Maritime Economics & Logistics (MEL)

P1: Transport and Trade Logistics

Port & Maritime Organization – I.R. Iran
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Recommended Reading:

1. UNCTAD *Review of Maritime Transport* (various years); freely downloadable from www.UNCTAD.org
2. HE Haralambides: Special Handout
3. HE Haralambides: Works on http://eur.academia.edu/HerculesHaralambides
4. HE Haralambides: Works on https://www.researchgate.net/profile/Hercules_Haralambides

The Role of Transport and Transport Infrastructure in the National Economy

- Adds utility: FOB+T = CIF
- Expands markets for inputs and output
- Allows mass production, minimization of unit costs and international competitiveness
- Connects transshipment points (ports, airports)
- Facilitates regional development
- Affects locational decisions of firms
- Efficient transport reduces inventory costs (*J-I-T*) and overall transport costs (less congestion) and increases productivity and profits
- Creates substantial direct, indirect and induced employment
- Meets national defense requirements

How do we measure the economic impact of shipping and ports?

Input-Output (I/O) or Economic Impact Analysis (EIA) is a powerful tool in project evaluation and economic policy formulation, invented by the Russian Nobel Prize winner economist Vassily Leontief (read my paper: on the impact of shipping).

In project evaluation it measures the overall impact of a project (direct; indirect; induced), such as a road, a port, or Panama Canal, in terms of employment, income, value added, and taxes to the government.

In terms of policy formulation, I/O analysis ranks sectors in the Economy, according to their forward and backward linkages with other sectors, and it thus allows prioritization of public spending.

The Position of Shipping in Input-Output Tables

		SECTORS					FINAL DEMAND			
		Agriculture	Manufacturing	Services	Shipping	Ports	*Personal Consumption*	*Private Investment*	*Net Exports*	*Government Expenditure*
SECTORS	Agriculture				**Victuals**					
	Manufacturing				**Parts**					
	Services				**Insurance**					
	Shipping	**Bulk**	**Liner**	**Tourism**	**INTRA INDUSTRY FLOWS**	**Tugs pilots**	**Cruises**	**Transport**	**Crosstrades**	**Cargo reservation**
	Ports				**Cargo handling**					
VALUE ADDED	Employment Costs				**Manning**		Σ=GNP			
	Profits and Depreciation				**Profits & Depreciation Allowances**		Σ=GNI			
	Rents				**Office rents**					
	Indirect Business Taxes				**VAT**					

Direct, Indirect and Induced Employment Impacts of Transport and Ports

Type of Employment	per $1 bn of US Federal Spending on Highways	Selected Ports in the European Union		
		Hamburg	Flemish Ports	Rotterdam
Direct	7,900	95,100	22,300	63,000
Indirect	19,700	47,500	22,500	35,000
Induced	14,500	N/A	N/A	N/A
Total	**42,100**	**142,600**	**44,800**	**98,000**

(Number of jobs)

Economic Impacts of Hub Ports

- Value added multiplier of $0.609m per increase of $1m of final demand for shipping
- Additional multipliers: Income (1.20); Output (1.76); Employment (20.23). In the case of Singapore, a small 'foreland' island state, economic impacts are distributed as follows:
  - 83% of impacts stays within the local economy
  - 17% of the impacts is spread throughout the national economy

  In most other cases of 'hinterland' ports, such as Rotterdam, this distribution could be the opposite and this is a major problem in the financing of ports, as impacts are not localized.

	Income	Output	Employment
a. Direct	0.78	1.00	11.99
b. Indirect	0.14	0.27	2.49
Total (a + b)	0.92	1.27	14.48
c. Induced	0.28	0.49	5.75
	1.20	1.76	20.23

Source: Port Multipliers in Singapore: Impact on Income, Output, and Employment.

Port Related Activities and Employment in Rotterdam

	Number of firms**			Employment***		
	1985	2005****	Change (%)	1985	2004	Change (%)
Stevedores	**99**	**50**	***-49.5***	**10732**	**5441**	***-49.3***
Multipurpose	60	25	*-58.3*	3197	629	*-80.3*
Labour pool	1	1	*0.0*	2300	785	*-65.9*
Full-container	11	9	*-18.2*	2240	2494	*11.3*
Roll on/roll off	2	3	*50.0*	168	294	*75.0*
Dry bulk (ore, coal, grain)	25	12	*-52.0*	2827	1239	*-56.2*
Transport	**1125**	**997**	***-11.4***	**17547**	**14421**	***-17.8***
Navigation	78	40	*-48.7*	7988	2775	*-65.3*
Inland navigation	626	436	*-30.4*	3502	2785	*-20.5*
Others (pipe, rail, road)	421	521	*23.8*	6057	8881	*46.6*
Storage and distribution	**58**	**63**	***8.6***	**2168**	**2559**	***18.0***
Warehousing	36	48	*33.3*	489	1469	*200.4*
Oil transhipment and storage	22	15	*-31.8*	1490	1090	*-26.8*
Distribution of fruit and vegetables	28	-	-	189	-	
Intermediaries	**632**	**628**	***-0.6***	**8260**	**7784**	***-5.8***
Transport related services	**406**	**255**	***-37.2***	**7404**	**5817**	***-21.4***
Port industries	**222**	**178**	***-19.8***	**30021**	**13608**	***-54.7***
Oil refineries	15	10	*-33.3*	6463	3815	*-41.0*
Manure factories	4	-	-	1736	-	-
Chemical industry	37	65	*75.7*	8633	6251	*-27.6*
Food	27	8	*-70.4*	3009	1490	*-50.5*
Shipbuilding and repair	139	95	*-31.7*	10180	2052	*-79.8*
Public authorities	**38**	**11**	***-71.1***	**3893**	**4926**	***26.5***
Port of Rotterdam Authority	13	5	*-61.5*	757	1370	*81.0*
Customs	23	5	*-78.3*	1667	1198	*-28.1*
Others	2	1	*-50.0*	1469	2358	*60.5*
Others	**66**	**49**	***-25.8***	**2442**	**3387**	***38.7***
TOTAL	**2646**	**2231**	***-15.7***	**82467**	**57943**	***-29.7***

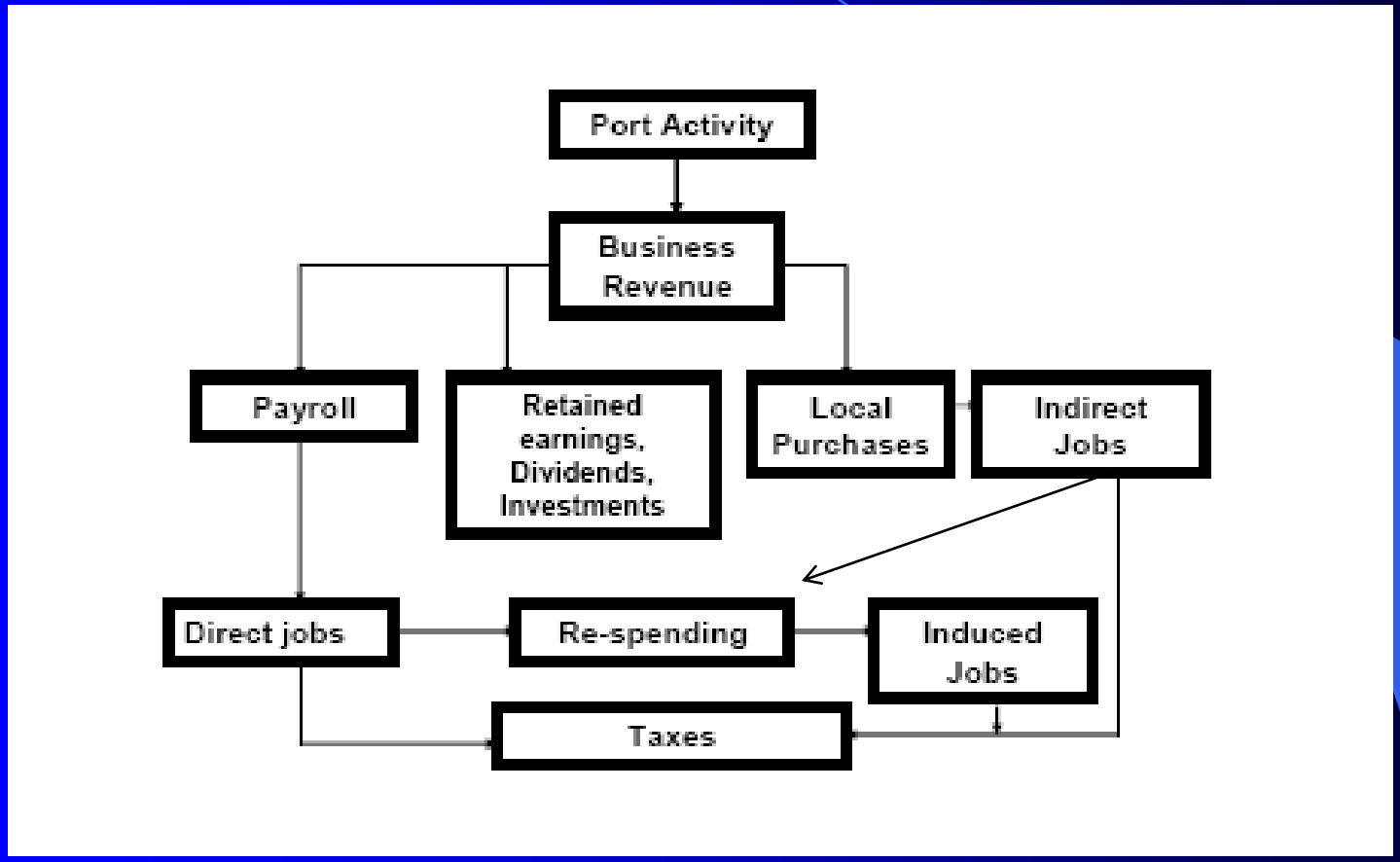
* The Greater Rotterdam area comprises the municipalities of Barendrecht, Bergschenhoek, Berkel, Bleiswijk, Brielle, Capelle a/d IJssel, Hellevoetsluis, Krimpen a/d IJssel, Maassluis, Bernisse, Rotterdam, Ridderkerk, Rozenburg, Schiedam, Spijkenisse, Albrandswaard, Oostvoorne, Vlaardingen.
** The number of firms is based on firm locations. Some firms can have more than one location so the data may be slightly distorted.
*** Directly port related gross employment rates.
****Data on firm locations in 2005 is preliminary.
Source: Port of Rotterdam Authority, 2005a; 2006.

Observe the reduction in the number of companies due to concentration and bigger size.

Notice the reduction in the number of employees (apart from HbR!) due to automation.

Notice the remarkable increase to warehousing personnel due to logistics.

Flows of Port Activity through the Economy



Economic Impacts Generated by Port Activity

	Port of Tacoma Marine Terminals and Tenants	Private Marine Terminals	Totals
JOBS			
DIRECT	9,370	1,608	10,978
INDUCED	4,504	789	5,292
INDIRECT	2,243	567	2,809
TOTAL JOBS	16,116	2,964	19,080
RELATED USERS	97,044	550	97,594
PERSONAL INCOME (1,000)			
DIRECT	$421,187	$74,829	$496,017
INDUCED	$413,185	$73,408	$486,592
INDIRECT INCOME	$81,336	$21,759	$103,095
TOTAL INCOME	$915,708	$169,996	$1,085,704
BUSINESS REVENUE (1,000)	$1,492,111	$161,977	$1,654,088
LOCAL PURCHASES (1,000)	$207,388	$44,668	$252,056
STATE AND LOCAL TAXES (1,000)	$90,655	$16,830	$107,485
FEDERAL TAXES (1,000)	$173,069	$32,129	$205,198
CUSTOMS (1,000)	$247,054		$247,054

Types of Port Employment

Employment totally dependent on port
(if the port ceases to exist these jobs are lost):

Direct: terminal operators; stevedoring companies; port authority; rail; truck; agents; forwarders; customs brokers; warehousing; towage; pilotage; line-handling.

Indirect: office supplies; equipment; utilities; communications; other goods and services.

Induced: retail; restaurants; transportation services; schools; hospitals; many more.

Employment not totally dependent on port
(if port ceases to exist, they will ship through another port):

Port users: exporters; importers.

