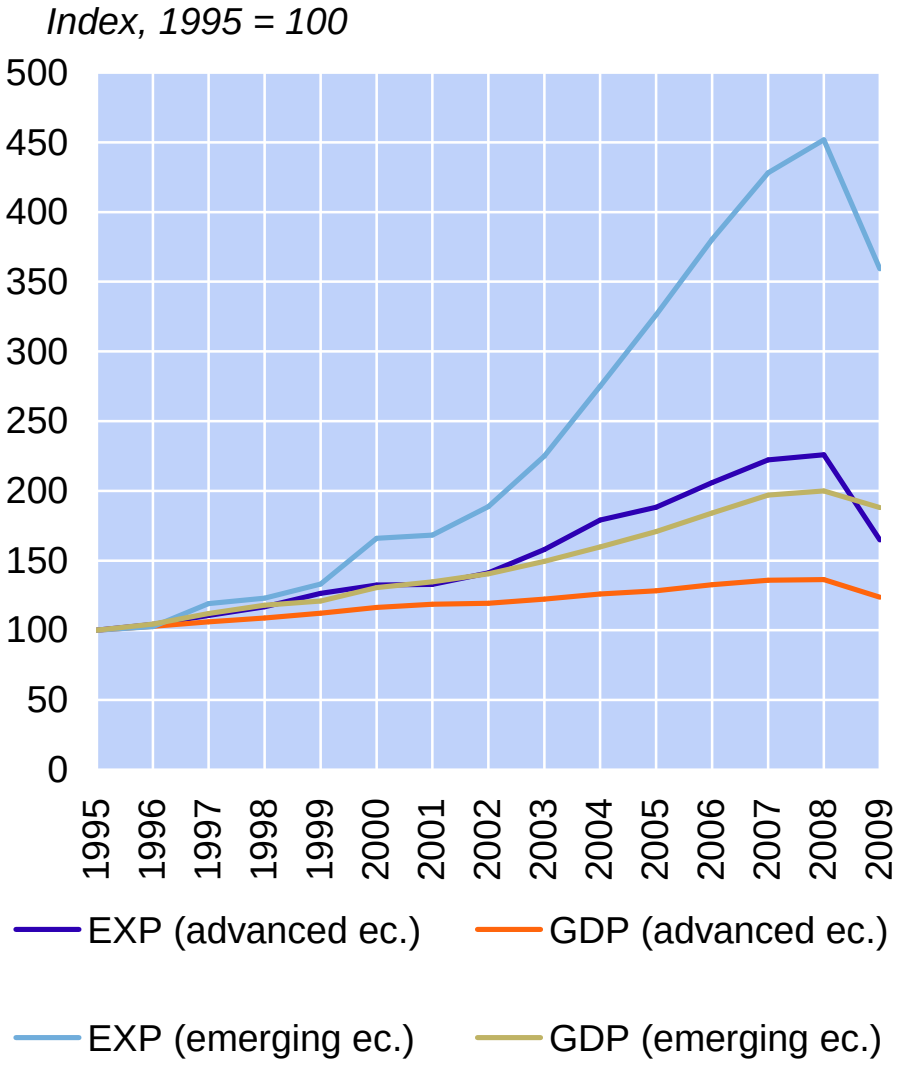
Regional composition of world exports, 1975-2009

current billion USD



Source: UN COMTRADE.

Global Shift in Production Towards Emerging Markets



Source: own calculations.

- Trade "over-reacts" to GDP growth
- Major share of world trade and production still in advanced economies
- Yet dynamics are much stronger in emerging economies
- Post-crisis: Emerging economies have reached or surpassed their pre-crisis trend level on average in 2010, while advanced economies **are** still considerably below pre-crisis trend level in 2010

Content of the Paper

Make a case against the "trade puzzle" in the spirit of *Young, QJE 1995*:

"The Tyranny of Numbers: Confronting the Statistical Realities of the East Asian Growth Experience"

Present new evidence on the trade response to output growth (generally found to be far greater than one, Irwin 2002, Freund 2009)

New additions to the growing literature on trade analysis:

- **Link trade growth to output growth at the industry level**
- **Use sector specific price deflators**

Overview of the Presentation

Analyse long-term developments of world trade:

1.) structural changes (decomposition analysis):

- **in terms of products**
- **in terms of countries**
- **role of sector-by-country composition**

2.) trade response to output (elasticity of exports to output):

- **by sector**
- **by region**

3.) What are the implications for Central- and Eastern Europe (CESEE)?

