

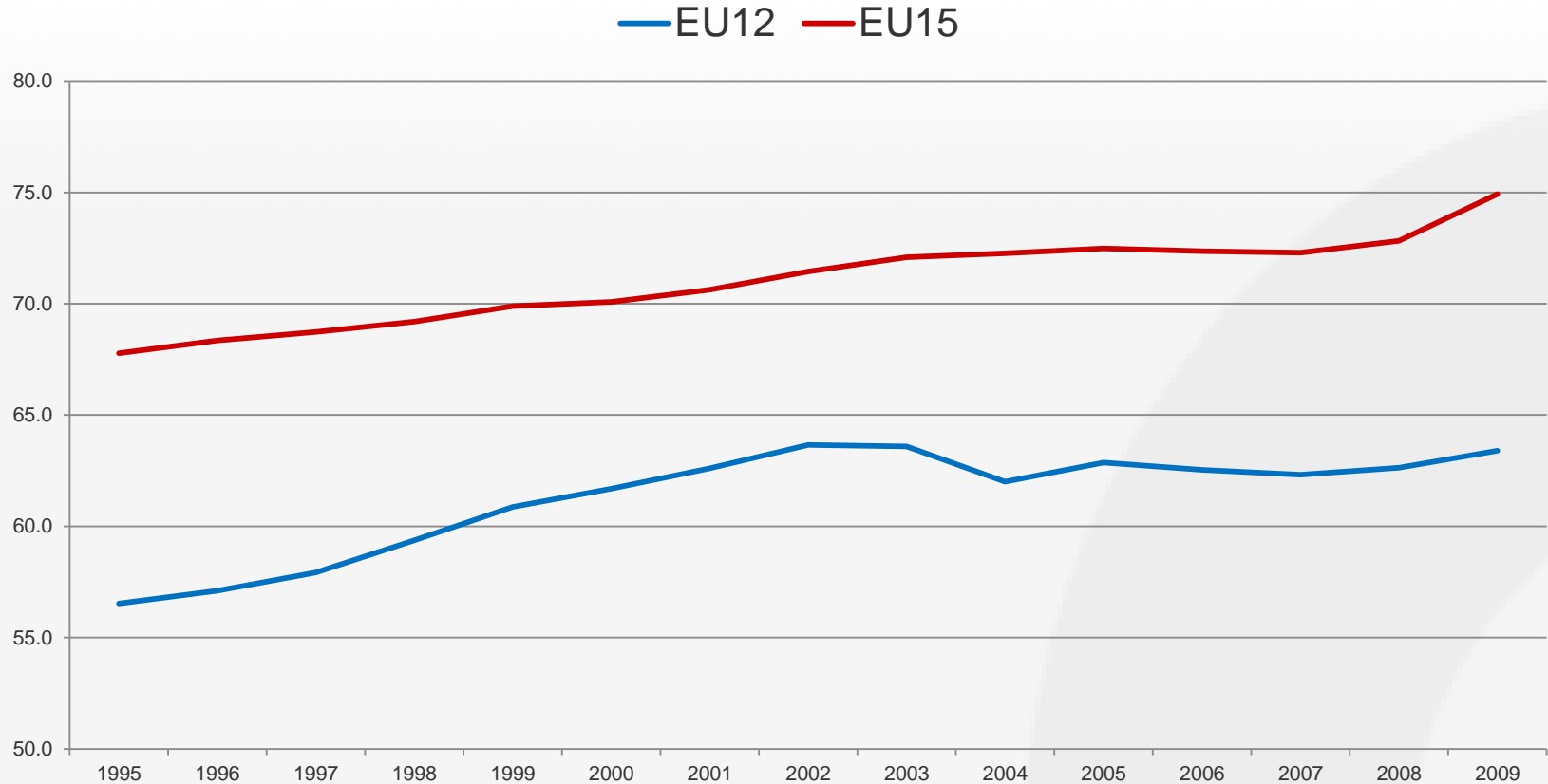
Services linkages and value added content of trade