Impacts of Merchant Shipping on the US Economy

	Merchant Marine	Cargo Preference	ODS
Direct, Indirect & Induced US Employment	107,000	40,000	31,000
Direct, Indirect & Induced Household Earnings ($ billion)	4.5	2.2	1.6
Direct, Indirect & Induced Federal Income Tax Revenues ($ million)	738	354	268
Dollars per Dollar of Government Outlay	NA	1.26	1.24
Foreign Exchange ($ billion)	3.8	1.2	0.9

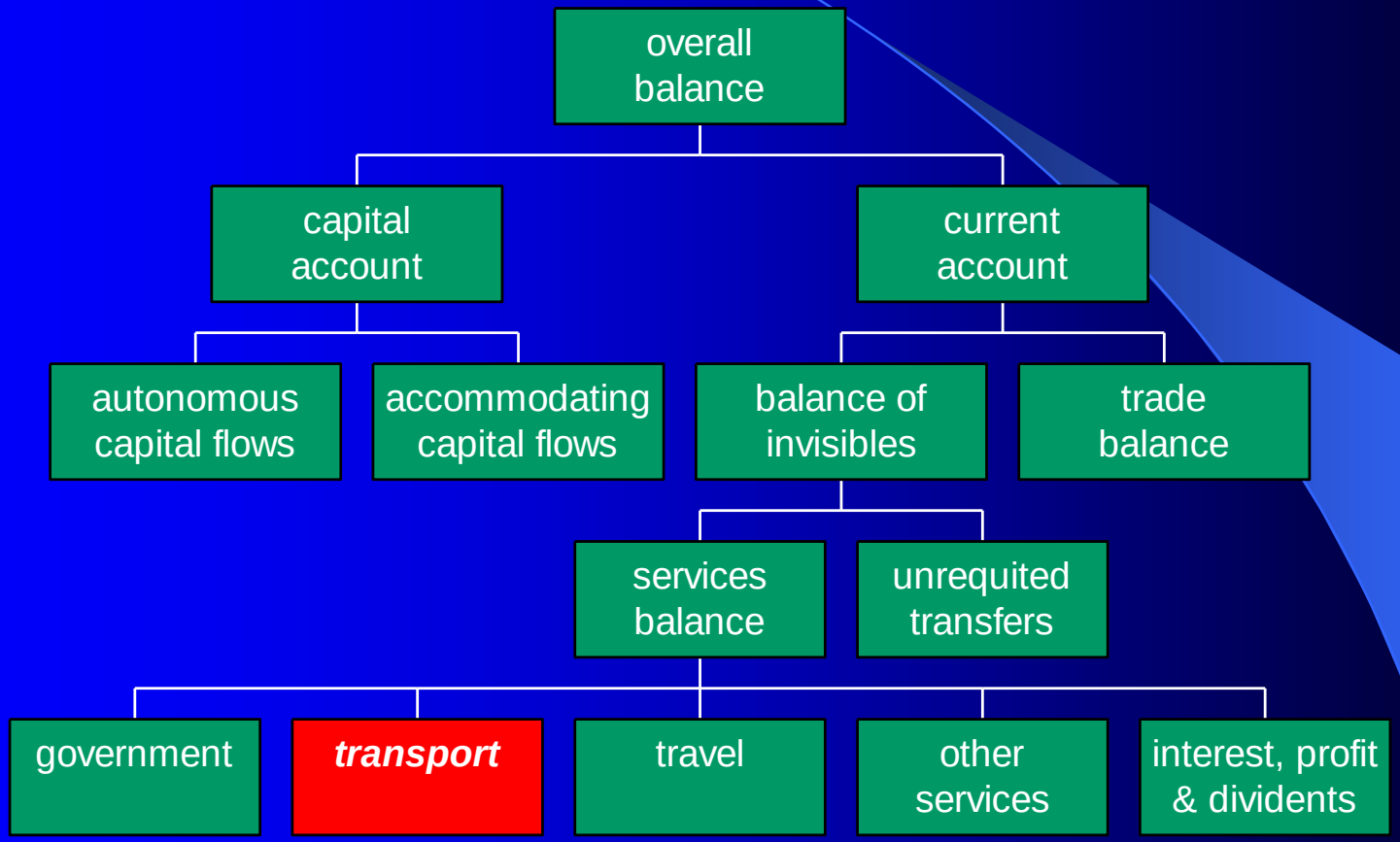
Transport in the Balance of Payments

The Balance of Payments (BoP) is a national record, registering transactions between the country and foreign economic agents, or between citizens of the country and the rest of the world. These transactions take place in foreign exchange.

Certain economic sectors and industries, e.g. exports and shipping, have particular significance for the BoP, as they are able to earn foreign exchange; something important for countries with exchange control regulations, such as developing countries, where the real value of foreign exchange outweighs by far its nominal value.

The possibility of earning foreign exchange has been the main reason for the development of merchant marines, often through subsidies, in many countries such as the former Soviet Union, Eastern European, African, Asian and South American countries.

Transport in the Balance of Payments



NB: accommodating capital flows are engineered by the government or the central bank and are meant to balance out autonomous capital imbalances (e.g. in LDCs outflows are usually much smaller than inflows of capital). This can be done by international borrowing, debt restructuring/reduction.

The Transport Account in the Balance of Payments

CREDIT

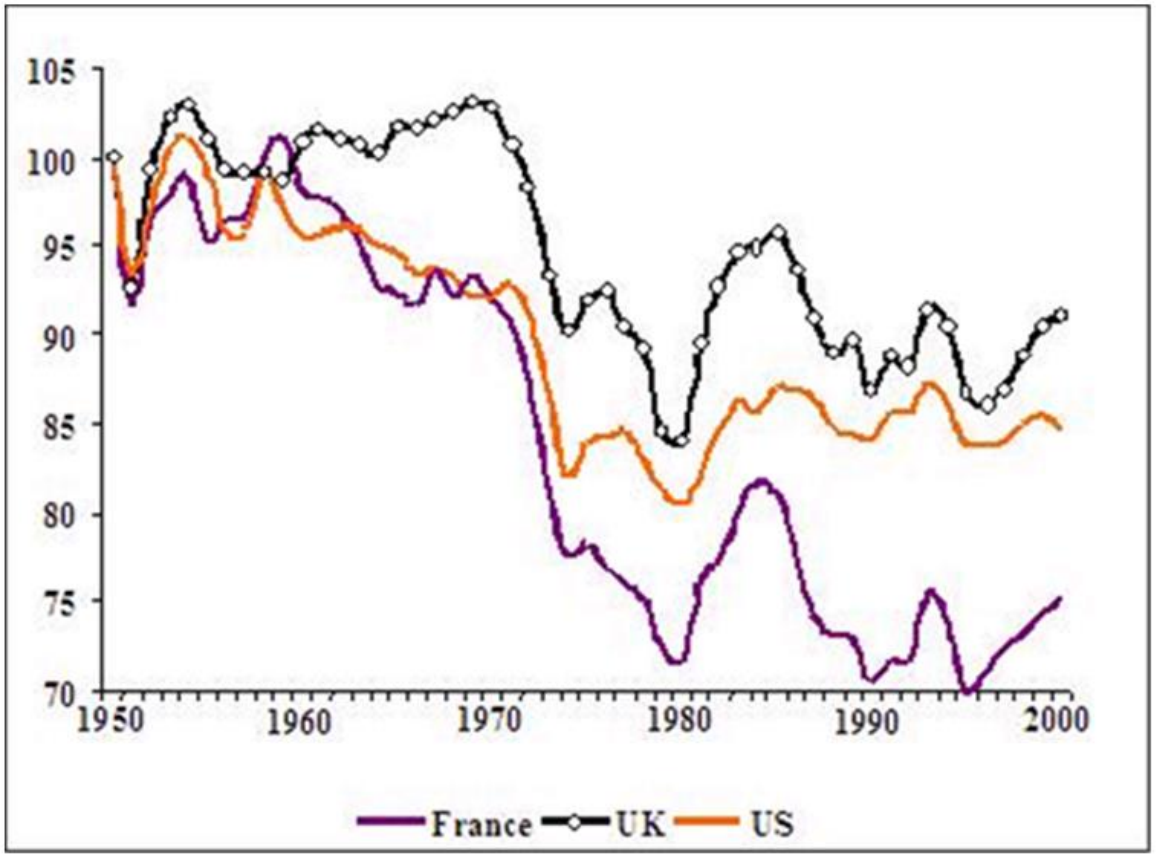
- Freight on Exports (cif)
- Freight on Crosstrades
- Charter Receipts
- Passenger Revenue
- Port Receipts

DEBIT

- Freight on Imports (fob)
- Charter Payments
- Passenger Expenses
- Port Disbursements

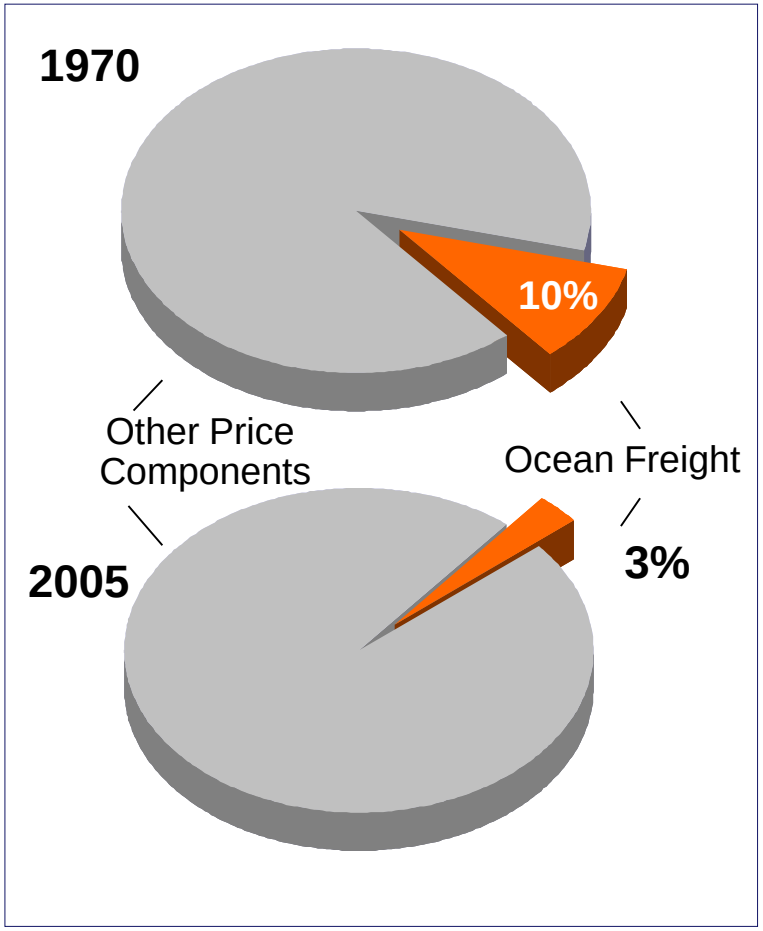
Have ports and transport promoted international trade and welfare?

(Trade costs have been decreasing due to trade liberalization, logistics, customs simplification and transparency, availability of information, competition, and economies of scale in ocean transportation)



Trade Cost Indices 1950-2000

Economies of Scale, Competition and Rationalization (alliances) have Decreased Transport Costs Substantially



Price Components Motorcycle

	Retail Price	Ocean Freight	Share
1970	$5,000	$500	**10%**
2005	$3,000	$90	**3%**

Typical Ocean Freight Levels 2005

	Retail Price	Ocean Freight	Share
Television Set	$500	$10	**2%**
Vacuum Cleaner	$75	$1	**1%**
Beer (1Bottle)	$1	$0,01	**1%**

Transport Costs

The transport cost element in the shelf price of consumer goods varies from product to product, but is ultimately marginal, for example, transport costs account for only 2% of a television shelf price and only 1.2% of a kilo of coffee.

The low costs of maritime transport

Due to continuous improvements in technology and efficiency maritime transport costs are very competitive.

- The typical cost to a consumer in the United States of transporting crude oil from the Middle East, in terms of the purchase price of gasoline at the pump, is about half a US cent per litre.

- The typical cost of transporting a tonne of iron ore from Australia to Europe by sea is about US $12.

