FORECASTING FOR LONG TERM INVESTMENT IN THE CONTAINER SHIPPING INDUSTRY - an holistic approach

By

Mike Garratt

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1. A decade of rapid growth

- Container industry can boast some remarkable rates of growth over the last decade

- Between 1996 and 2006 (estimated)
  - 175% growth in port TEU throughput
  - 220% growth in total ship (teu) capacity (Ships > 1000 TEU)
  - 134% growth in liner service capacity
  - 217% growth in capacity of the three present largest lines

- 800 container terminals now offer
  - 584 kilometres of quay
  - 2900 cranes

- Vessel supply and port capacity to 2009 already determined
  - Paper attempts to address requirements to 2014

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2. The need for objective analysis

- The industry serves a rapidly expanding market which requires huge investment
  - in new ships @ $12-15,000/TEU of fleet capacity
  - in new terminals @ $500 per TEU of port capacity (W. European costs)
  - in inland networks involving corresponding investments by railroads and road hauliers

- The scope for investor error is considerable
  - erratic charter rates do not encourage financial confidence
  - industry dominated by short term forecasts but assets (ships and ports) have an accounting life of 20-50 years

- The need to integrate port and shipping capacity within a competitive environment

3. The principal drivers for growth and change

- Globalisation
  - continuing economic development
  - expanding international trade substituting for domestic production
  - a changing mix of cargo – even ferrous scrap by container
  - longer routes expanding faster than shorter routes

- Regulation
  - the end of the conference system
  - the emergence of global service providers in shipping and stevedoring

- Economies of scale
  - the paramount need to be cost effective
  - larger ships and deeper berths

4. The public sector interest and its impact

- Continuing global economic development heavily dependent on an efficient shipping industry with adequate capacity
  - so that the freedom of this industry to operate in a liberal economic environment it enjoys depends upon it continuing to 'deliver'
- Concern over the operation of cartels has led to the dismantling of the established conference system
  - and as a consequence an attack on the transfer of information that helped lines plan their investments

"*Unless something is done concerning data in the post conference regime in 2008, the industry could be in danger of getting worse information than it has now*"

Lars Jensen, Director of global intelligence and analysis, Maersk Line
At the European Shippers Forum November 2006

"*There is nothing to replace **data supplied by the conferences** right now*"

- This paper is an attempt to explore how that shortage of data and need for consensus can be addressed.

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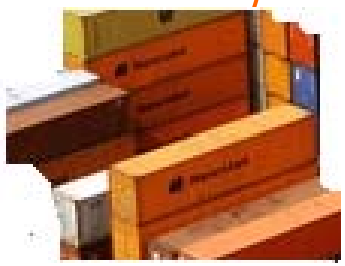
5. Our Approach: bottom up to describe a global industry

- We have given equal weight to measuring trade, shipping and port capacity

TRADE



250 countries x
250 countries x
1996-2005
and forecasts
- derived from individual country's customs data

SHIPPING CAPACITY

World fleet of 9000 ships by
deployment
operator,
capacity,
ports served
1985 – 2006
and forecasts