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Motivation

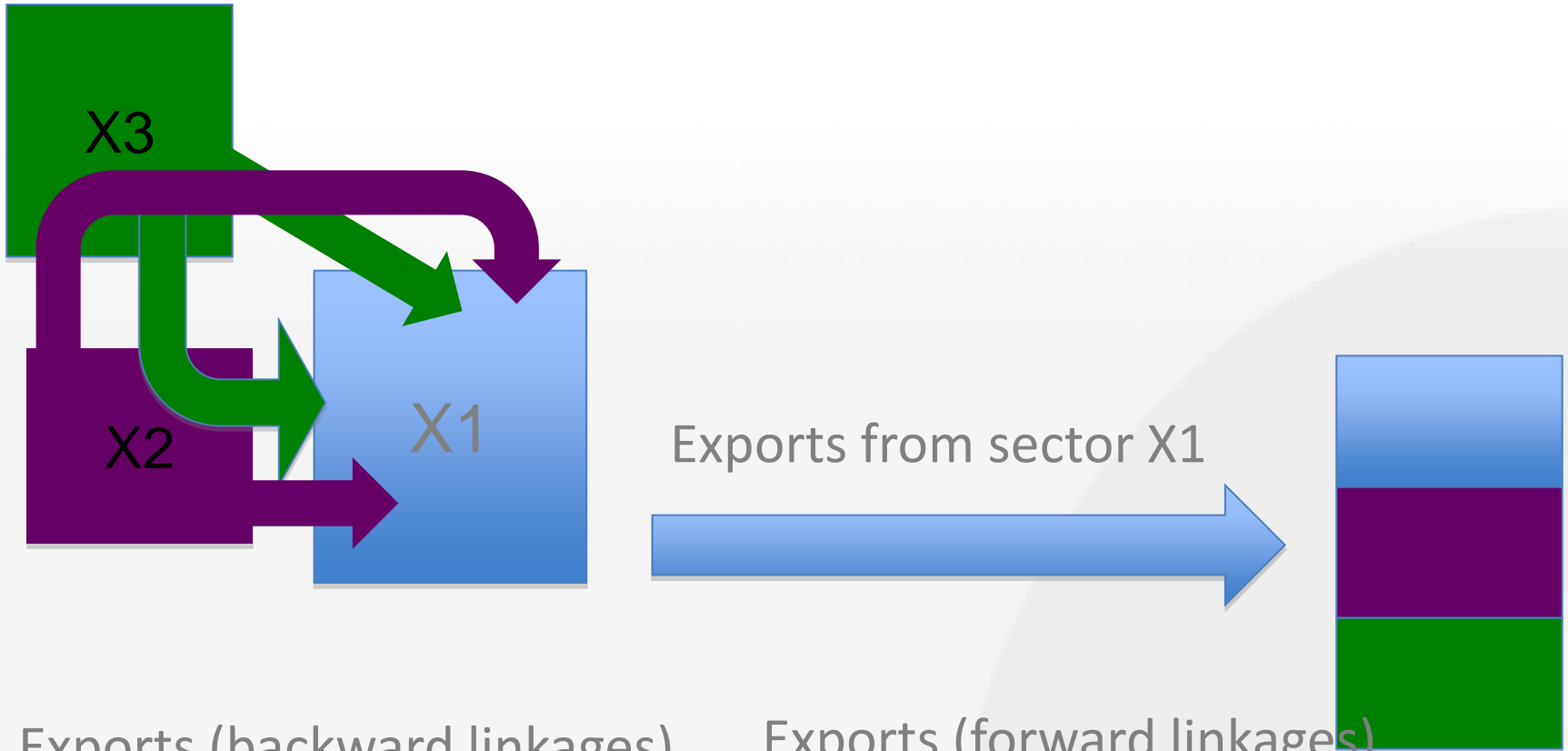
- While direct exports are informative when exploring trade linkages, ultimately it is the linkages between trade and value added (labor, investment, land and natural resources) that establish a link between trade and the pattern of national income and labor market conditions.
- Services account for more than 70% of GDP in most developed economies and for increasingly higher cost shares for manufacturing industry

Share of services in GDP, %

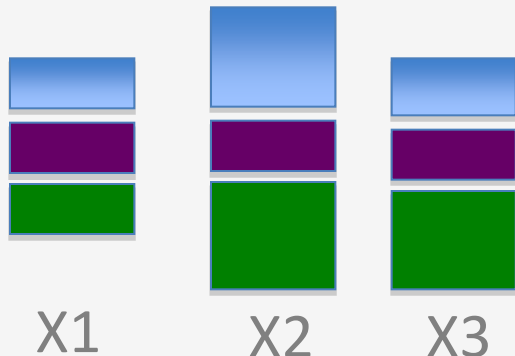


Source: WIOD, own calculations

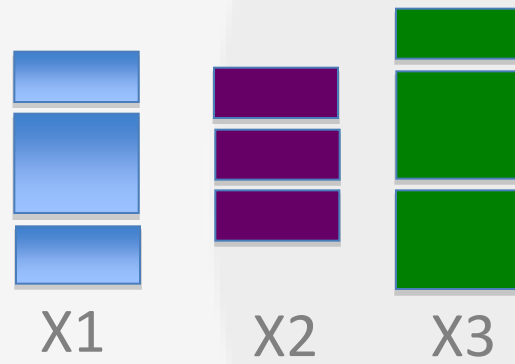
Activity flows and exports



Exports (backward linkages)



Exports (forward linkages)



Working with the intermediate accounts (input-output data) from GTAP, we estimate the Leontief inverse matrix **M**.

We also define the vector **B** which represents the value added share of gross output in our data. This means we can represent value added

$$\mathbf{V} = \mathbf{B}\mathbf{M}.$$

Finally, we can obtain the value added (factor or activity content) of exports

$$\mathbf{G} = \mathbf{V}\mathbf{Z}$$

from **V** and the vector of exports **Z**.