Background

Literature on the rise of trade:

- **Falling trade barriers and institutional factors**
  (Baldwin 2001, Hummels 2007, Jacks et al. 2008)

- **Rising fragmentation of production**
  (Feenstra 1998)

- **Income elasticity of trade**
  (Baier and Bergstrand 2001, Irwin 2002)

Background

Rapidly growing literature on the trade collapse:

- **Consensus has emerged that it is primarily demand driven**
  (Bems, Johnson & Yi 2010, Eaton, Kortum, Neiman & Romalis 2010, Francois & Wörz 2009, Keppel & Wörz 2010, Rose & Spiegel 2009)

- **Changes in global production networks and composition effects also mattered**
  (Altomonte & Ottaviano 2009, Benassy-Quére et al. 2009, Bricongne et al. 2009, Domit & Shakir 2010, Yi 2009)

- **Trade frictions (trade finance, protectionsim, trading costs, etc.) play some, albeit a subdued role**
  (Auboin 2009, Chor & Manova 2010, Chauffour & Farole 2009)

Preview - Main Conclusions

Structural change explains a lot of the „rapid“ trade growth.

This implies that the evidence for policy and falling transport / trade costs in driving globalization may be more limited than often emphasized in the literature.

In particular CESEEs have moved rapidly into more trade intensive manufacturing activities, hence domestic structural change has been highly important in driving their export performance.

However, structural change will continue to be of utmost importance for the region, given the discrepancy between their current specialization patterns and global industrial dynamics in trade.

Dataset

Export and output data for 196 countries and 25 industries

1988-2009

Deflate exports by industry-specific US import price index (reflecting world prices)

Deflate output by industry-specific US PPI

Classify countries into 6 regions

- EU-15
- CEE-10 (=EU members)
- CIS & Balkan
- NAFTA
- Latin America
- South East Asia (ASEAN + JP, CN, IN, KR)