PORT CAPACITY

800 terminals by
by quay length,
depth,
cranes,
capacity and
throughput

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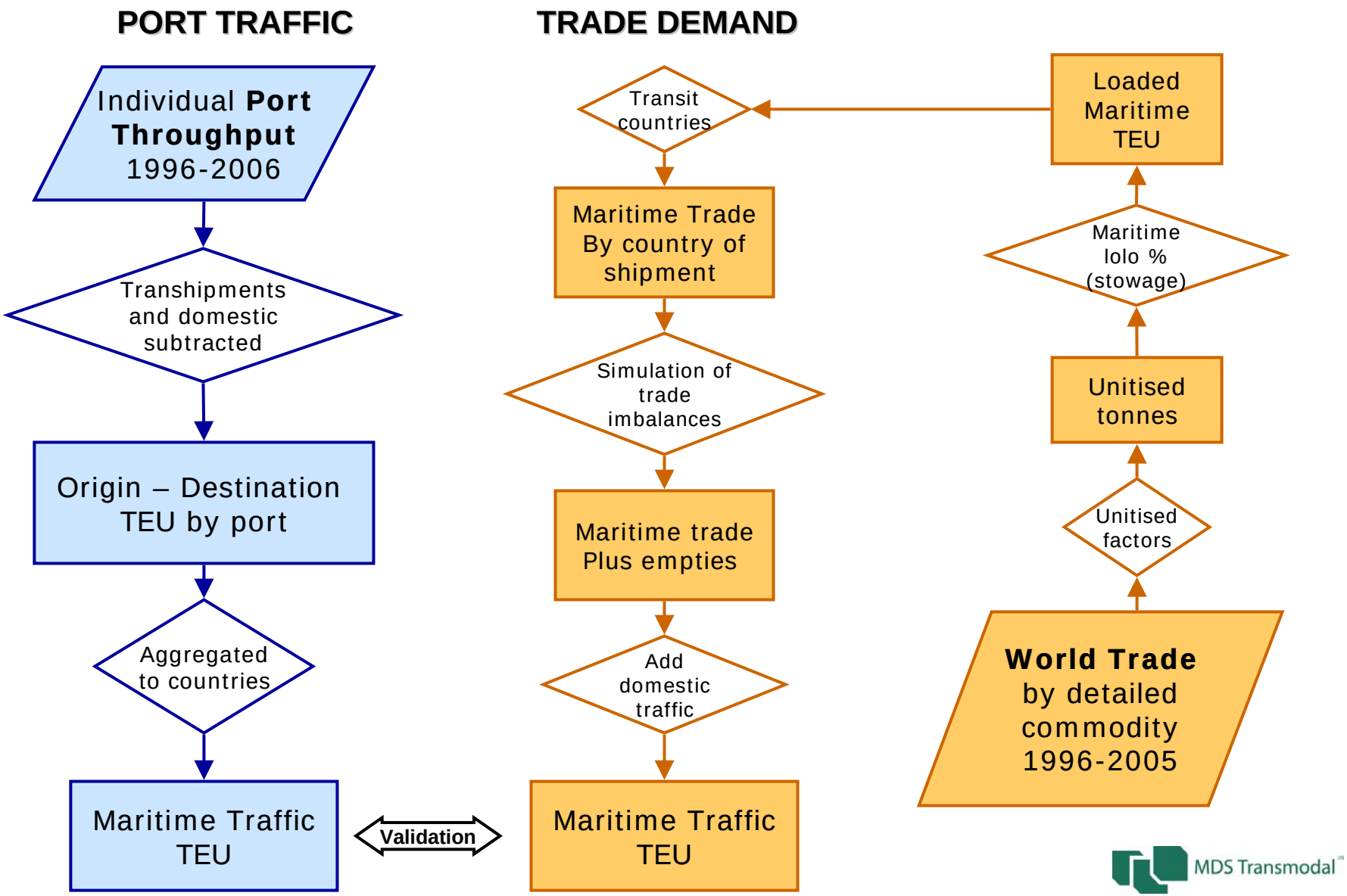
6. Examining the drivers: estimating world cargo



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7. Examining the drivers: estimating world cargo

- Results indicate that a constant basket of goods imply only a 6.8% per annum growth in demand for containerised goods over 10 years

- Actual growth rate of 10.1% per annum also explained by
  - Increasing levels of containerisation (+1.4% per annum)
  - Switching to 40’ high cube containers (+1.0% per annum)
  - Rising proportion of empties (+0.9% per annum)

- Forecasting depends on appreciating interaction between all these factors and how they are likely to mature