Tracing value-added through linkages

		sector 1		sector n		Activity content
sector 1	vq_1	$\rightarrow V_1$	L	vq_n	$\rightarrow V_n$	$\sum_j vq_{1j}$
	M		M	O		M
sector n	vq_n	$\rightarrow V_1$	L	vq_n	$\rightarrow V_n$	$\sum_j vq_{nj}$
	$\sum_j vq_{j1}$		L	$\sum_j vq_{jn}$		
	Factor content					

Note: the diagonal gives us the direct domestic value added content of exports



Forward and backward linkages

- Direct cost shares linked to demand for intermediate inputs

$$\theta_{z,i} = \frac{e_{z,i}}{\sum_j e_{j,i}} \times 100$$

- Direct value added in exports $\alpha_z = v_z x_z$

- Total (direct and indirect) value added in exports based on forward linkages

$$F_z = \alpha_z + \sum_{i \neq z} .01 \times \theta_{z,i} v_z x_i$$

- Total (direct and indirect) value added in exports based on backward linkages

$$B_z = \alpha_z + \sum_{i \neq z} .01 \times \theta_{i,z} v_i x_z$$

- $e_{i,j}$ – expenditure in sector j on inputs i , including both value added or primary inputs (capital, labor, land) and intermediate inputs;
- v_j – expenditure on primary inputs as a share of total costs of production in sector j ; and
- x_j – gross value of exports from sector j .

- GTAP vintages: 1992, 1995, 1997, 2001, 2004, 2007
 - Globally linked social accounts data (input-output, final demand, and bilateral trade)
 - Global aggregation (preserving gross trade flows)
 - Regional aggregation (full 1992 region structure gives us 29 countries and regions)
 - Sector aggregation (full 1992 region structure gives us 24 sectors)
 - Trade flows are reconciled to BOP data on services margins (in contrast to WIOD)

- For 1997-2007, data cover 98 countries and 26 sectors. In the full panel there are 29 countries and 24 sectors.

- Reconciling UN, OECD, EUROSTAT, US, IMF sources of data
- Different types of problems
 - Different data format conventions and human factor
 - Missing data – countries who just do not report
- Solutions
 - Cross-checking across multiple sources
 - Mirroring of flows, cross checking types of flows
 - Reconsurtuction of aggregates from reconciled detailed flows

■ Input-Output studies of services and linkages

- Francois, Manchin and Tomberg (2013) analyze services linkages and value added content of trade based on GTAP data
- Park and Chan (1989), Francois and Reinert (1997), Robinson et al. (2002) all offer cross-country study of linkages between goods and services
- Inklaar, Timmer, and van Ark (2007), Francois and Woerz (2008), Pindyuk (2011) explore service linkages and transmission of productivity and openness shocks across sectors

■ Country and regional CGE studies of services:

- Kox and Lejour (2006) examine EU integration and regulatory divergence.
- ECORYS (2009) focuses on transatlantic barriers, and Sunesen et al (2009) on Japan, NTMs quantified with surveys and econometrics.
- Balisteri, Rutherford, and Tarr (2009) examine domestic and foreign firm regulation in Kenya, also using firm surveys.
- Francois and Pindyuk (2011) emphasize services aspect of the factor content of trade to the crisis transmission in Austria.

- Strong linkages between manufacturing and services mean that trade shocks in manufacturing sectors feed back to the service sector as well
- At the same time, this sector is not as exposed to trade as manufacturing itself
- Francois, Pindyuk (2011) show that in Austria
 - great deal of the value added contained in Austrian manufacturing exports comes from (producer) service inputs
 - services account for for 31% of exports in value terms, but for 49% of exports in terms of total value added
 - 40% of the drop in external demand feeds back to services