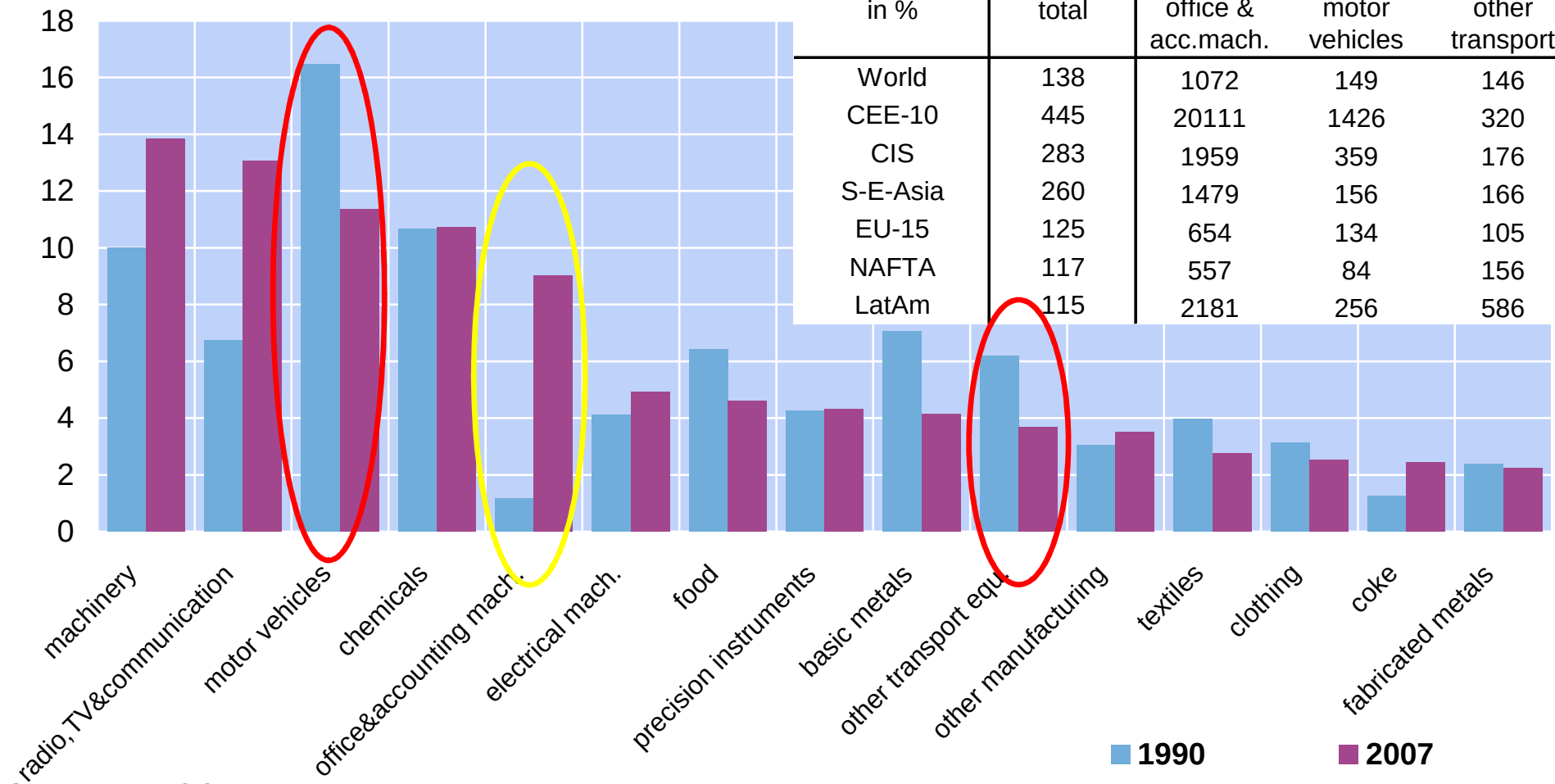
Data sources: UN COMTRADE, UNIDO, US BLS

Structural Change in World Exports

Relative Importance of Transport Equipment Is Declining

World: Export Shares of Individual Industries. 1990-2007

in % of total trade



Cumulative Real Manufacturing Export Growth in %, 1995-2007.

in %	total	office & acc.mach.	motor vehicles	other transport
World	138	1072	149	146
CEE-10	445	20111	1426	320
CIS	283	1959	359	176
S-E-Asia	260	1479	156	166
EU-15	125	654	134	105
NAFTA	117	557	84	156
LatAm	115	2181	256	586

Source: UN COMTRADE.