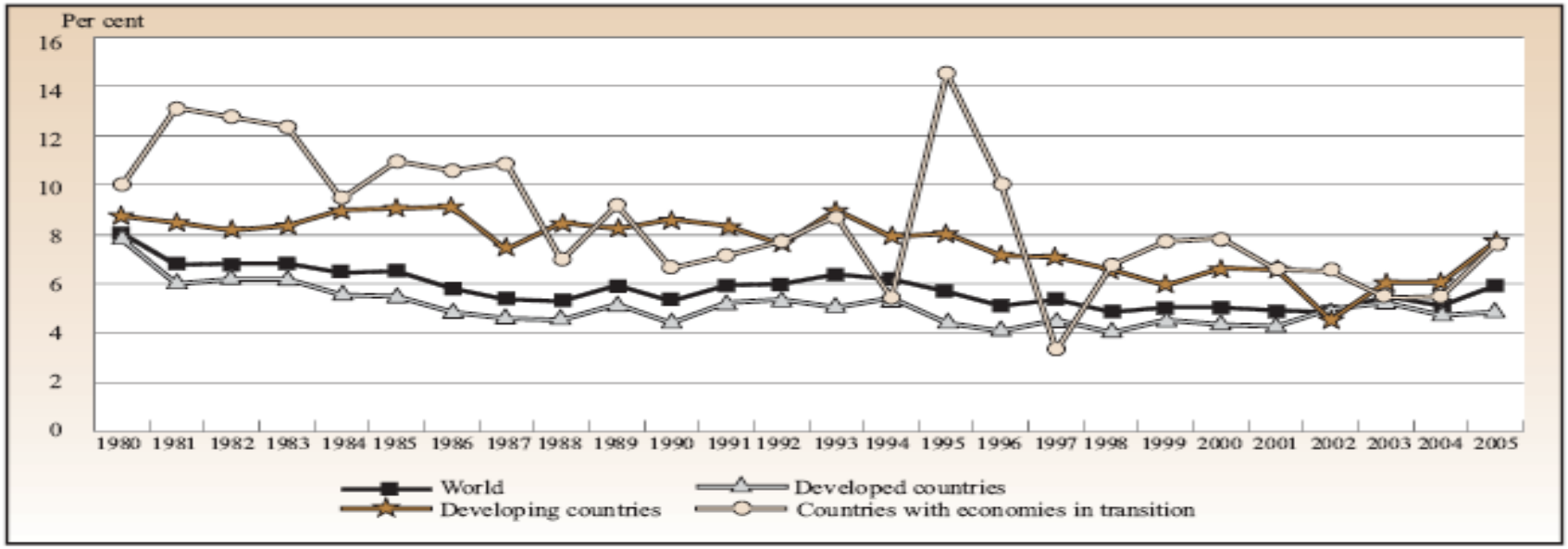
- The typical cost of transporting a 20 foot container from Asia to Europe carrying over 20 tonnes of cargo is about the same as the economy airfare for a single passenger on the same journey.

Typical Ocean Freight Costs (Asia-US or Asia-Europe)

	Unit	Typical Shelf Price	Shipping Costs
TV Set	1 unit	$700.00	$10.00
DVD/CD Player	1 unit	$200.00	$1.50
Vacuum Cleaner	1 unit	$150.00	$1.00
Scotch Whisky	Bottle	$50.00	$0.15
Coffee	1 kg	$15.00	$0.15
Biscuits	Tin	$3.00	$0.05
Beer	Can	$1.00	$0.01

Transport costs as % of value of imports 1980-2005

However, transport costs have not decreased uniformly. Developing countries pay at least 50% more for the transport of their imports than developed countries. Within developing countries themselves, differences are pronounced: Africa pays twice as much as Asia and Latin America. Why does this happen?

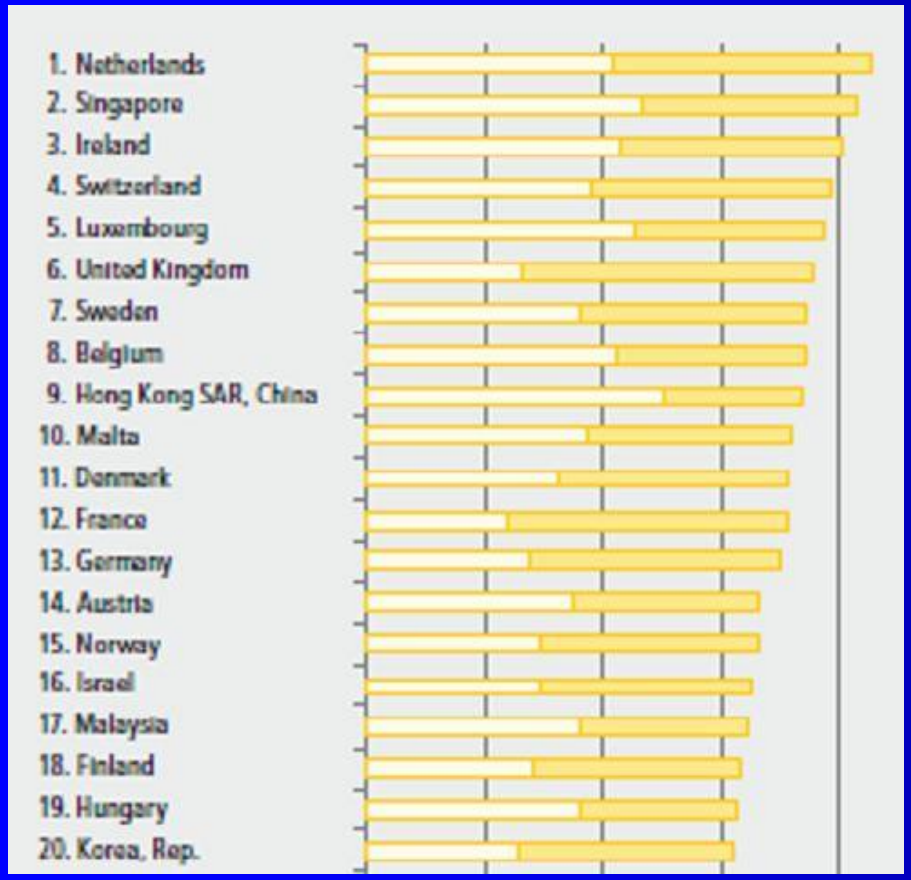


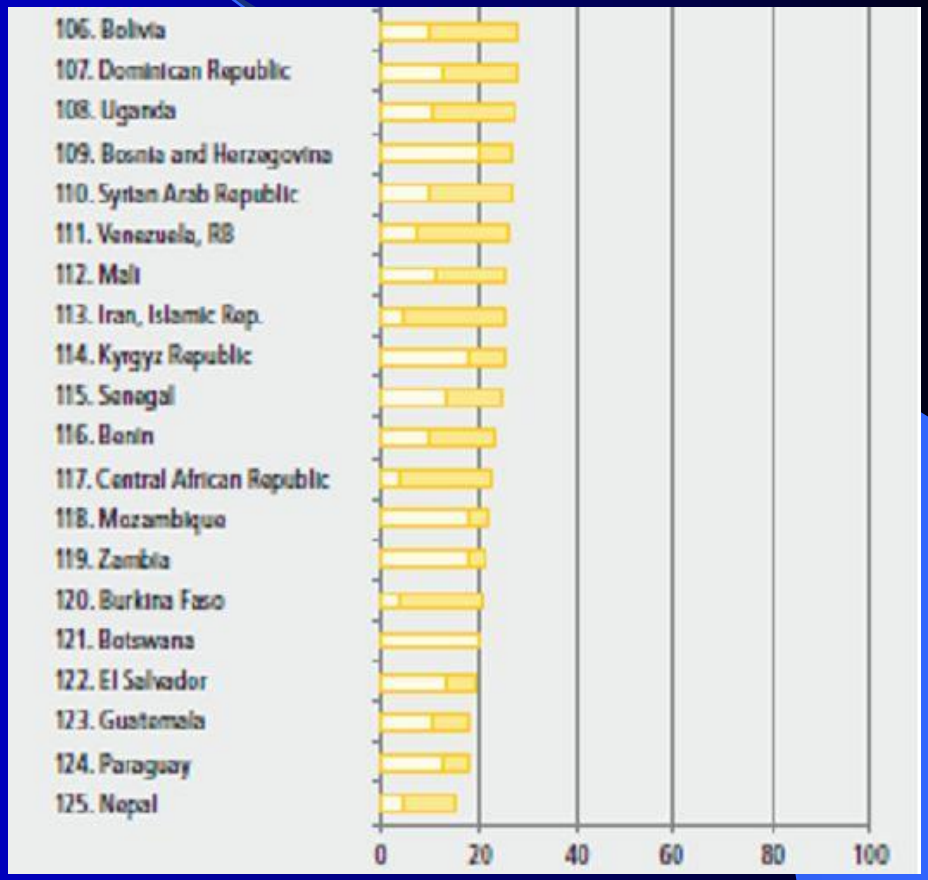
Source: UNCTAD secretariat, based on table 42.

Answers

- Distance from markets
- Connectivity to liner networks
- Port efficiency and management practices
- Land transport infrastructure
- Customs procedures (transparency)
- ICT adoption and *e*-commerce
- Logistics and SCM
- Integration of SMEs in the global economy