Some global trends

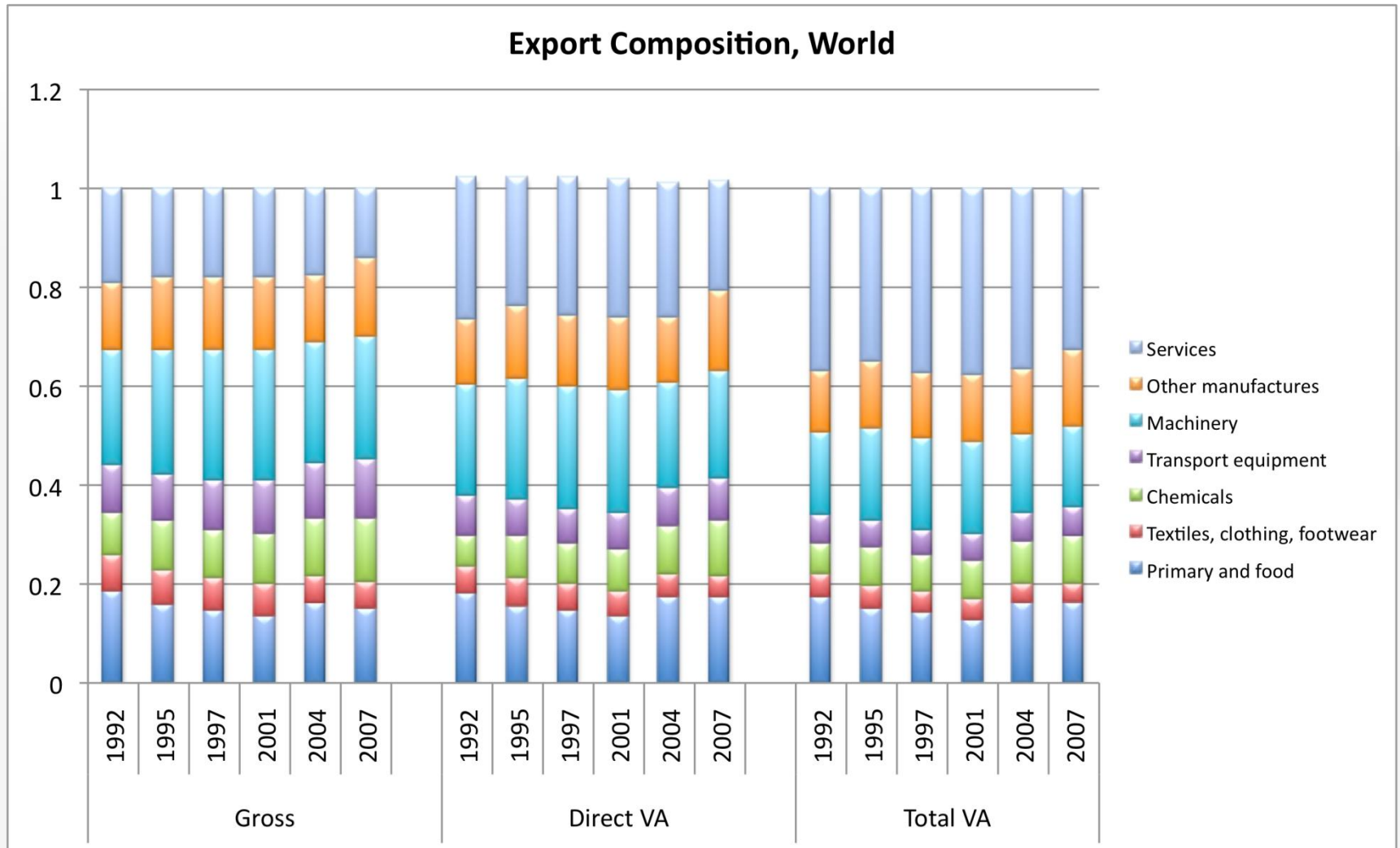
value added and gross values

- Falling ratio of value added to gross values in trade for goods (increased roundaboutness and cross-border vertical fragmentation)
- Ratio >1 for services (follows from embodied exports exceeding direct exports) with no apparent change over time (except construction)

total value added in exports relative to gross value of exports						
	1992	1995	1997	2001	2004	2007
Total	0.696	0.670	0.635	0.628	0.594	0.594
Public Services	1.380	1.006	1.367	1.380	1.301	1.425
Commercial Services	1.430	1.628	1.492	1.335	1.241	1.421
Trade and Transport	1.239	1.171	1.257	1.339	1.186	1.424
Construction	2.401	1.598	1.231	1.565	1.484	1.657
Other Manufactures	0.573	0.571	0.552	0.554	0.583	0.590
Machinery	0.451	0.446	0.396	0.391	0.346	0.350
Transport Equipment	0.375	0.344	0.293	0.290	0.267	0.270
Metals	0.719	0.647	0.593	0.601	0.589	0.536
Chemicals	0.470	0.517	0.466	0.456	0.412	0.417
Textiles, clothing, footwear	0.410	0.404	0.390	0.383	0.371	0.379
Energy and mining	0.662	0.641	0.597	0.555	0.584	0.634
Agriculture and processed foods	0.679	0.648	0.638	0.646	0.660	0.677