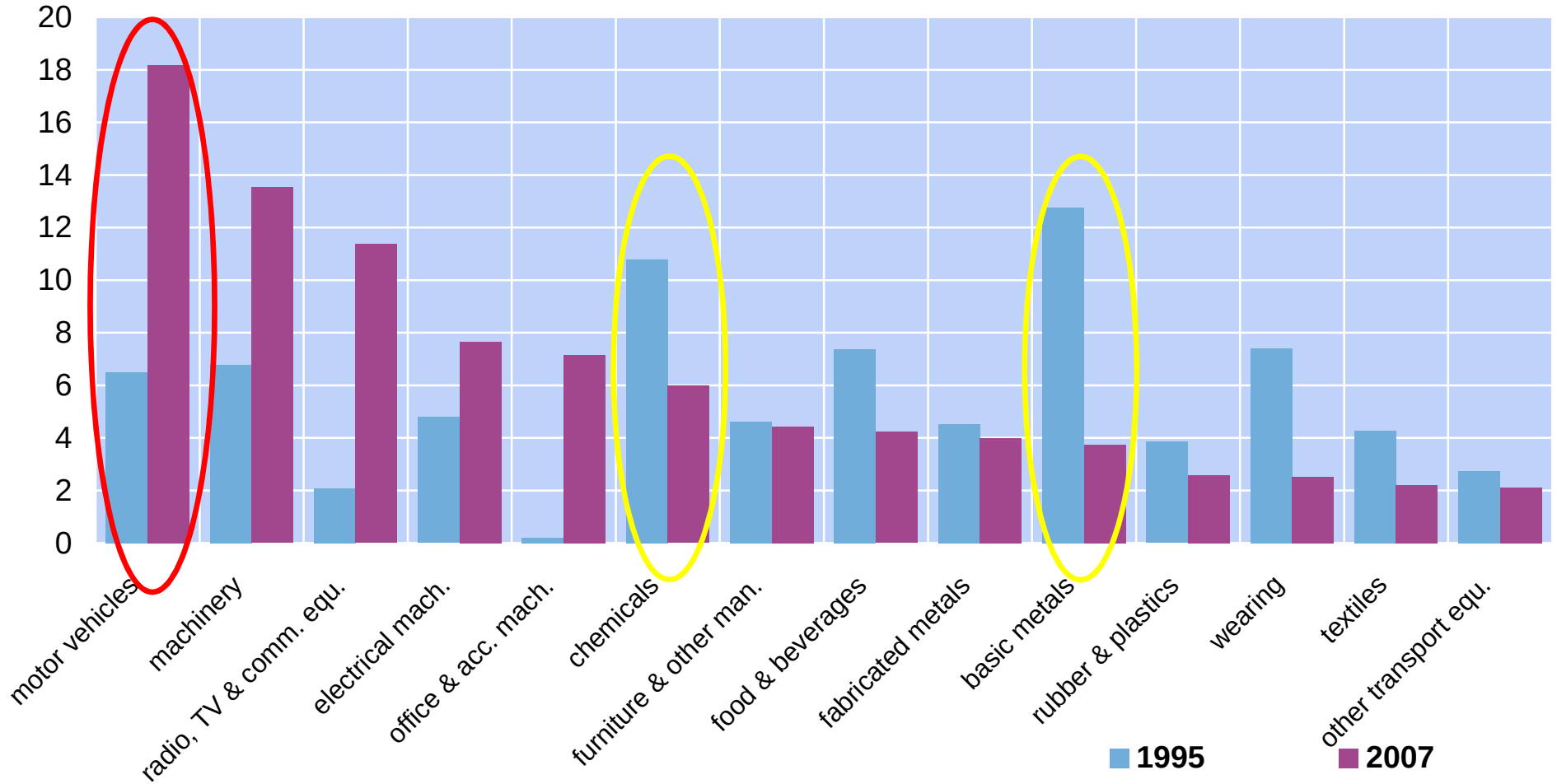
JOHANNES KEPLER UNIVERSITÄT LINZ | JKU

OeNB

Pronounced Structural Change in New Members

CEE-10: Export Shares of Individual Industries, 1995-2007

in % of total trade



Source: UN COMTRADE.

Structural Decomposition of Export Growth

X_{isp} ... exports X in sector i by country s to destination p

$$\phi_{i,s} = \frac{X_{i,s}}{\sum_i \sum_r X_{i,s}}$$ ... export shares by country for each industry

$$\Phi_i = \frac{\sum_s X_{i,s}}{\sum_s \sum_i X_{i,s}}$$ ... global shares by industry

$$\Psi_i = \sum_s X_{i,s}$$ ... global exports by industry

Structural Decomposition of Export Growth

$$\%\Delta X_s = \frac{X_s^1 - X_s^o}{X_s^o} = A + B + C$$

$$A: \text{global change in total trade} = \sum_i \Phi_i^0 \left[\frac{\Psi_i^1 - \Psi_i^o}{\Psi_i^o} \right]$$

pure growth effect

initial structure

$$B: \text{deviation from global share structure} = \sum_i \left(\phi_{i,s}^0 - \Phi_i^0 \right) \left[\frac{X_{i,s}^1 - X_{i,s}^o}{X_{i,s}^o} \right]$$

$$C: \text{shift in composition} = \sum_i \Phi_i^0 \left[\frac{X_{i,s}^1 - X_{i,s}^o}{X_{i,s}^o} - \frac{\Psi_i^1 - \Psi_i^o}{\Psi_i^o} \right]$$