The DHL 2011 Global Connectedness Index



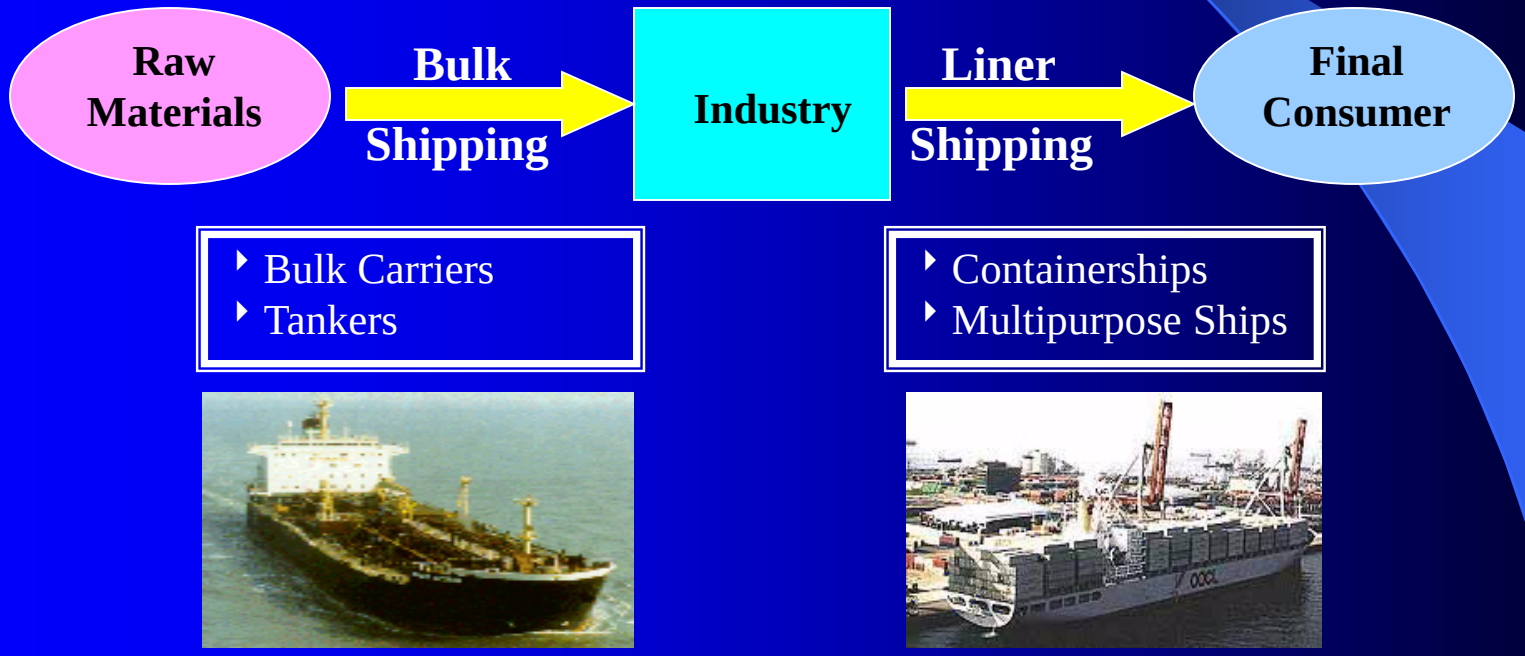


Shipping and Trade

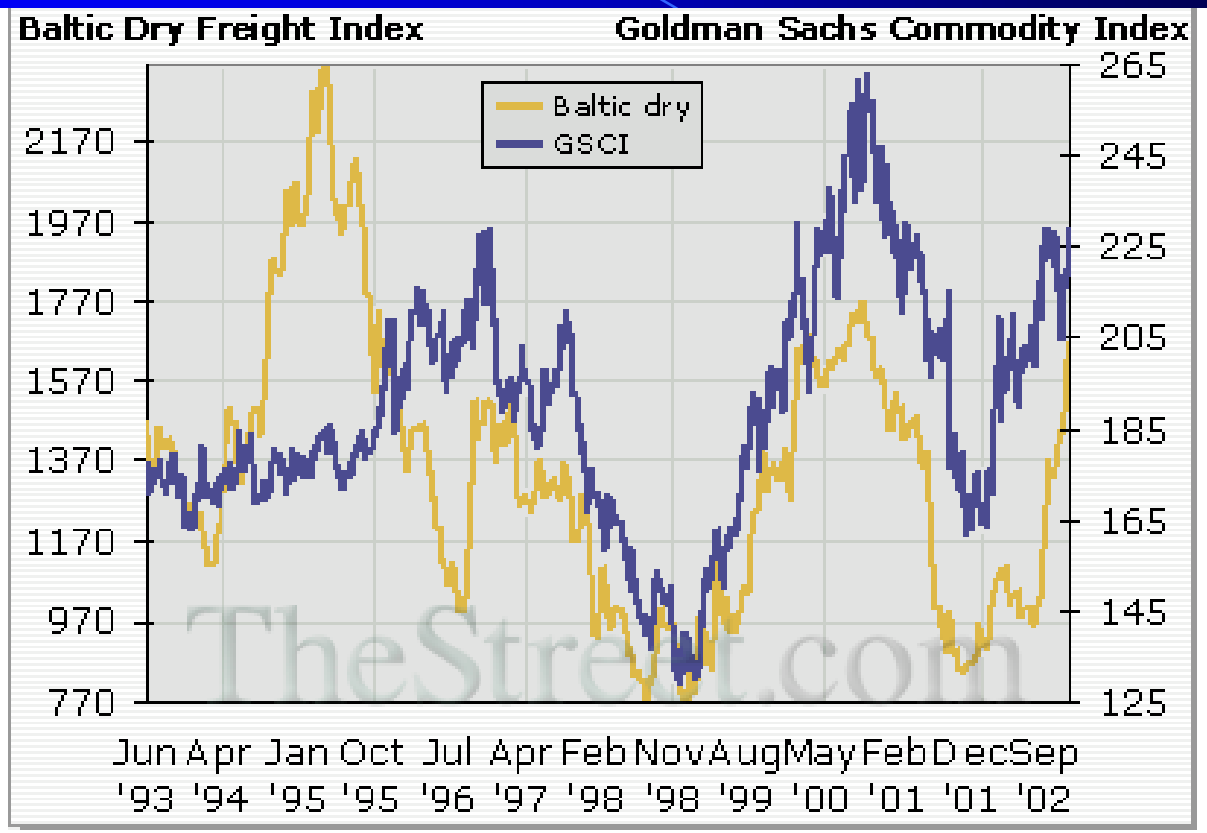
Merchant shipping is a service industry moving goods to places where consumption has higher utility. International shipping moves raw materials to industry (bulk shipping), and finished products from industry to final consumer (liner shipping). In this process, a lot of intermediaries, such as freight forwarders and logistics companies, exist and thrive.

Shipping is both a facilitator to trade –moving goods that otherwise wouldn't be traded- as well as a promoter of trade –low transport costs and economies of scale in shipping have allowed trade among nations that wouldn't be possible 20 years ago-.

Shipping in the Production Process

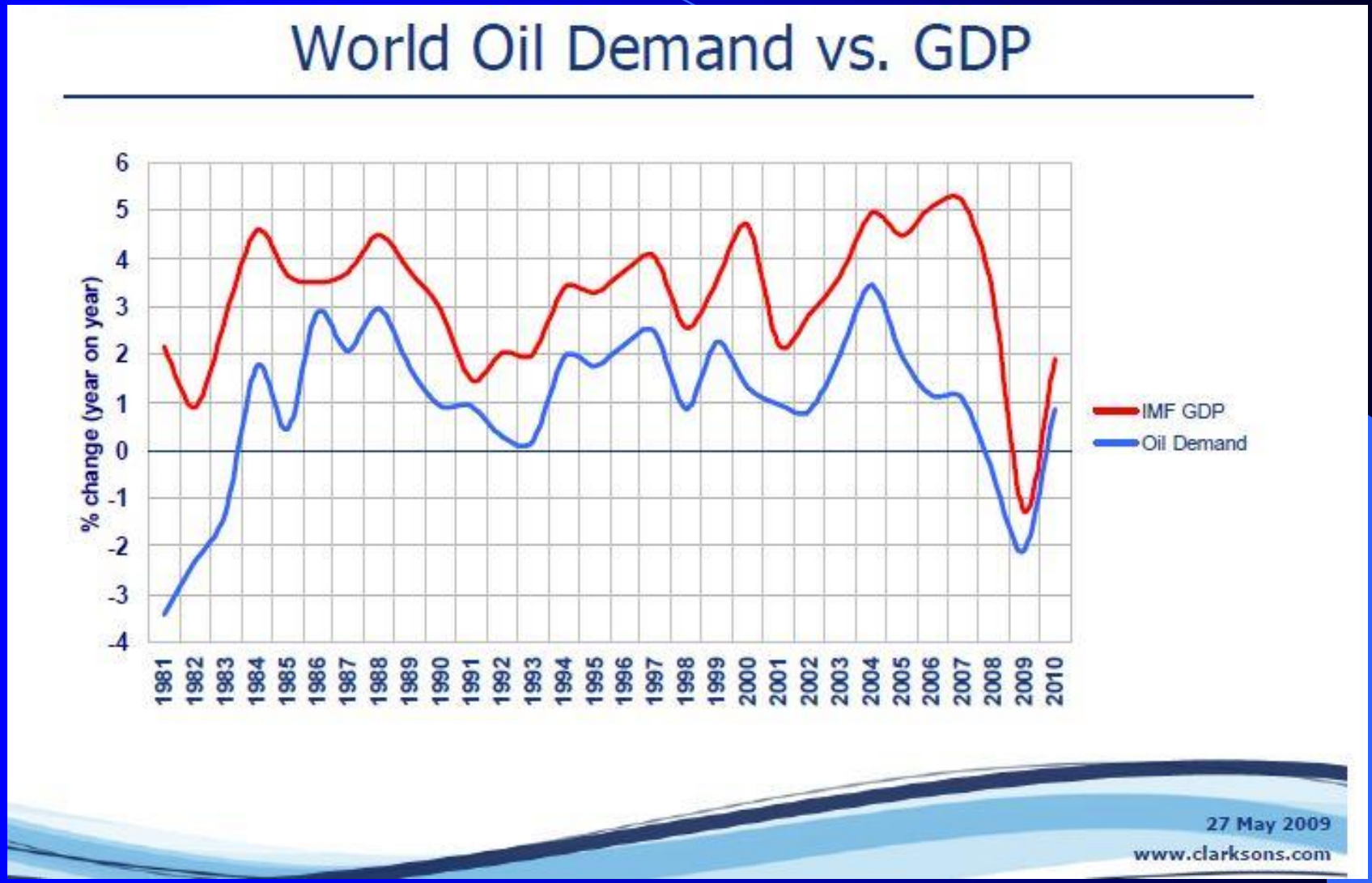


Commodity indices are good leading indicators to global economic development: their rise indicates that there must be industrial demand somewhere in the world

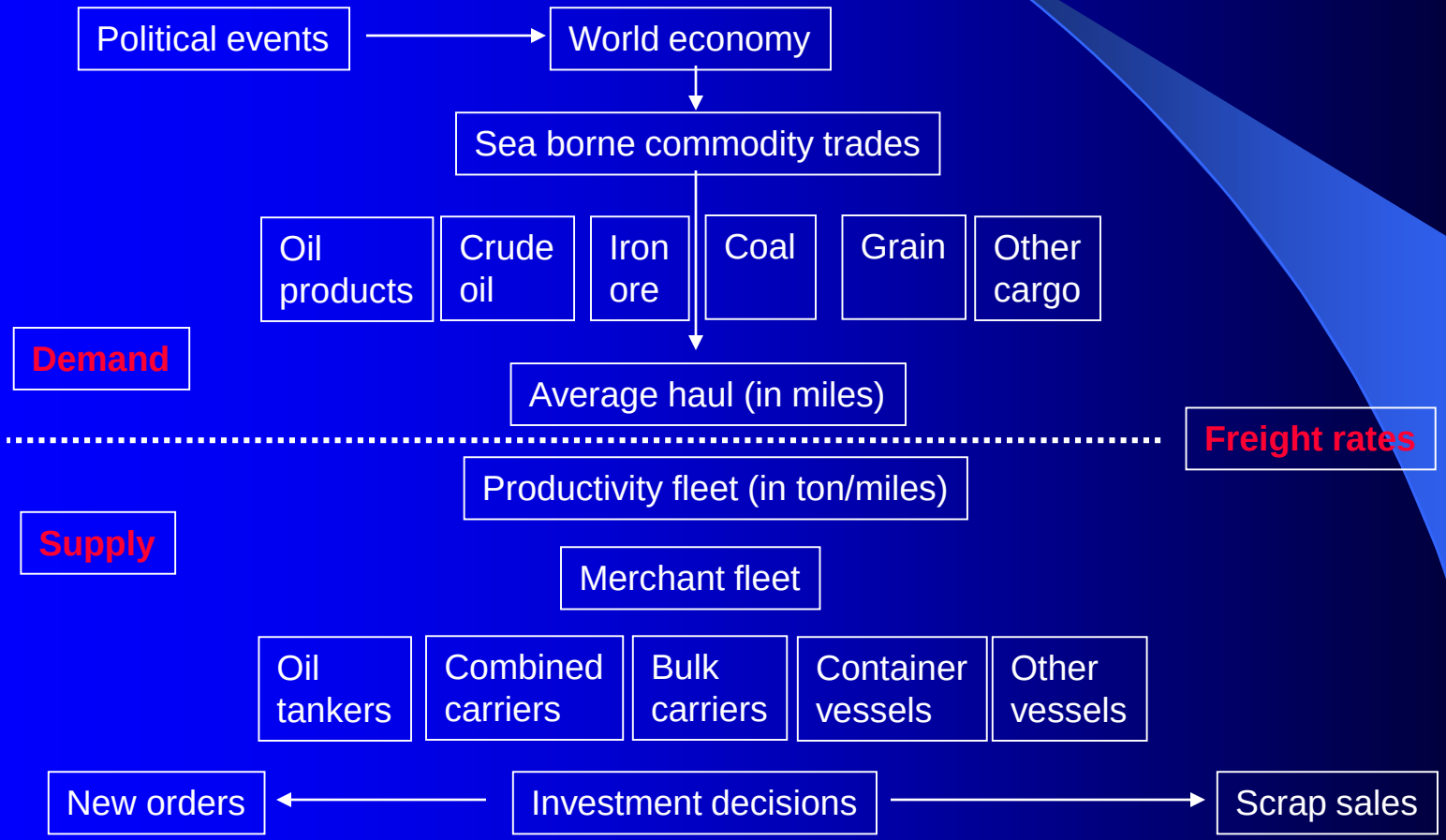


Observe the high correlation after 1997. Interesting to note that trade leads the dance on the rise but roles are reversed on the downturn. Freight rates are good leading indicators of oncoming recessions and you are among a select few to know this!

Another leading indicator: Oil demand envelops GDP



The shipping market model(s)