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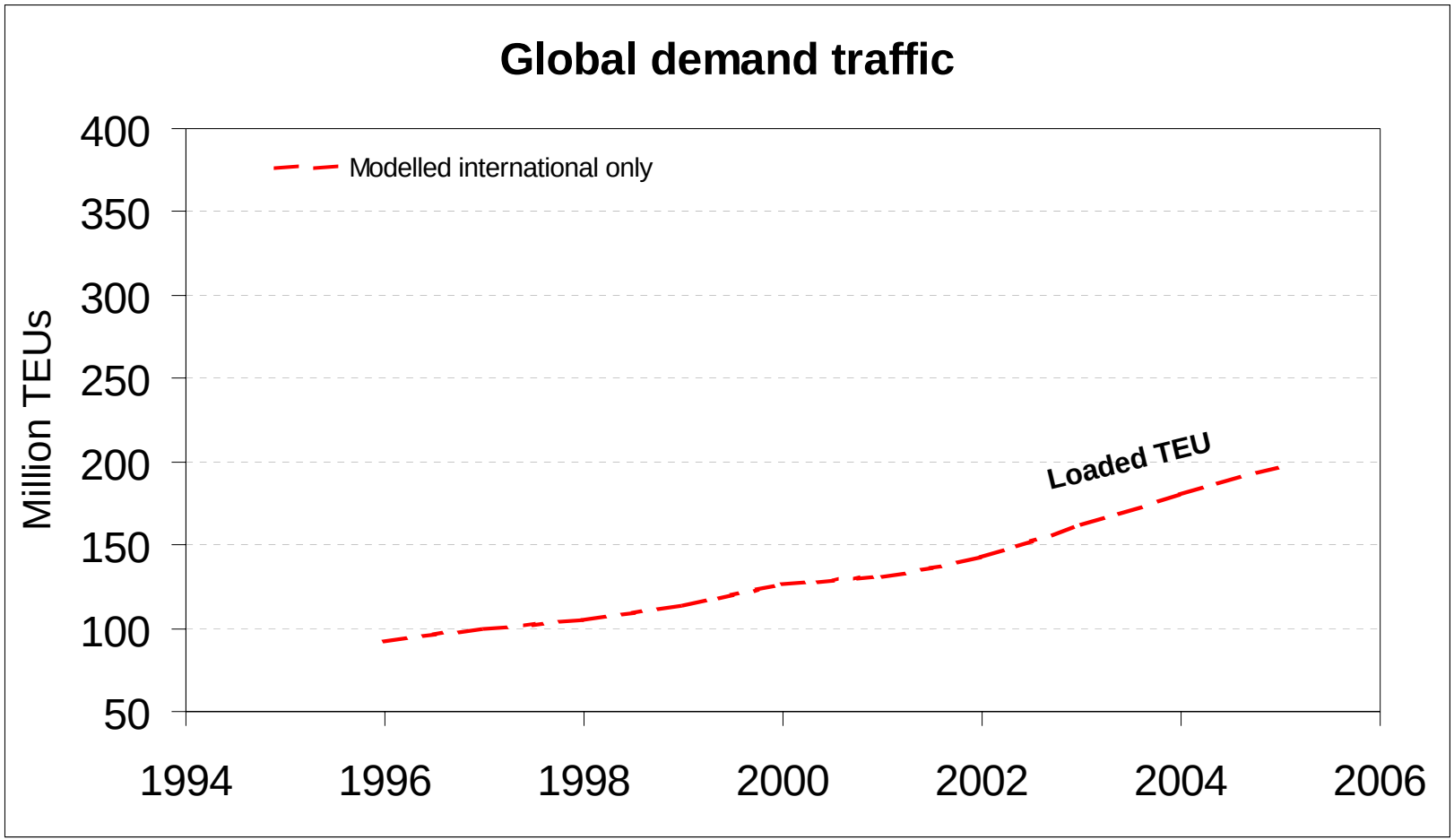
8. Comparing the demand model with world port container traffic to validate methodology