industry specific growth differential

Structural Decomposition of Real Export Growth

Export growth (DX) = A + B + C

A: **pure growth effect, global export growth without structural change**

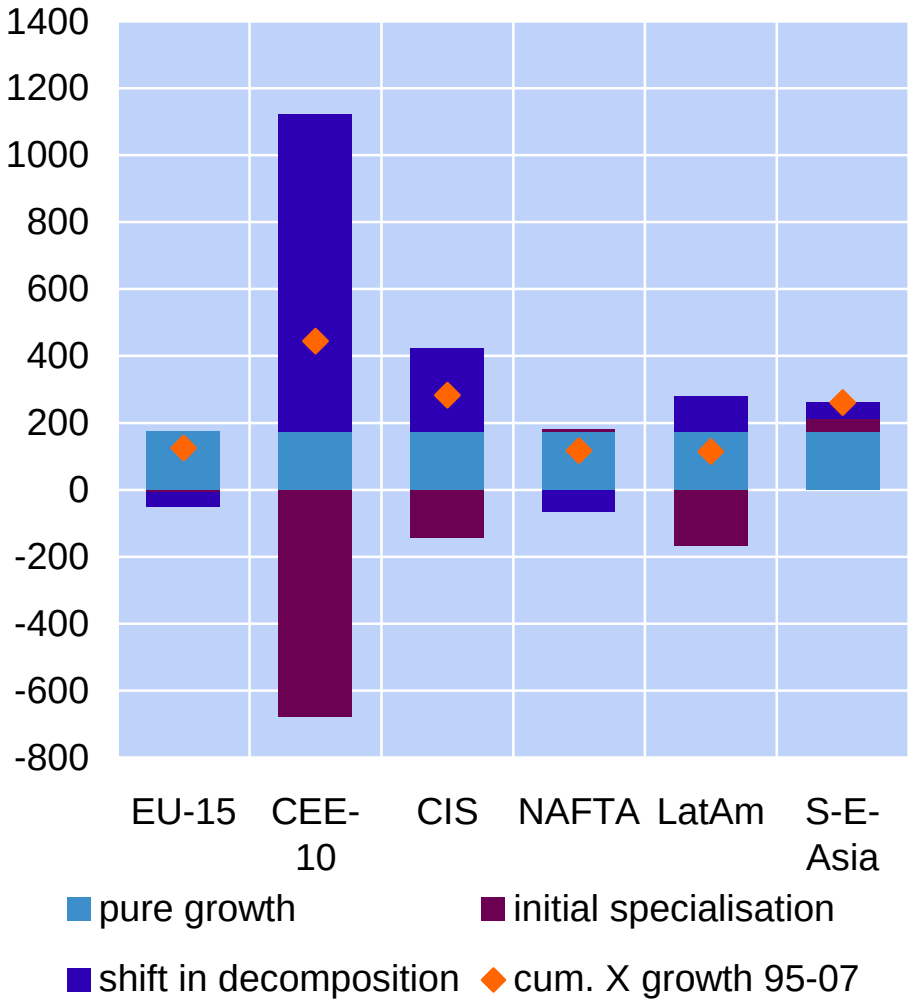
B: **effect of initial sectoral specialisation, deviation from the global industry structure**

C: **effect of growth differential in individual sectors, shift in industry composition in a country‘s exports**

Large values of B + C indicate a high importance of structural change

Structural Decomposition of World Export Growth 1995-2007

in percentage points, X growth in %



Source: own calculations.