The 4 shipping (sub)markets

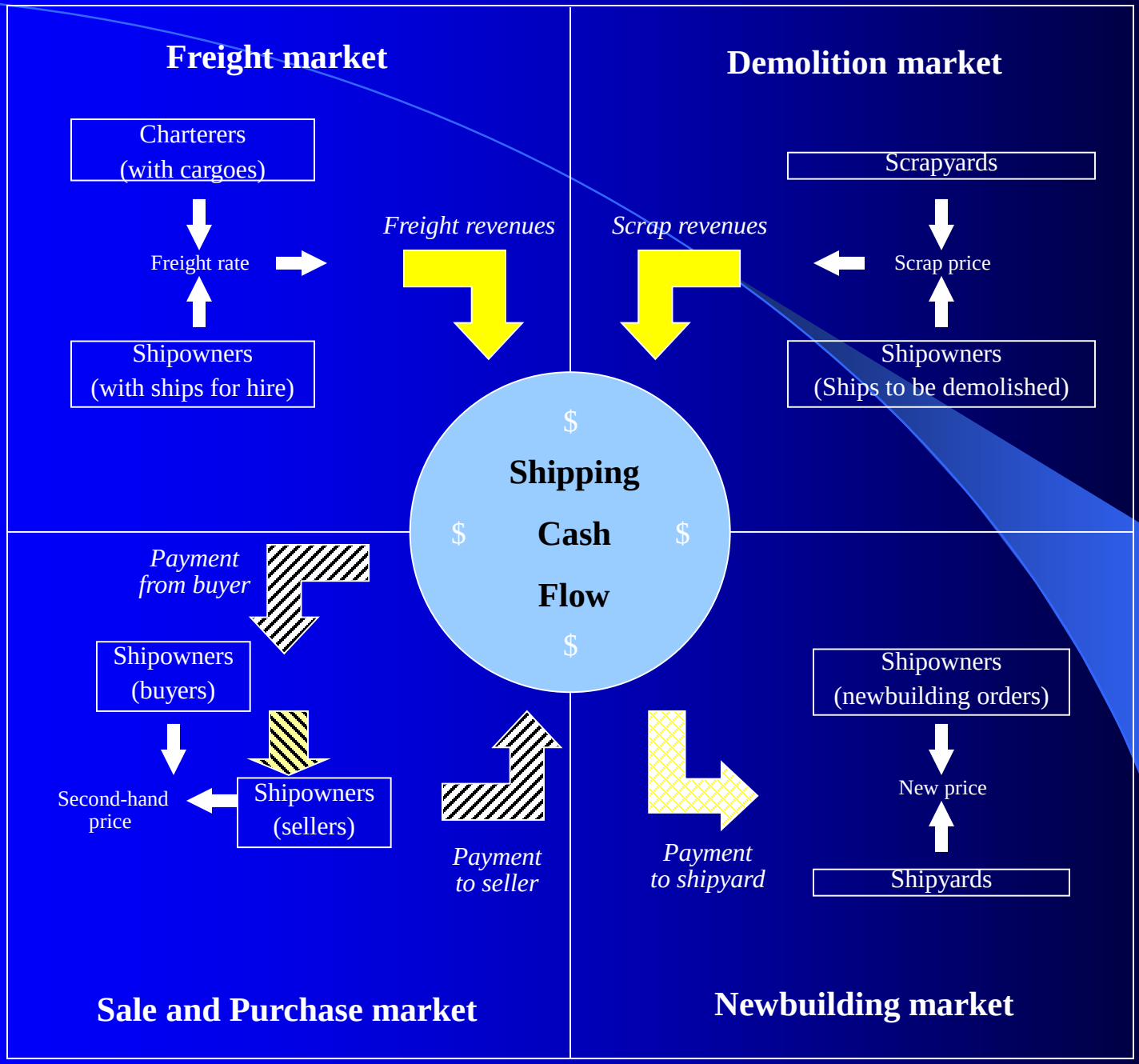
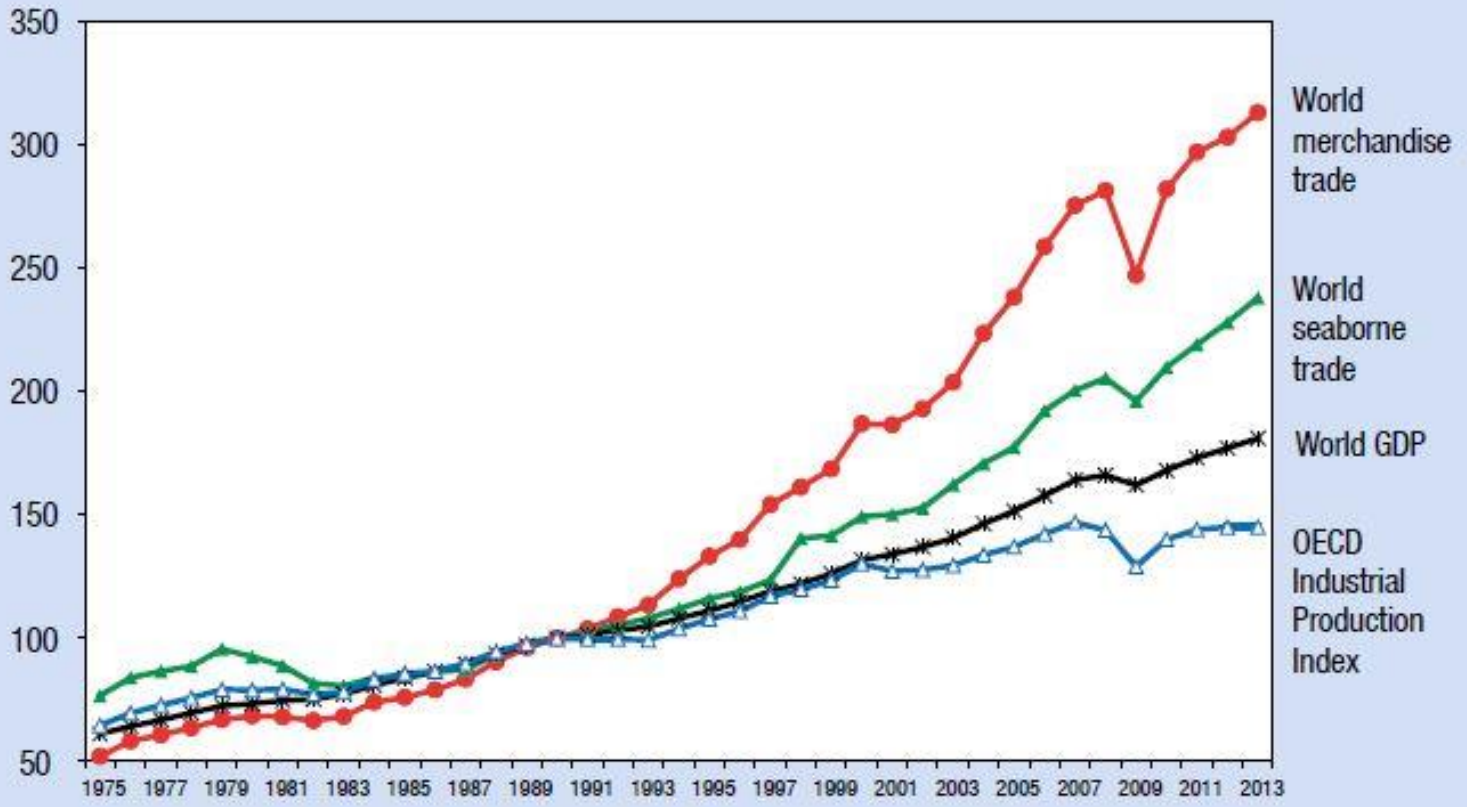


Figure 1.1. The OECD industrial production index and indices for world gross domestic product, merchandise trade and seaborne shipments (1975–2013), (1990 = 100)



Why?

1. World GDP grows faster than OECD industrial production
2. Trade grows twice as fast as output (8% vs 4%)
3. World exports grow faster than seaborne trade

Answers

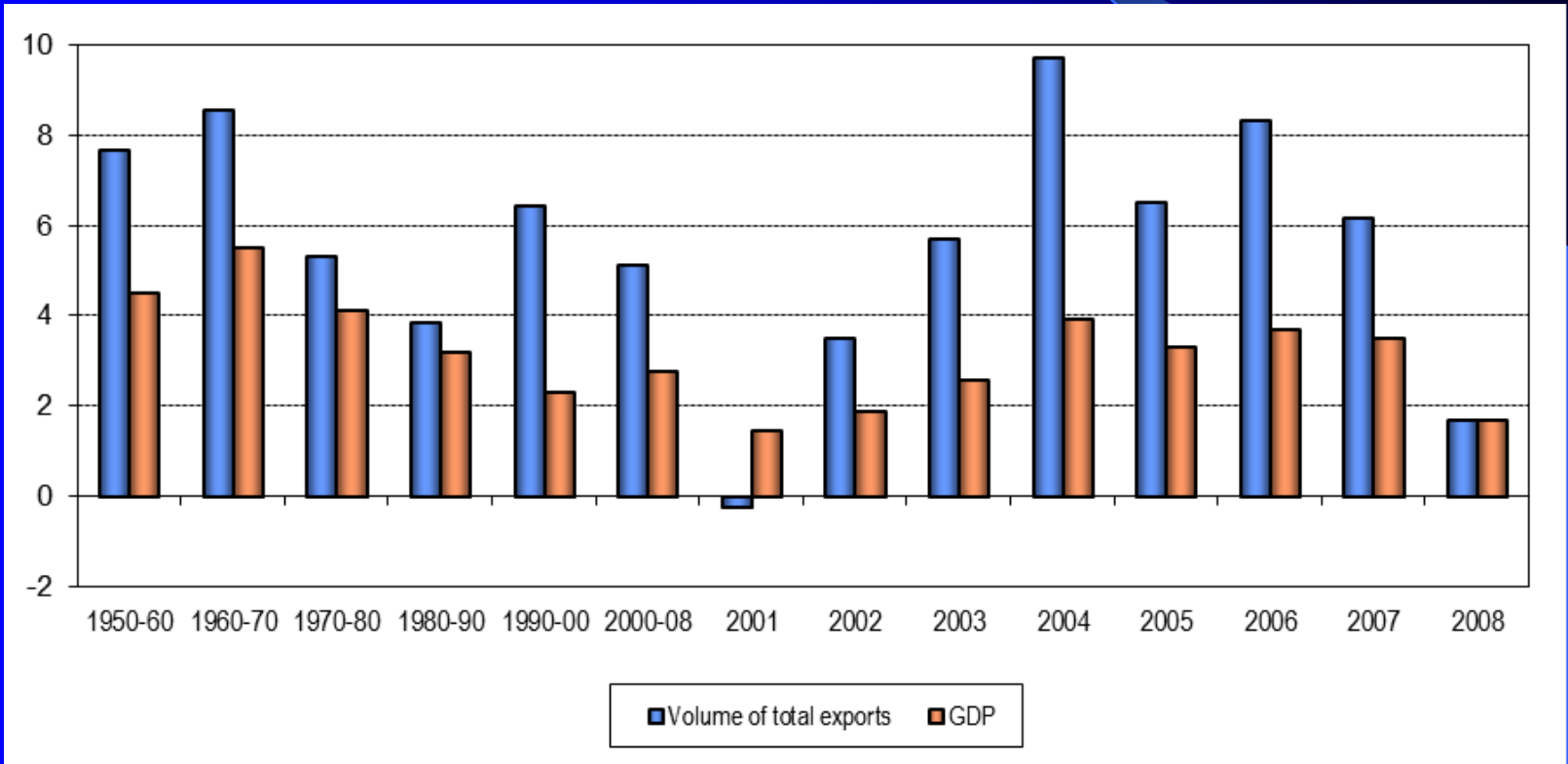
- 1q World GDP grows faster than OECD industrial production
- 1a The role of developing countries is becoming more prominent

- 2q Trade grows twice as fast as output (8% vs. 4%)
- 2a This is called globalization and deepening of economic integration. In addition, trade statistics also include trade in intermediate products and raw materials.

- 3q World exports grow faster than seaborne trade
- 3a There are other modes of transport (rail; road; river; air)

Volume of world merchandise exports and gross domestic product, 1950-2008

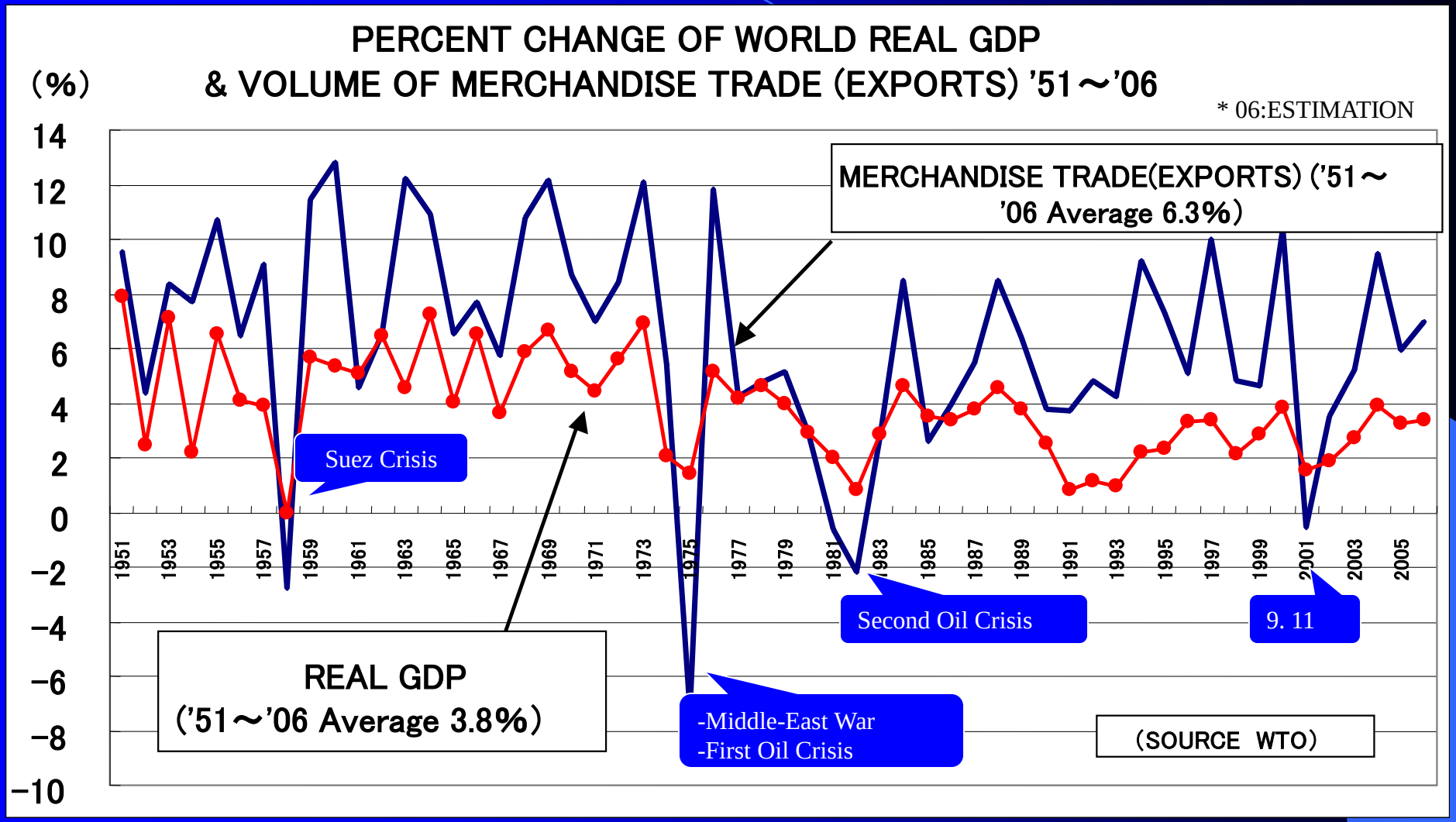
(Trade grew twice as fast as output but not any more (since 2008). Overcapacity in shipping and ports is becoming a major problem)