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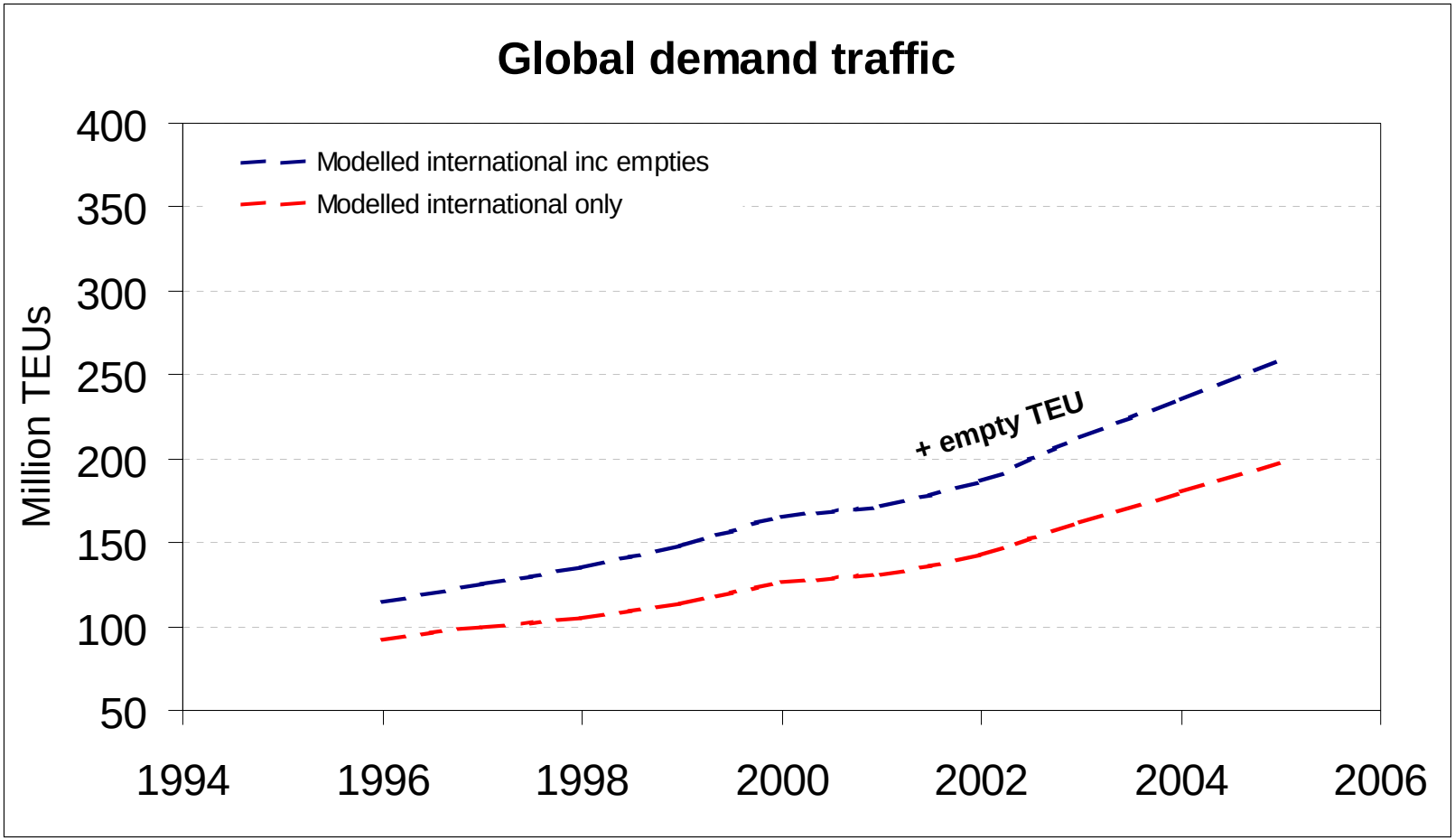

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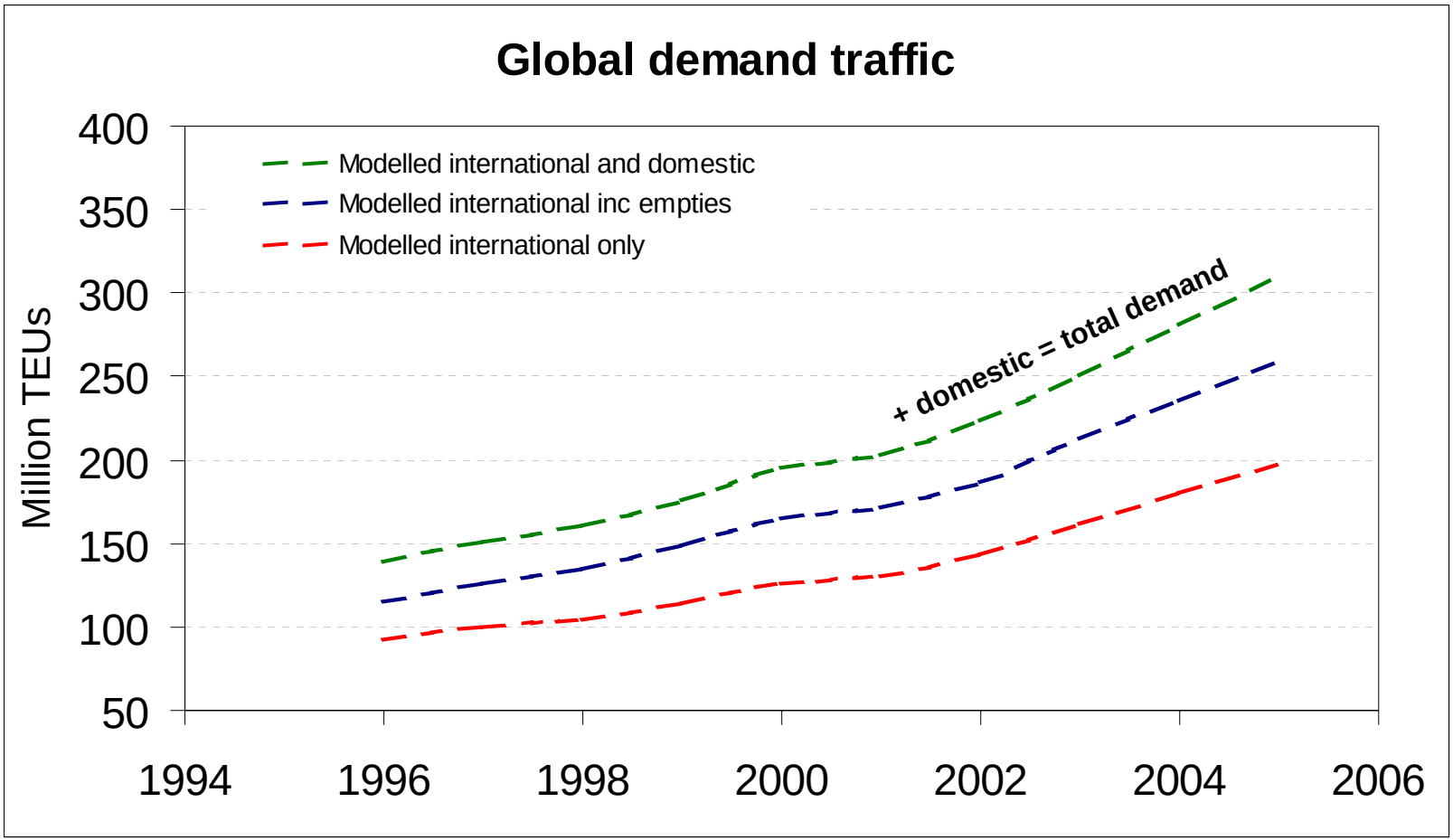