Source: GTAP data; calculations Francois et al

The activity composition of exports - global view

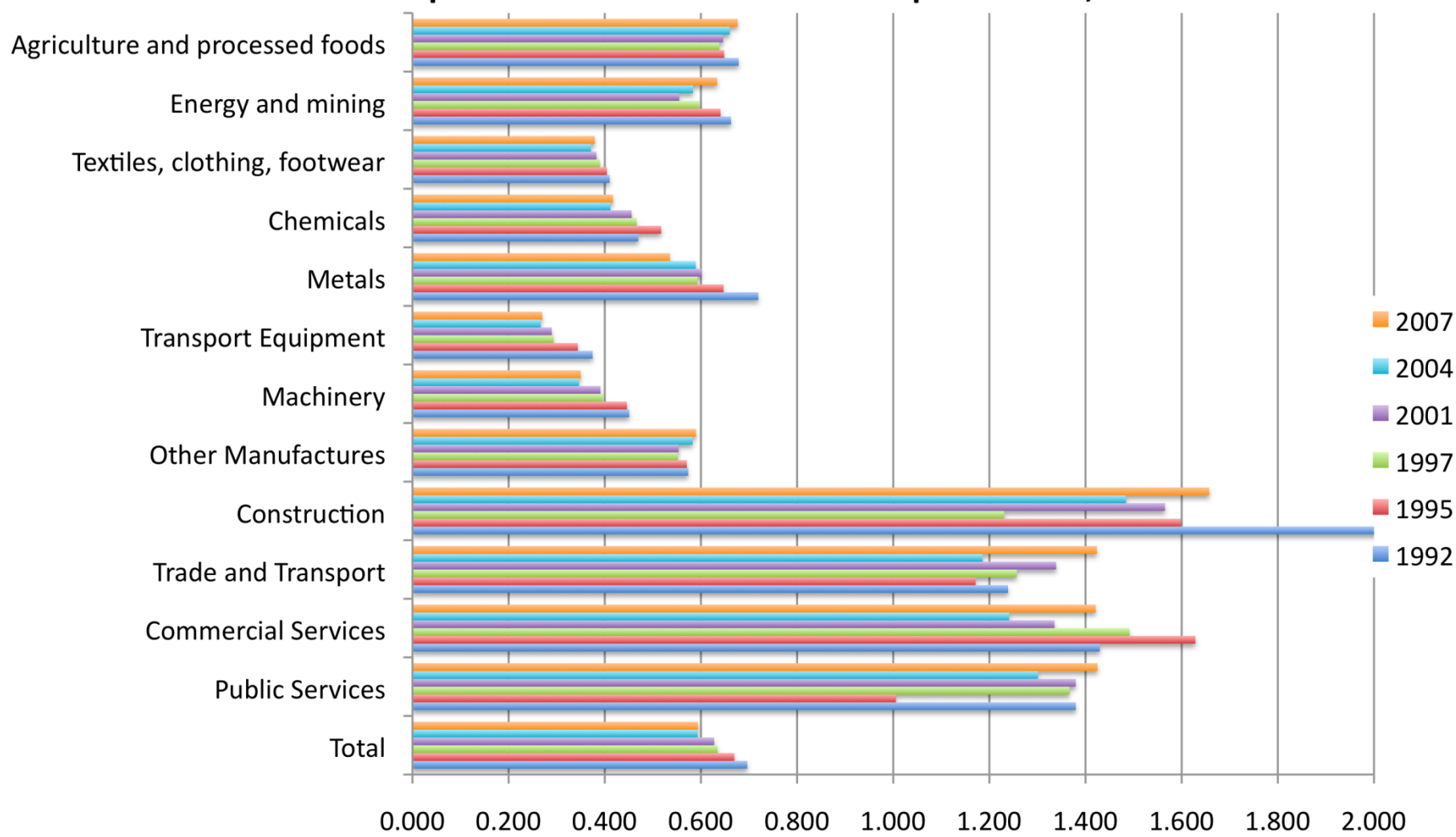


Source: GTAP data; calculations Francois et al



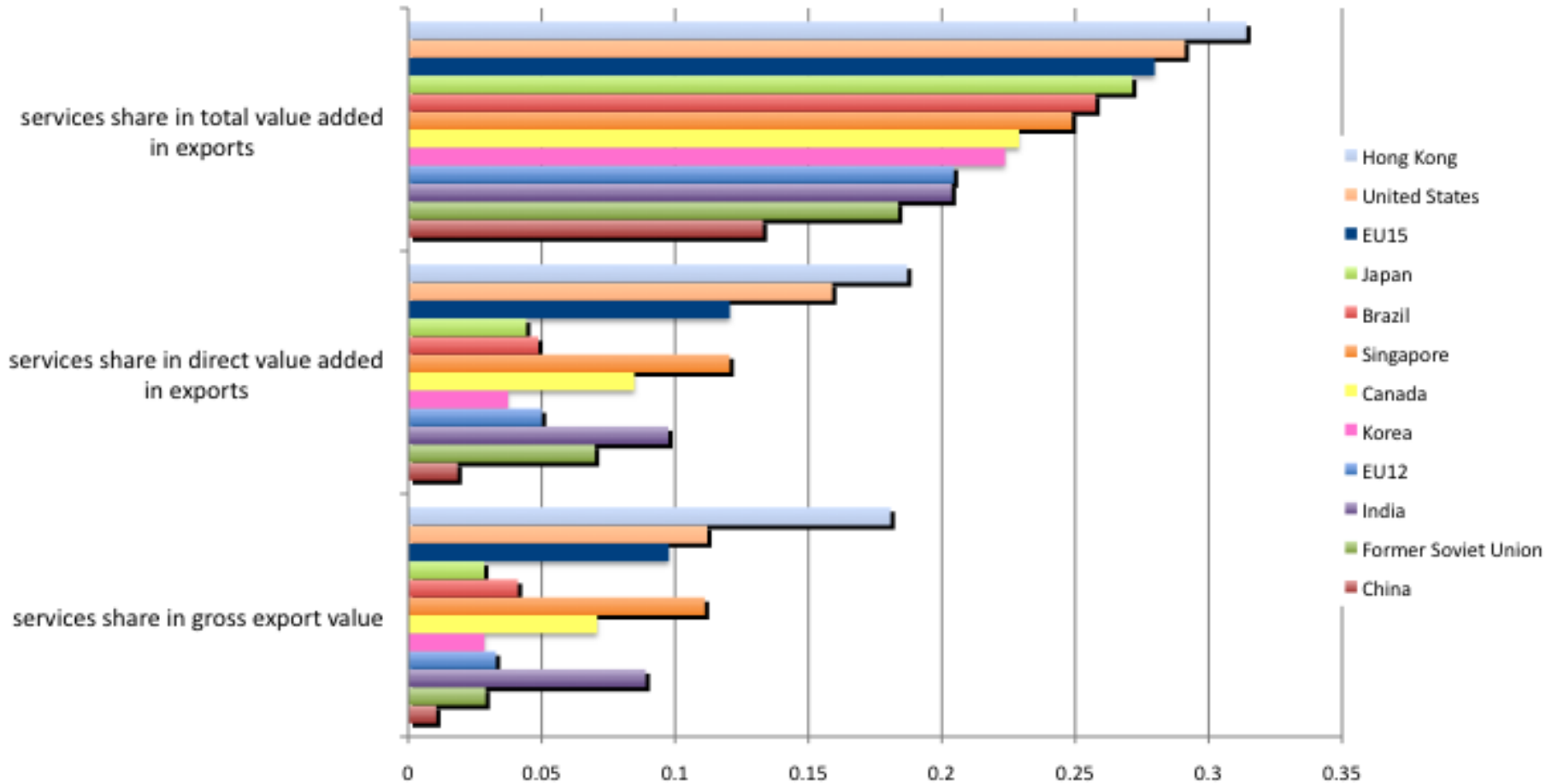
Activity composition of exports - global view