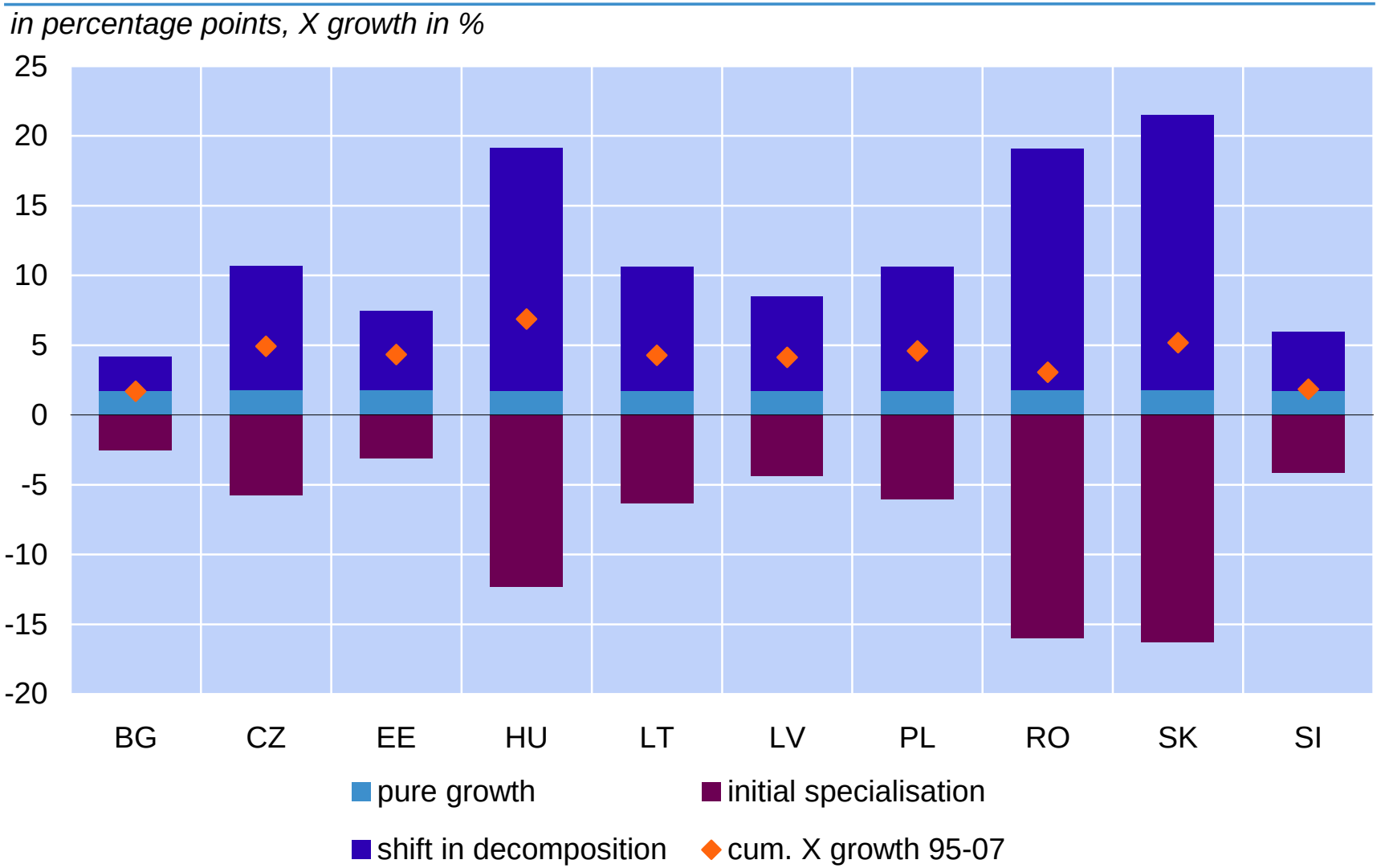
Large growth differentials between regions (Eastern Europe and East Asia most dynamic)

Contribution of moving-into-fast-growing-sectors to overall export growth is highly positive in CEE

Negative contribution of initial specialisation in CESEE

Importance of structural change is observed in CESEE only, but not so much in East Asia

Structural Decomposition of CEE-10 Export Growth 1995-2007



Source: own calculations.

Response of Exports to Output Growth Revisited

Estimating the Elasticity of Exports to Output

1.) Based on Input-Output Tables *(Bems, Johnson & Yi 2010; Eaton, Kortum, Neiman & Romalis 2010)*

2.) Based on regression analysis *(Irwin 2002; Freund 2009, our paper)*

Existing literature regresses export growth on GDP growth, thus confounding changes in the export response to output (GDP) growth with structural changes in the sectoral composition of exports and GDP.

Also, exports and GDP are usually deflated by an economy-wide aggregate price index, disregarding significantly different price developments at the sectoral level.