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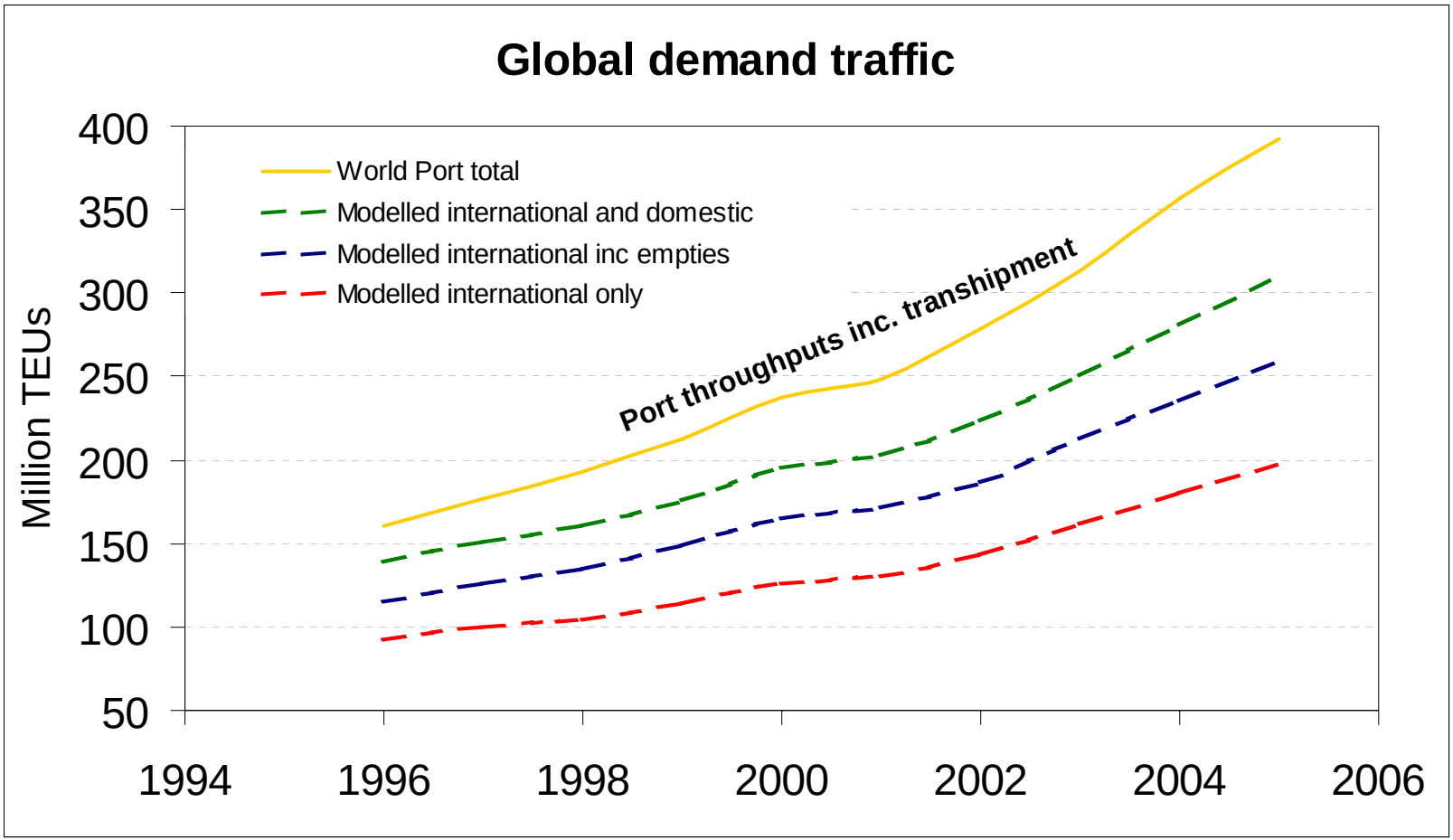