Ratio of Exported Value Added to Gross Export Values, World

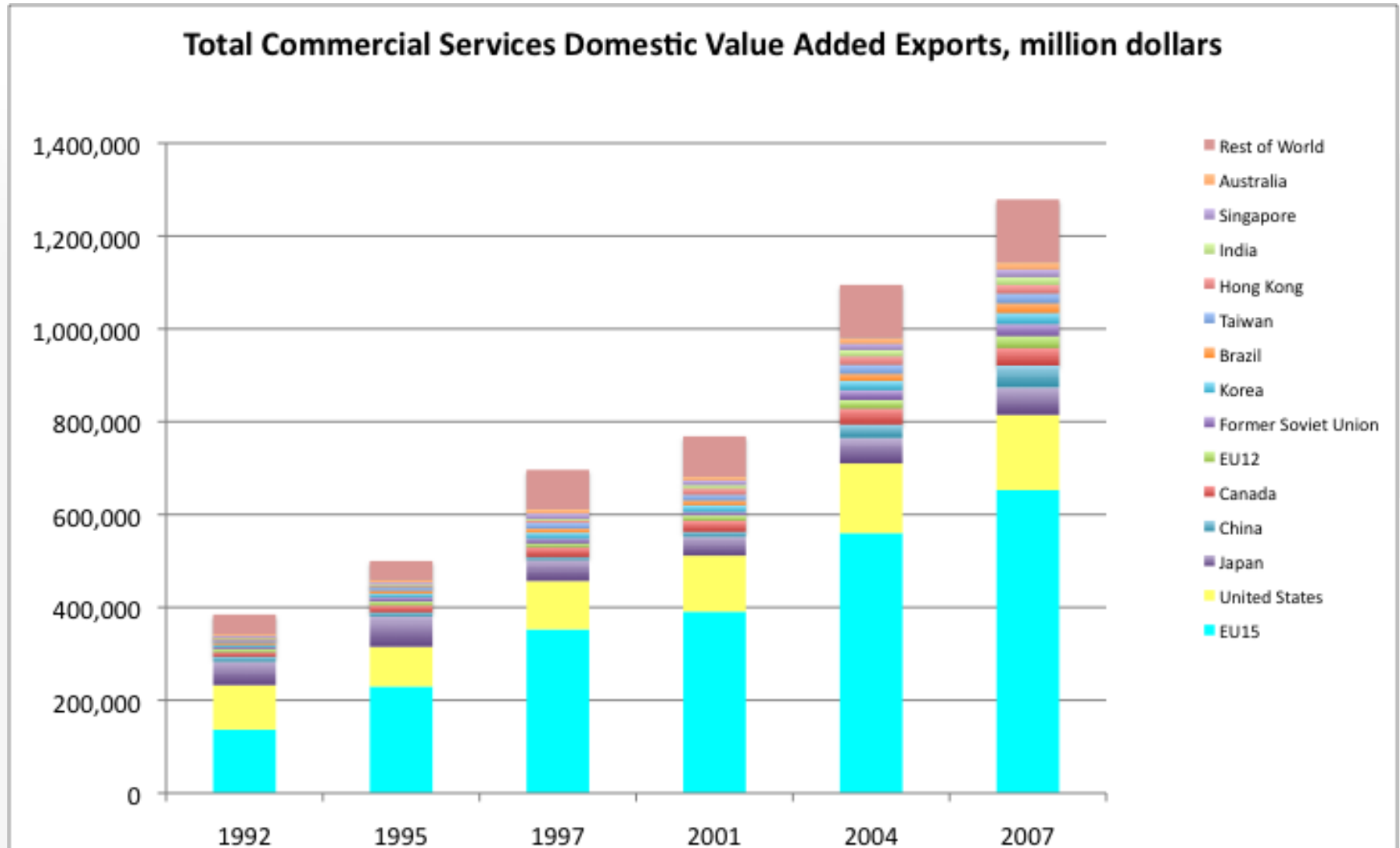


Source: GTAP data; calculations Francois et al

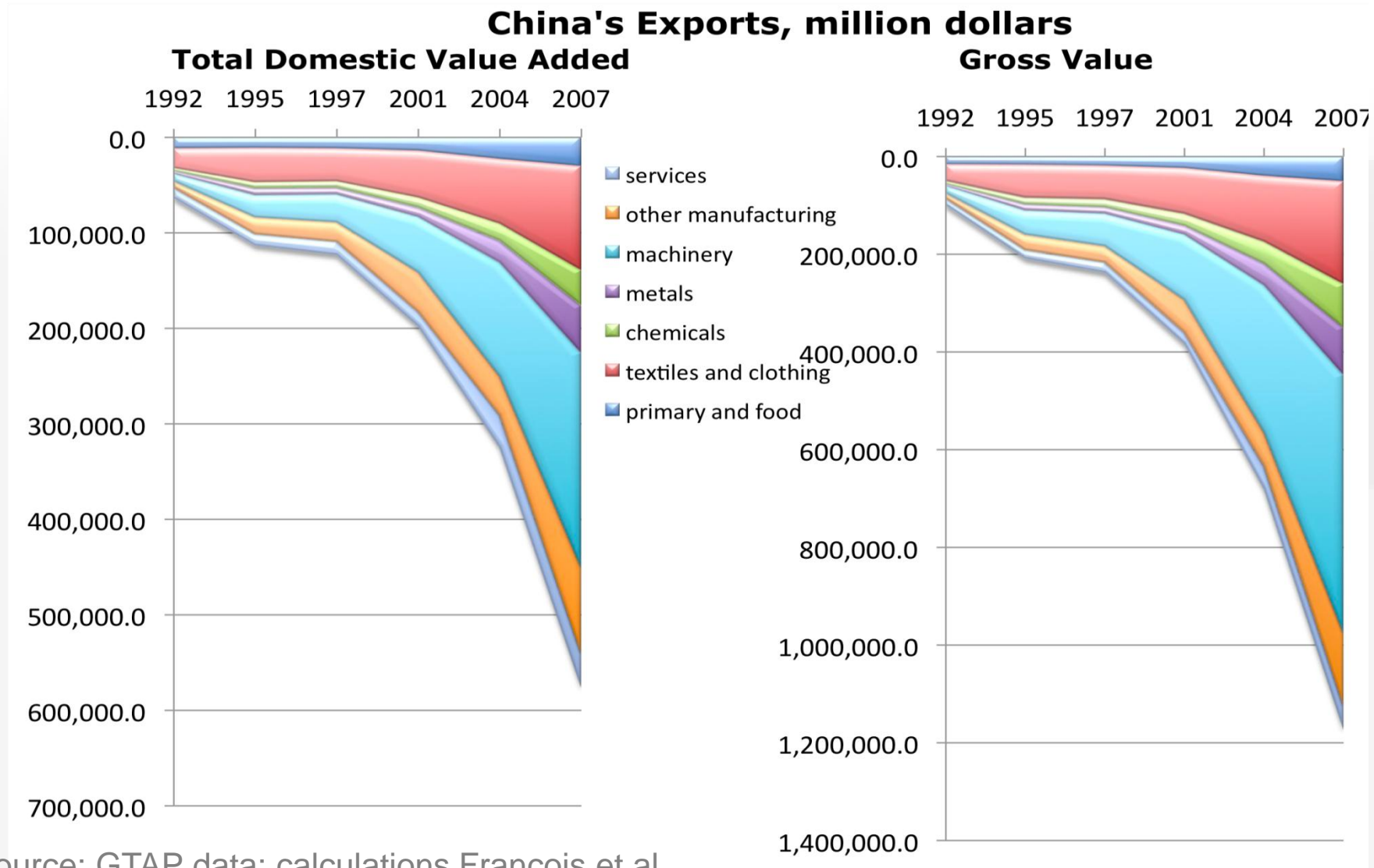
Commercial Services Share of Exports, 2007



Trend – EU15 are a growing source of embodied service exports



Trends – China has seen growth in everything but services



Source: GTAP data; calculations Francois et al

Services in production and trade in cross section

- Linkages mean services are important not only in direct trade, but more so in the impact they have on traded goods costs.
- There is also a delineation based on income levels.

Commercial Services share of exports (excludes transport, public services), 2007

	gross export value	direct value added in exports	total value added in exports
EU15	0.098	0.121	0.280
EU12	0.033	0.050	0.204
United States	0.112	0.159	0.291
Canada	0.071	0.085	0.229
Australia	0.062	0.085	0.224
Japan	0.028	0.044	0.271
Korea	0.029	0.037	0.224
China	0.010	0.018	0.133
Hong Kong	0.181	0.187	0.314
Singapore	0.111	0.120	0.249
India	0.089	0.097	0.204
Brazil	0.041	0.049	0.258
Former Soviet Union	0.029	0.070	0.184

Source: GTAP data; calculations based on Francois et al

Sectoral structure of Austrian exports in 2007, %

	Gross value	Total value added
Other machinery	20.6	12.3
IT and other business services	12.8	16.9
Other light manufacturing	11.3	9.2
Transport	10.9	17.3
Motor Vehicles	10.1	6.2
Chemicals and plastics	8.6	6.2
Metals	8.2	5.8
Processed Food	4.0	4.2
Textiles and Clothing	2.7	2.3
Finance and insurance	2.5	4.2
Other	8.4	15.4