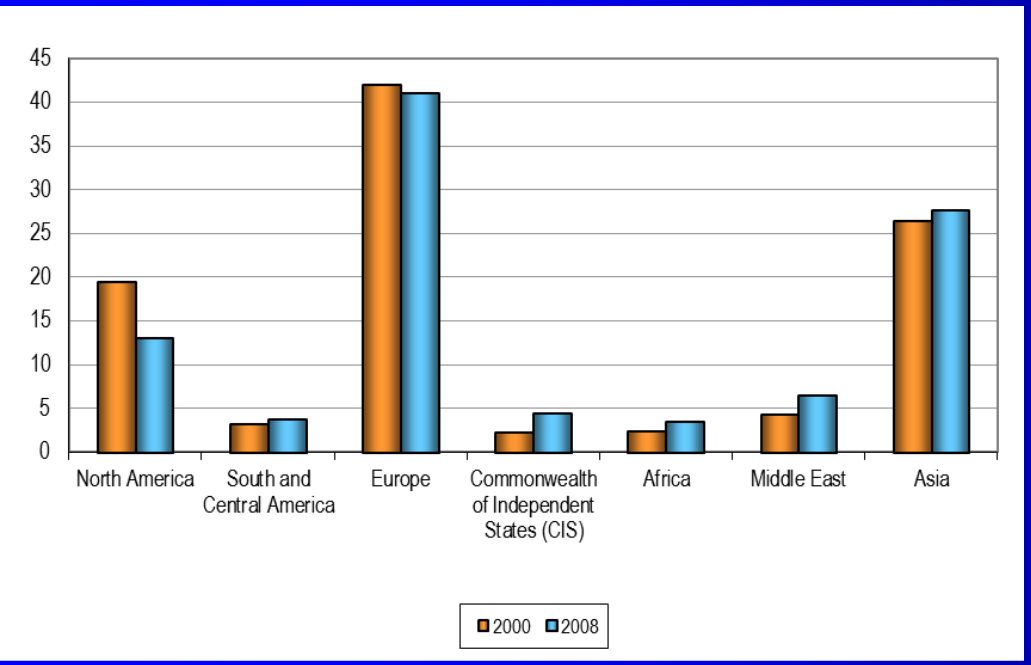
Source: WTO

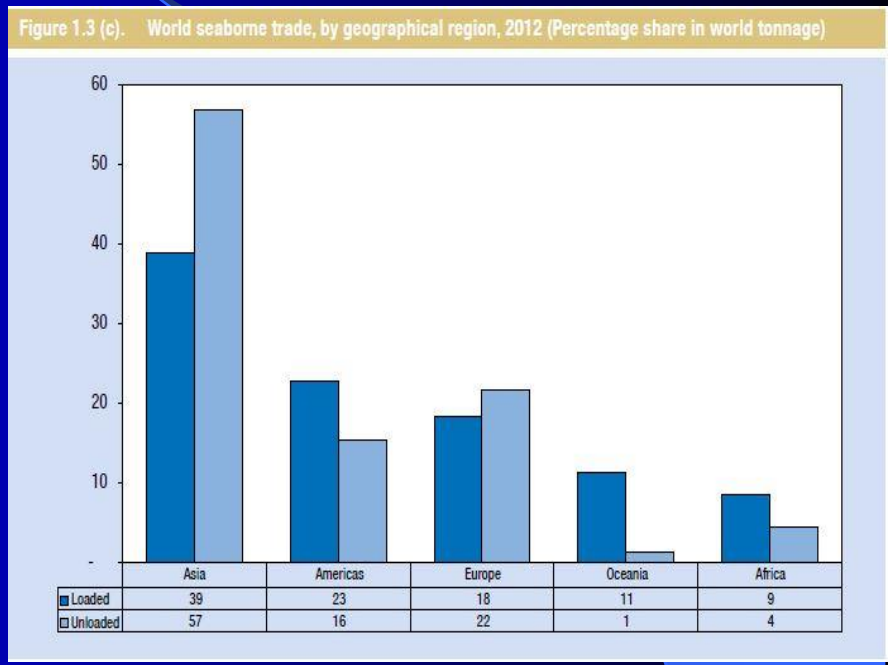
GDP and World Trade Development

(Problem: trade fluctuations are much more pronounced than those of output: it is much more difficult to reduce the production of cars, than to stop trading in them. Thus, demand-driven, make-to-order production technologies are changing the world of manufacturing)



Regional shares in world merchandise exports, 2000, 2008, 2012

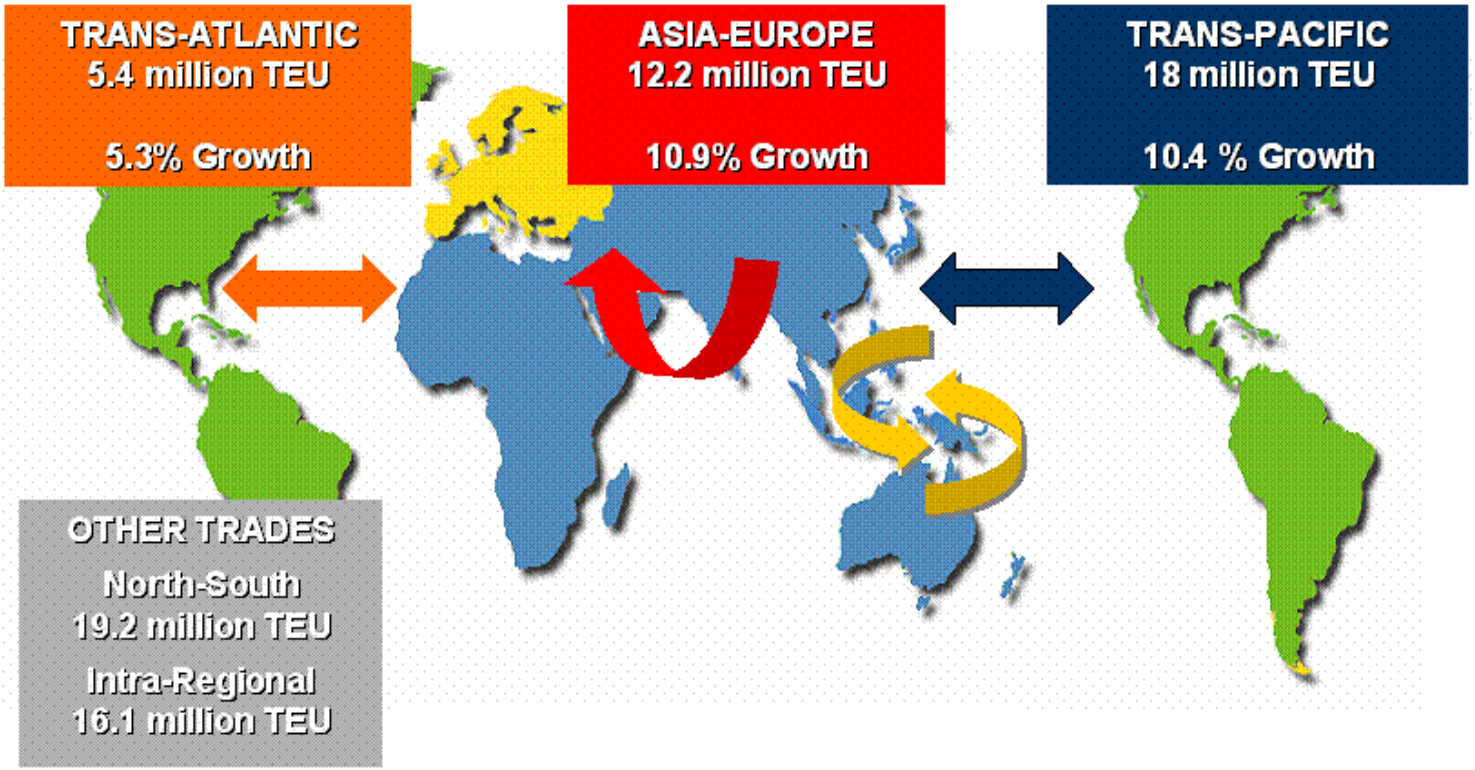




NB. For eight years (2000-2008) China's share of world trade remained almost constant at 25%. However, within four years since its entry to WTO (2008-2012), the country almost doubled it market share to about 50% (40% for imports; 60% for exports).