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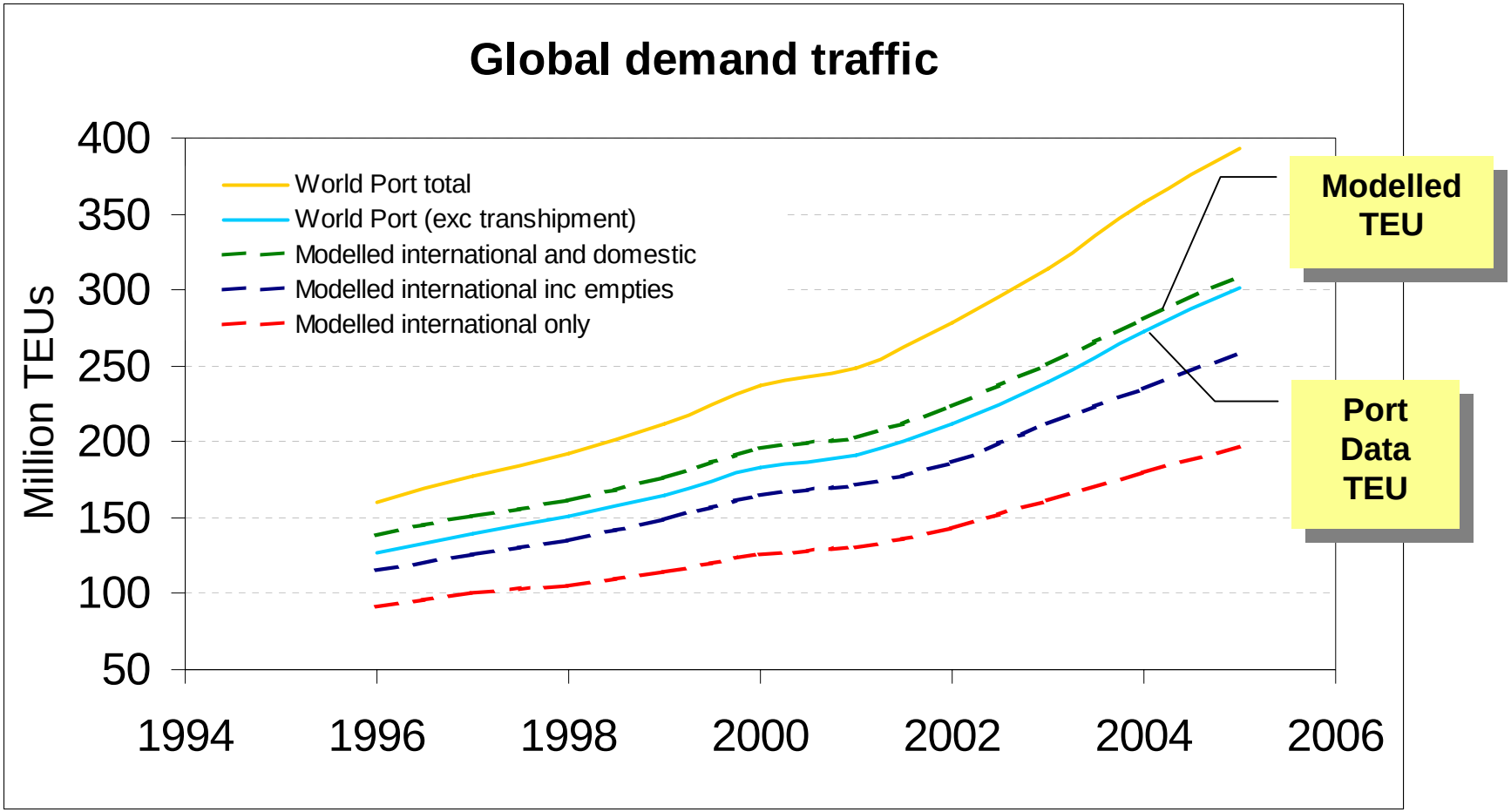