Further, exports and GDP are based on very different concepts: gross versus net concept

Export Elasticity to Value Added

Define GDP in growth terms as the weighted growth in value added in goods and in services:

$$g_{GDP} = \theta_{goods} g_{VA,\ goods} + \theta_{services} g_{VA,\ services}$$

Define a set of export growth indicators:

$$Z_1 = g_X - g_{GDP}$$

$$Z_2 = g_{X,\ goods} - g_{GDP}$$

$$Z_3 = g_{X,\ goods} - g_{VA,\ goods}$$

$$Z_4 = g_{X,\ services} - g_{VA,\ services}$$

Then: $$Z_2 = Z_3 + \theta_{services} \left[g_{VA,\ goods} - g_{VA,\ services} \right]$$

Z_2 is commonly used in the literature. We look at Z_3.

Trade growth and GDP growth

The relationship between export growth and GDP depends on the composition of GDP growth. It also depends on how we measure export growth:

$$\underbrace{g_{X,goods} - g_{GDP}}_{\text{trade growth in goods relative to GDP}} = \underbrace{(g_{X,goods} - g_{VA,goods})}_{\text{trade growth in goods relative to goods output}} +$$

$$+ \underbrace{\theta_{services}[g_{VA,goods} - g_{VA,serices}]}_{\text{differences in sector growth rates}}$$

Change in trade growth over time can result from:

- **Changes in structure of GDP itself (if some sectors are more trade intensive)**
- **How we measure total trade growth**

We focus on goods trade relative to goods output in the following!

Estimating the Elasticity of Exports to Output

Simple regression over exporters *s*, industries *i* and time *t* (1995-2007):

$$d \ln X_{sit} = \alpha + \beta * d \ln(output)_{sit} + \mu_{si} + \varepsilon_{sit}$$

	estimated elasticity	deflators used
Total X_{st} / GDP_{st}	**3.4**	GDP-deflator
Man. X_{st} / GDP_{st}	**2**	sector specific
Man. X_{st} / Man. VA_{st}	**0.19**	sector specific

Source: Freund 2009, own calculations.

Difference in **deflators**: relevant differences in price developments of cars, electrical machinery and precision instruments (together 17% of total trade)

Difference in **base**: GDP (= 30% goods and 70% services) versus Manufacturing Value Added (=100% goods)

Elasticity of Exports to Output Over Time and by Regions

	full period	1995-2001	2001-2007
common coefficient:			
value added	**0.19 *****	**0.14 *****	**0.19 *****
Obs.	*622*	*281*	*402*
Countries	*81*	*69*	*78*
adj. R_2	*0.0976*	*0.0600*	*0.1019*
regional differences:			
EU-15	**0.26 *****	**0.23 *****	**0.20 *****
CEE-10	**0.30 *****	**0.38 *****	**0.09 *****
NAFTA	**0.10**	**0.54 *****	**0.74 *****
LatAm	**0.05 *****	**-0.03 *****	**0.24 *****
S-E-Asia	**0.38 *****	**0.37 *****	**0.49 *****
Obs.	*622*	*281*	*402*
Countries	*81*	*69*	*78*
adj. R_2	*0.1238*	*0.0975*	*0.1284*