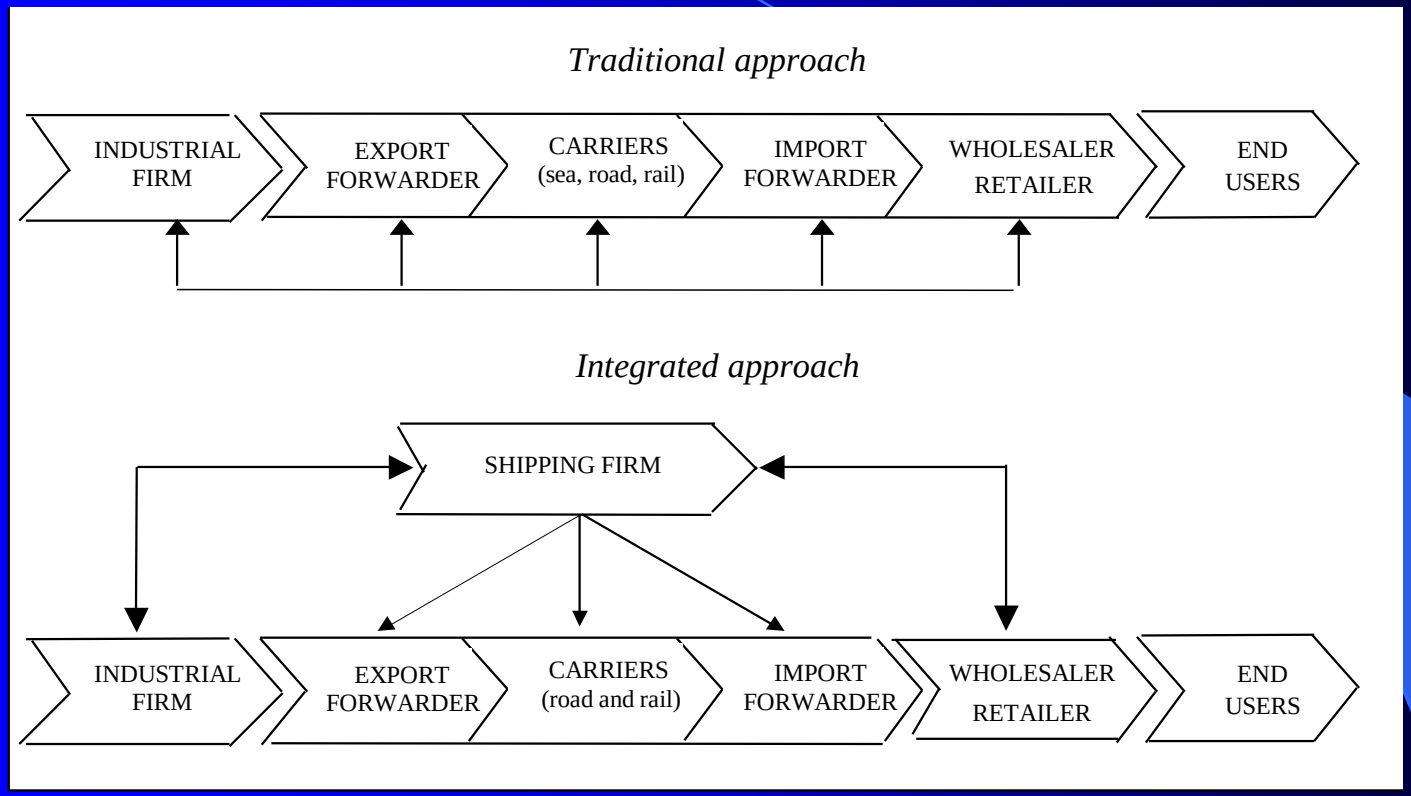
Source: WTO

East-West Containerized trade flows



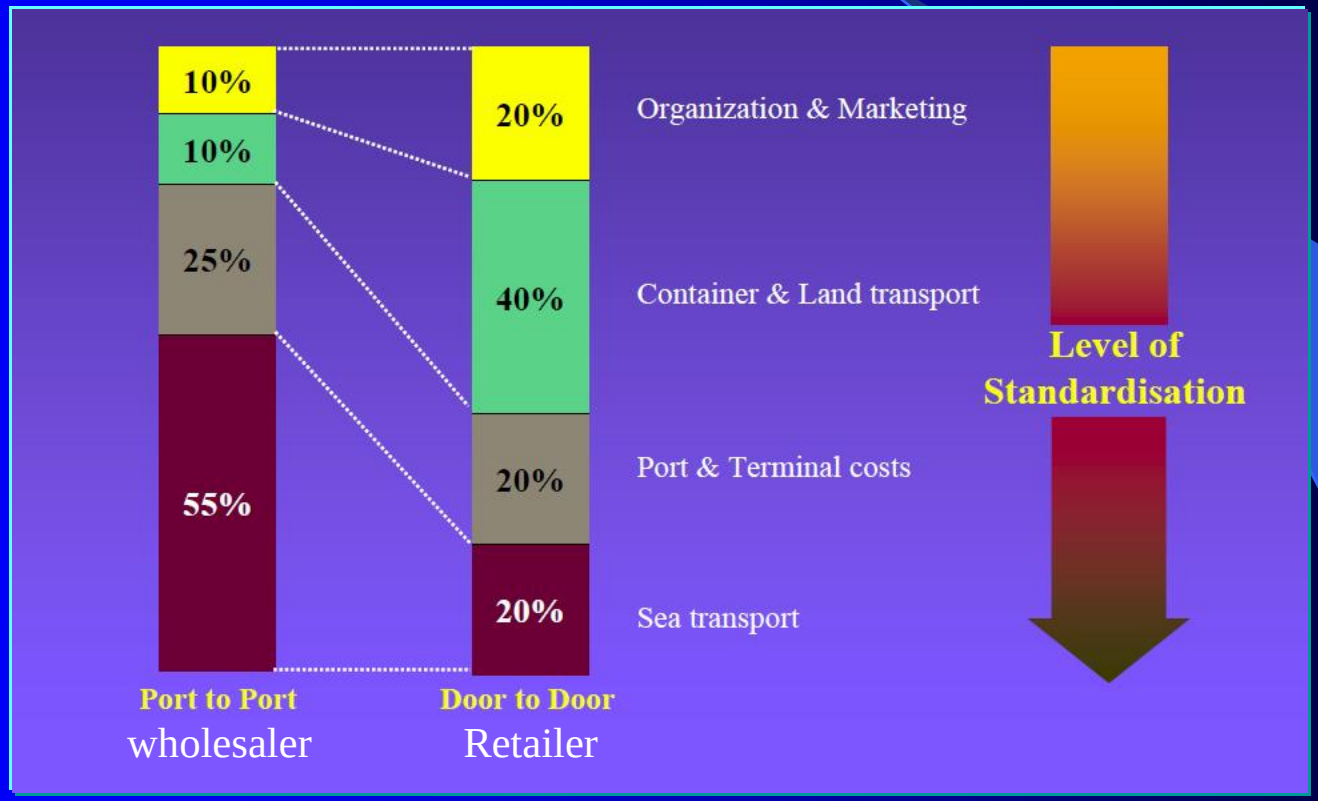
The Europe-Far East Trade and the Role of China

From 'Traditional' to 'Integrated' Approach in Shipping

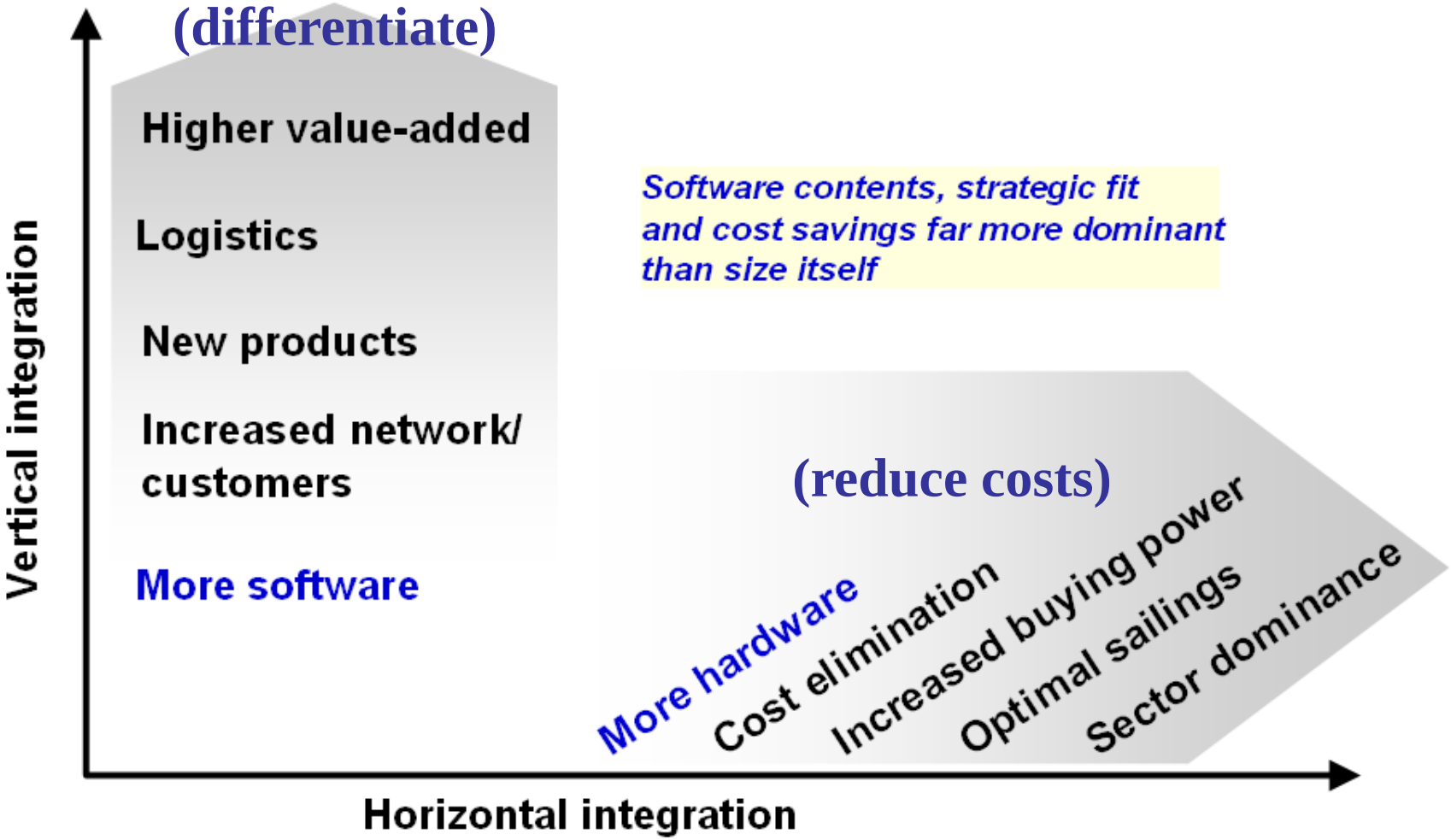


Carriers offer integrated services in competition with freight forwarders and logistics service providers (3PL)

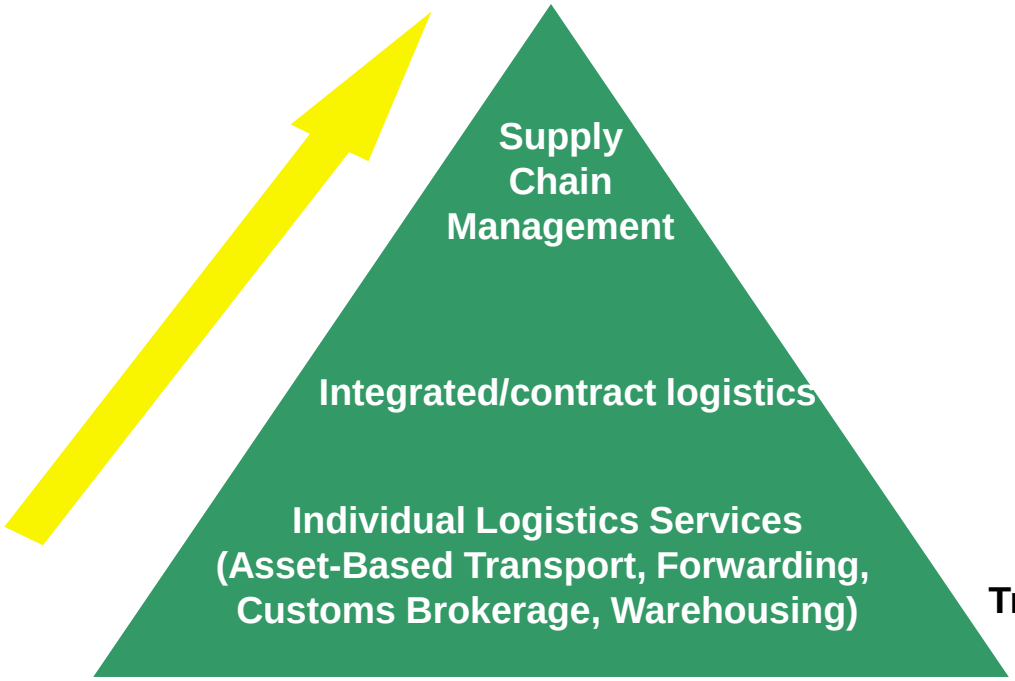
Shipping: from a standardized commodity (port-to-port) to a tailor-made service (door-to-door) (Wholesaler-Retailer strategies)