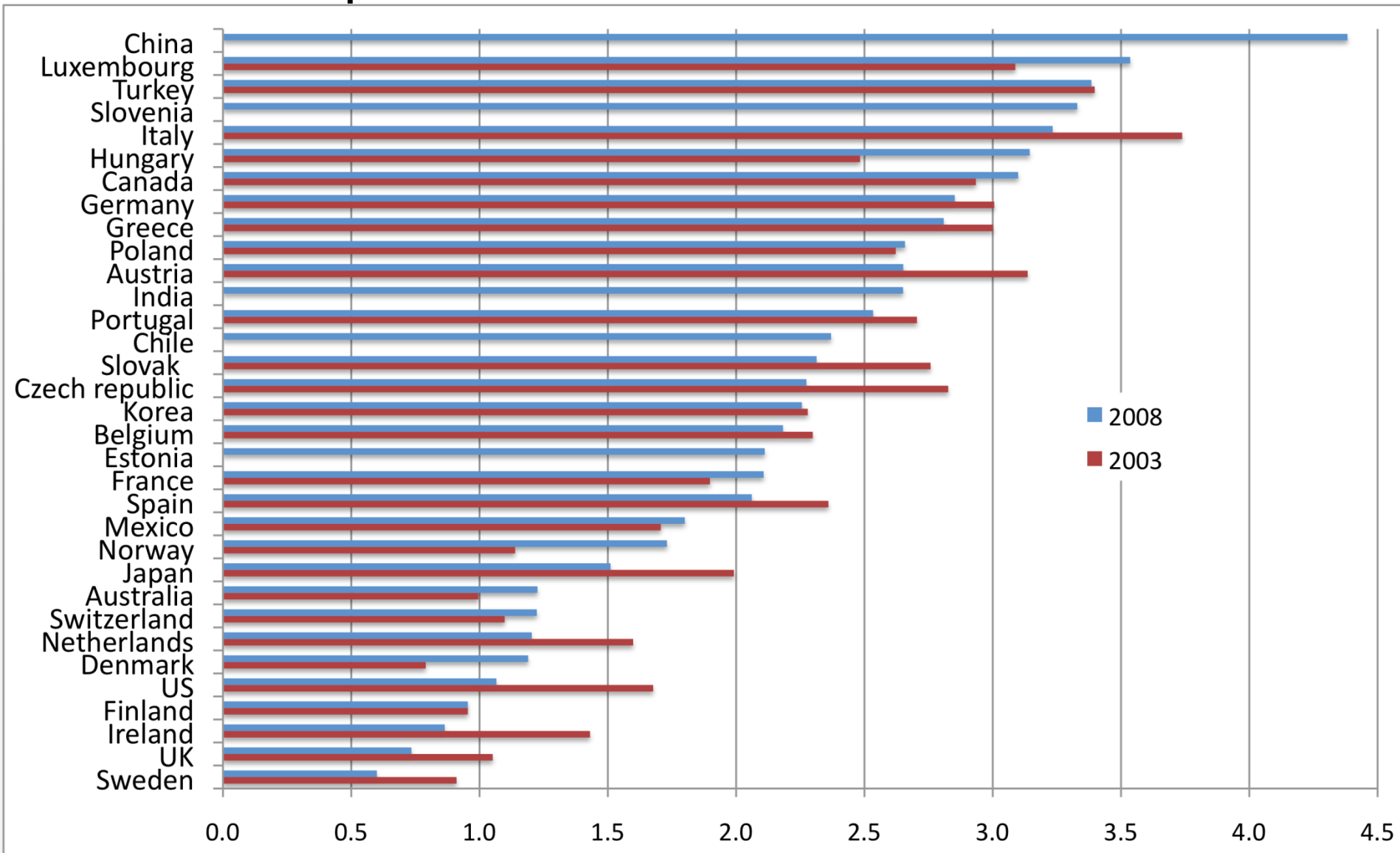
- Differences in productivity are considered to be the main source of income per capita variability across countries (Hall and Jones, 1999)
- Since 1995, acceleration in labour productivity in most services industries in the US (Bosworth and Triplett (2006))
- Post-2000 productivity growth in the US was driven by capital deepening and productive advance in services (Bosworth and Triplett, 2007)
- Slowdown in the EU15 productivity growth during 1995-2006
 - slower emergence of the knowledge economy in Europe (O'Mahony and Timmer (2008) (O'Mahony and Timmer (2008))
 - services regulations and productivity (Kox and Lejour, 2007)

- Services have been playing increasingly more important role in boosting productivity of manufacturing sectors (Arnold, Javorcik, and Mattoo (2006), Javorcik (2004), Maroto-Sanchez and Cuadrado-Roura (2008))
 - Directly as intermediate inputs
 - Facilitating transactions through space and time
 - Transmission of knowledge spill-overs and change of production processes of client firms

- Liberalization of services trade has positive impact on manufacturing sectors' productivity (Arnold, Javorcik and Mattoo, 2011; Arnold et al., 2012; Shepotylo and Vakhitov, 2011)
 - EBRD policy reform index
 - Presence of foreign investors
 - FDI inflows
 - Level of competition

- Several dimensions:
 - Affecting establishment (the ability of services suppliers to establish physical outlets in an economy and supply services through those outlets) or ongoing operations (the operations of a services supplier after it has entered the market);
 - Non-discriminatory (restricting domestic and foreign services suppliers equally) or discriminatory (restricting only foreign services suppliers);
 - Affecting prices of services or costs of service providers.
- Even when services regulations are not discriminatory and were designed to meet legitimate economic or social objectives, they may they still hamper trade

OECD indices of regulation in professional services



OECD indices of regulation in retail distribution