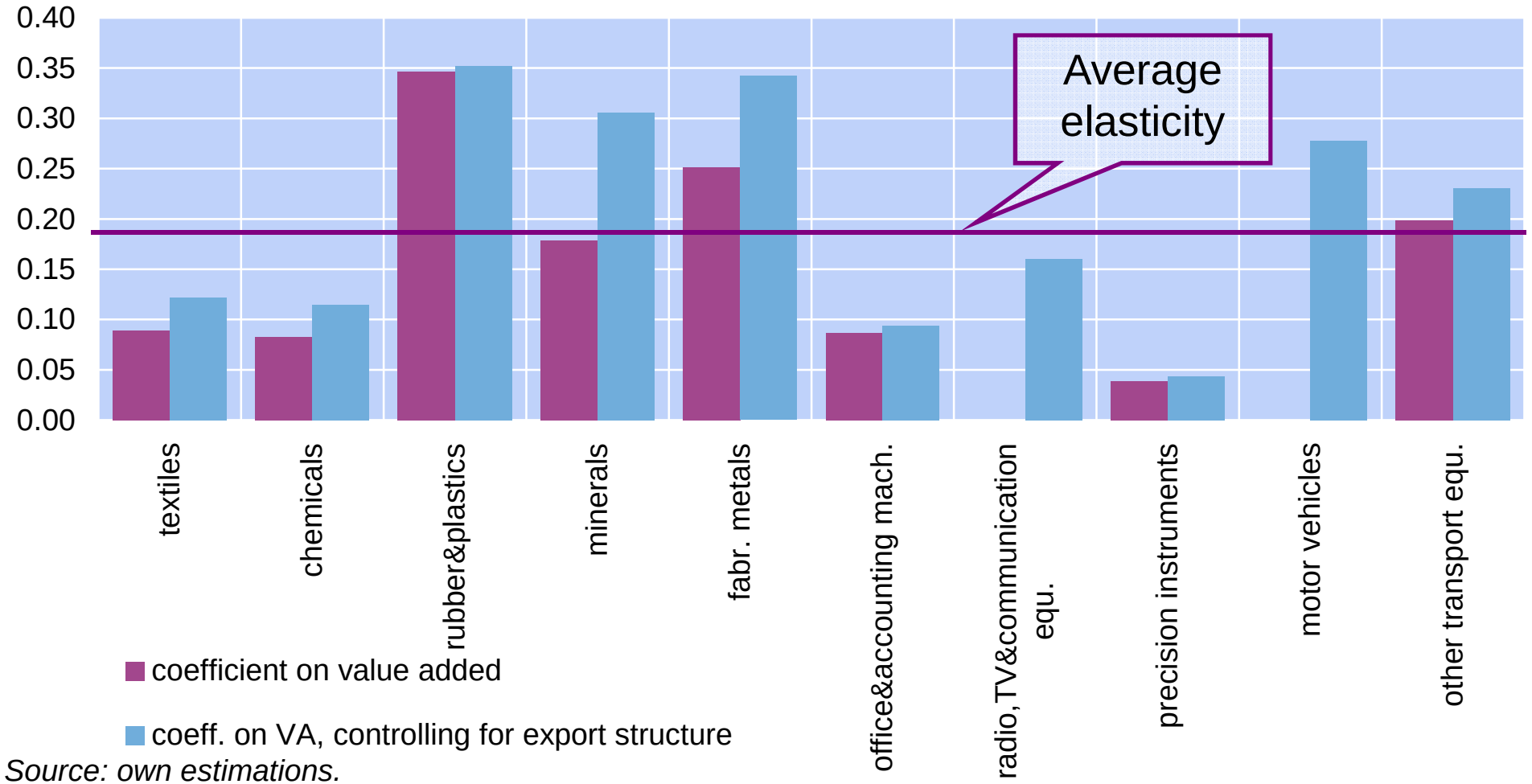
Source: own calculations.

Output-elasticity of trade has increased over time

Large regional differences

Stronger trade reaction in Europe and S-E-Asia to output shocks

Elasticities of Exports to Value Added by Industries



Source: own estimations.

Implications for CEEs

Structural Change Remains an Important Driver of Growth

In particular transition economies showed a successful restructuring towards fast growing sectors, which also explains their above-average export performance.

In the past this implied increasing specialisation on motor vehicles besides machinery and electronic goods.

However, in a longer term perspective, trade in motor vehicles is becoming less important in relative terms.

(Further, trade in machinery and cars was severly hit in the recent crisis, corroborating the negative impact on Eastern Europe.)

Therefore, domestic restructuring remains important for the region, as global trade patterns partly move away from CESEE‘s current specialisation.

Conclusions

Stylized fact: trade grows faster than GDP

Long-term analysis of structural change in trade shows that changes in the sectoral and regional composition of trade have in fact driven trade growth to a large extent.

This result is important, as it offers an alternative explanation of the rise and fall of trade: Changes in the composition of trade itself (i.e. countries moving into trade-intensive sectors), rather than the nature of trade and production (i.e. global supply chains).

This may also imply that we overestimate the effect of falling trading costs and global supply chains.