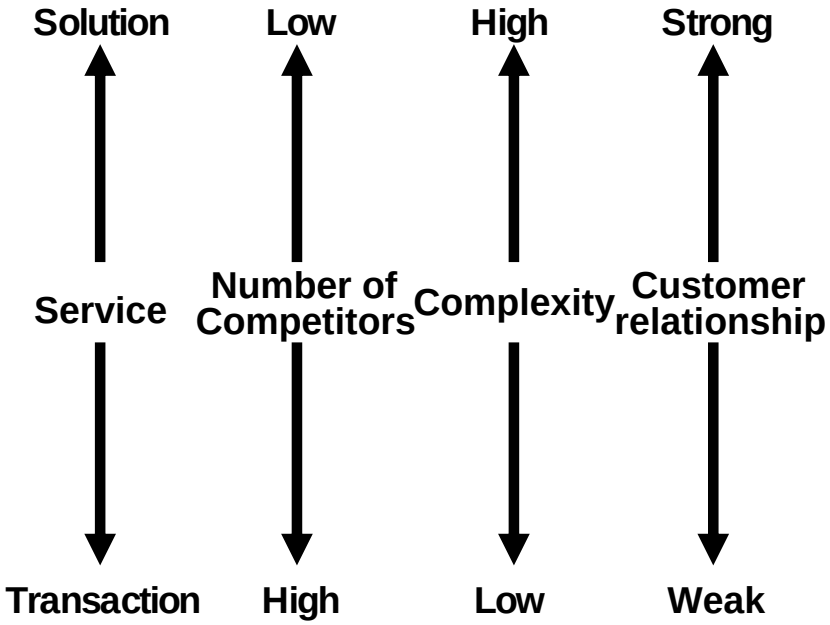


Advantages of horizontal and vertical integration

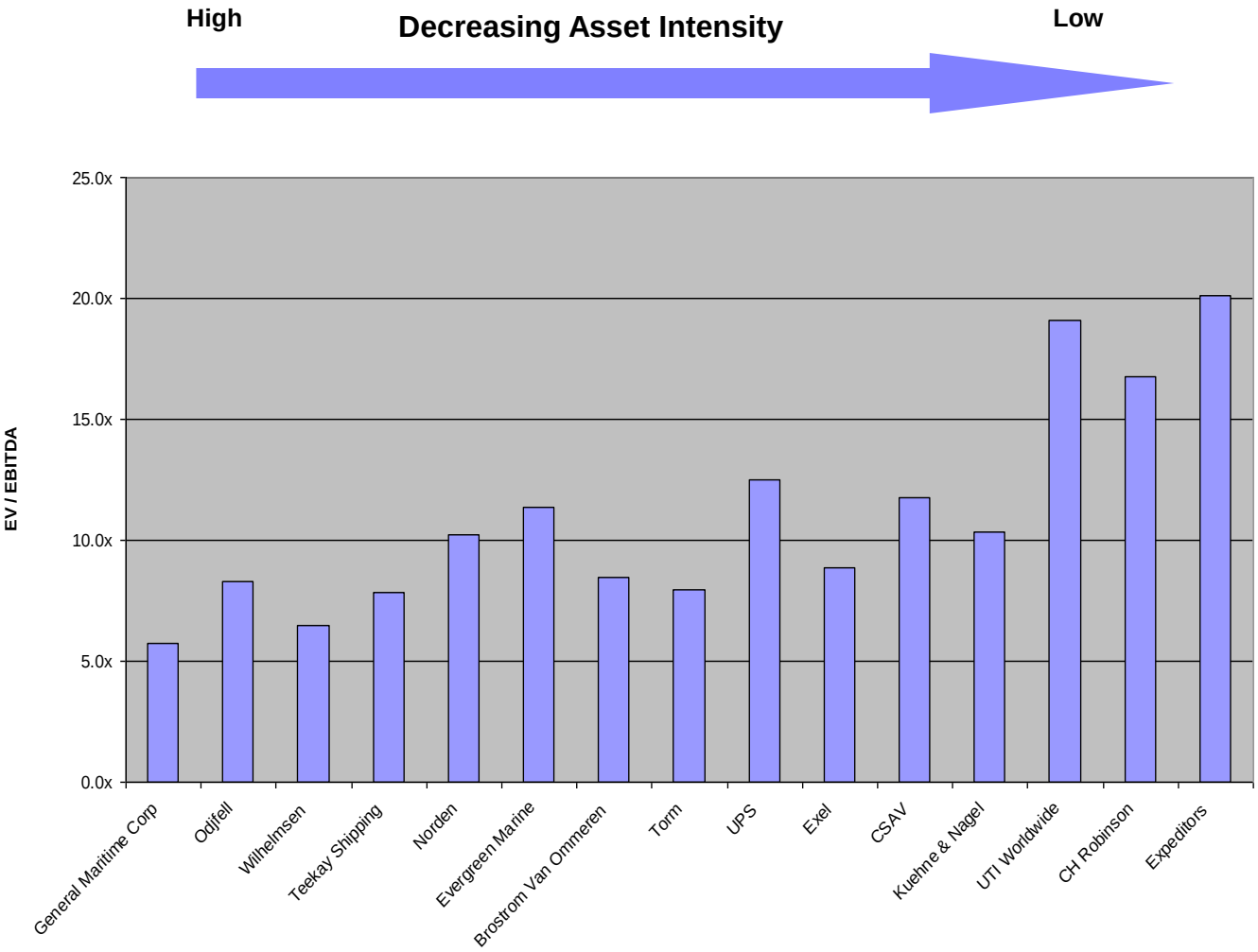


Companies focus on developing value added full service solutions





Logistics Companies tend to be higher valued than pure Transportation Companies



Companies towards the right of the chart (i.e., “asset light” companies) typically have :

- lower asset bases

- high levels of asset utilisation

- and, therefore, a higher return on equity, which, together with higher observed growth rates, boosts their market valuations

-Moreover, due to its broader diversification, logistics revenues are more stable over time

Source: Bloomberg data 2-Sep-04, DVB Analysis

Third Party Logistics (3PL)

Global production and sourcing, together with the need for export competitiveness and low consumer prices, have made trade efficiency a paramount consideration. Increasingly, manufacturers are outsourcing warehousing, transport and distribution activities to either carriers or specialized companies known as third party logistics services providers.

This, allows producers and manufacturers to:

Advantages of Third Party Logistics

- no capital investments/less risks
- flexibility in space and manpower
- economies of scale
- insight in logistics costs
- lower total logistics costs
- concentration on core business

Logistics Hubs

In simple words, logistics hubs are ‘warehouses’ where LCL cargo is consolidated (Singapore), or FCL cargo deconsolidated (Rotterdam).

Simply put, Indonesian demand for Malaysian exports might be too small for direct FCL shipments and, thus, Singapore is used as consolidation centre.

Similarly, French demand for Vietnamese bicycles could be too low for direct FCL shipments and, thus, Rotterdam is used to receive the FCL and distribute its bicycles to France, Belgium and Switzerland.

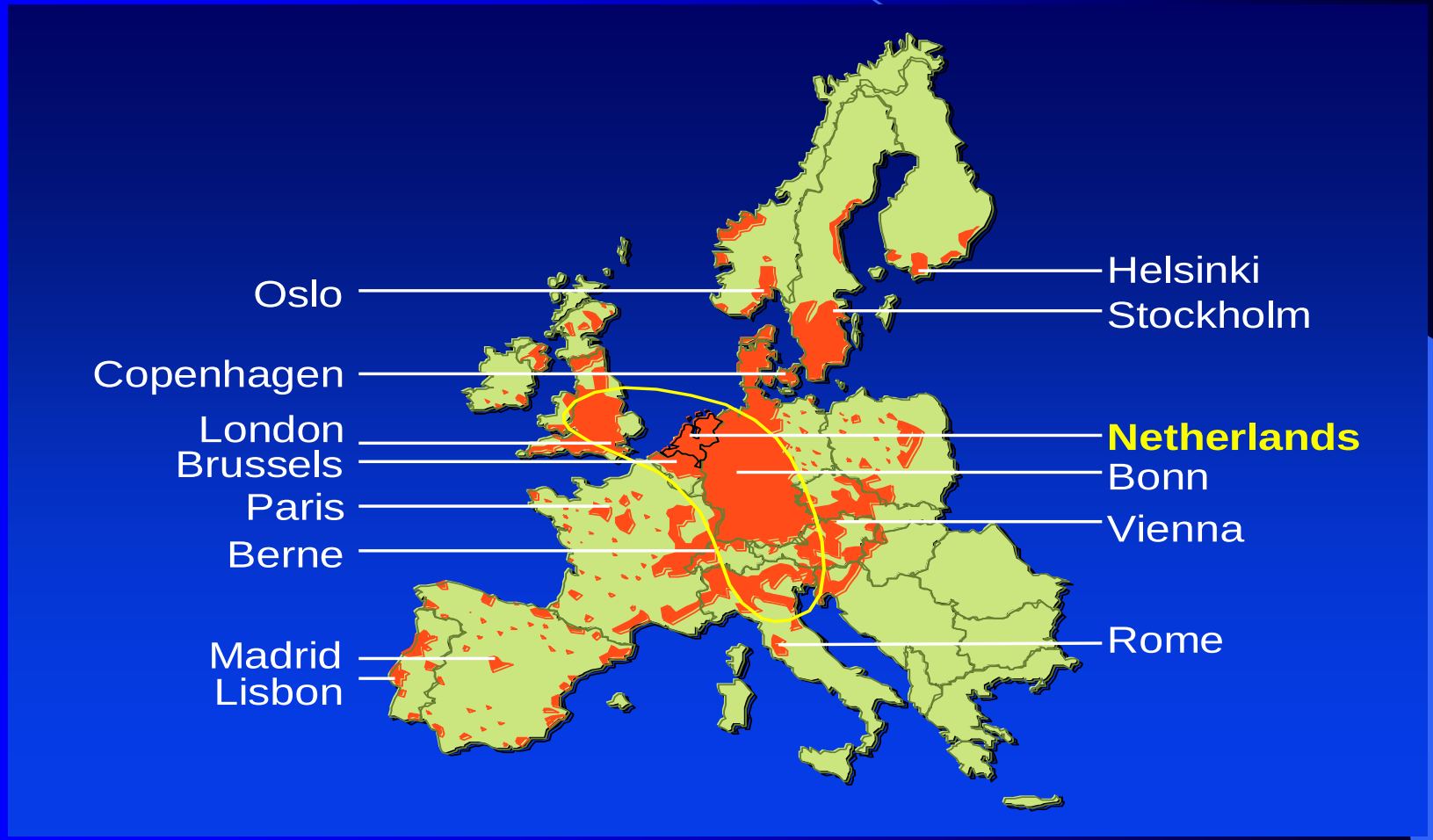
Success in Transport Logistics

Centrality (distance and transport cost minimization), good infrastructure and advanced IT systems are prerequisites for successful logistics developments.

These factors all present in The Netherlands and Singapore, the world's foremost logistical hubs.

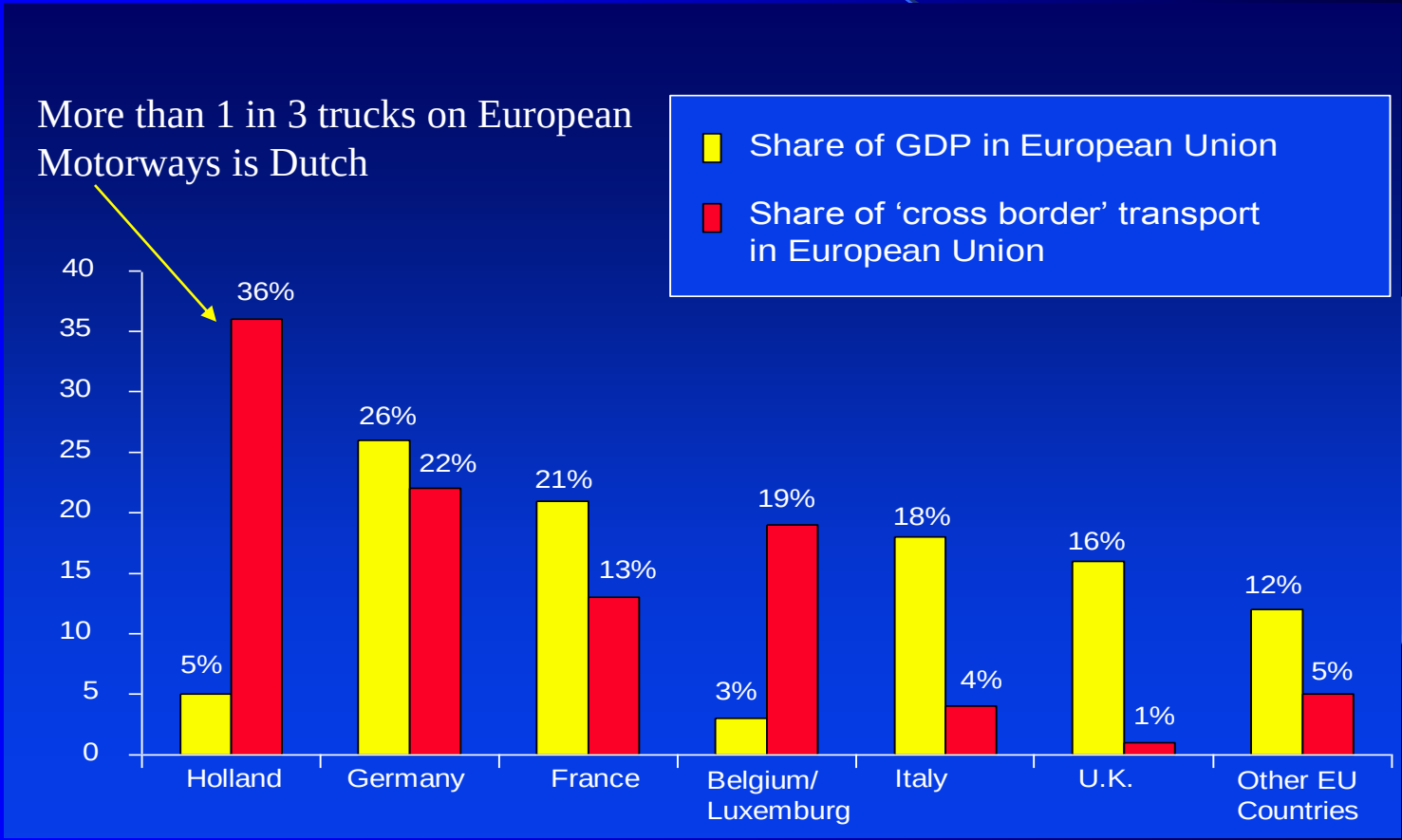
Infra-Red Satellite Map of Europe

(Shaded areas indicate economic activity)



Dutch Transport Companies

(market leader in European transport)



European Distribution Centres