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9. Estimated growth in loaded TEU

- **Loaded TEU 1996 – 2005; growth from 45m to 98m**

Principal routes		Growth	% of all TEU growth
Far East	- Americas	181%	22 %
	- Europe & Med	208 %	19 %
S.E.Asia	- Americas	144 %	1 %
	- Europe & Med.	131 %	3 %
Europe & Med.	- Americas	76 %	7 %
	- sub Saharan Africa	77 %	2 %
Australasia routes		109 %	4 %
Intra regional		143 %	35 %
Other		121 %	6 %
Overall		142 %	100 %

- 41% of <u>all</u> growth in estimated loaded TEU on Far East routes with Europe, Mediterranean and Americas
- Between 1996 and 2005 an extra 53m loaded TEU associated with an extra 58m TEU transhipment lifts

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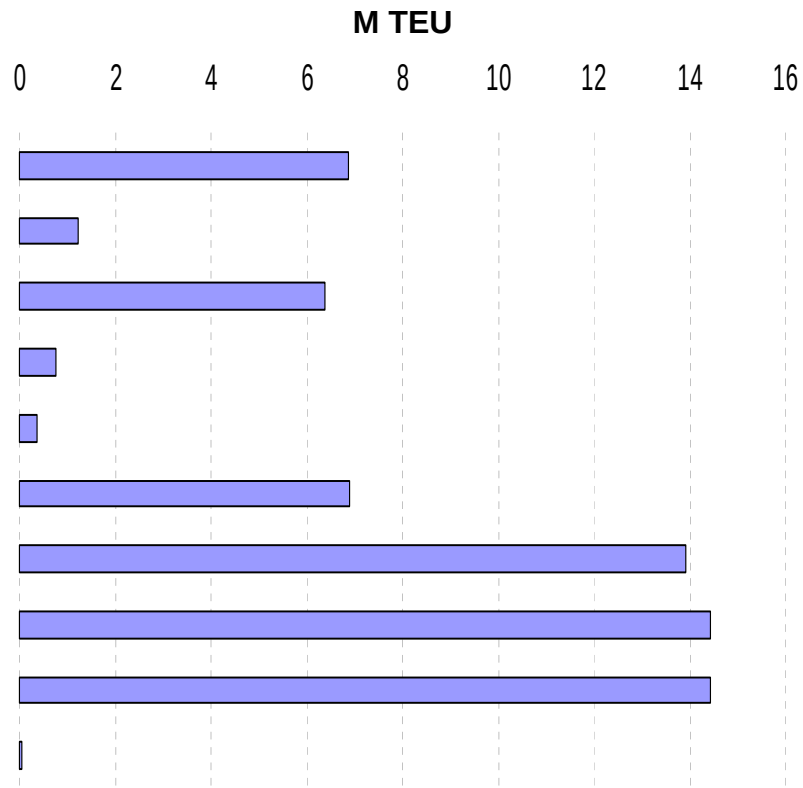
10. Estimated growth in loaded TEU

By broad commodity groups 1996 – 2006

- Total extra loaded containers moving, 1996-2006 = 65m TEU

of which (1 digit SITC classifications):

0	Foodstuffs	7
1	Beverages and tobacco	1
2	Basic materials	6
3	Fuels	1
4	Edible oils and fats	1
5	Chemicals and plastics	7
6	Manufactures classified by material	14
7	Machinery and transport equipment	14
8	Miscellaneous manufactures	14
9	Unclassified	0
	Total extra TEU	65



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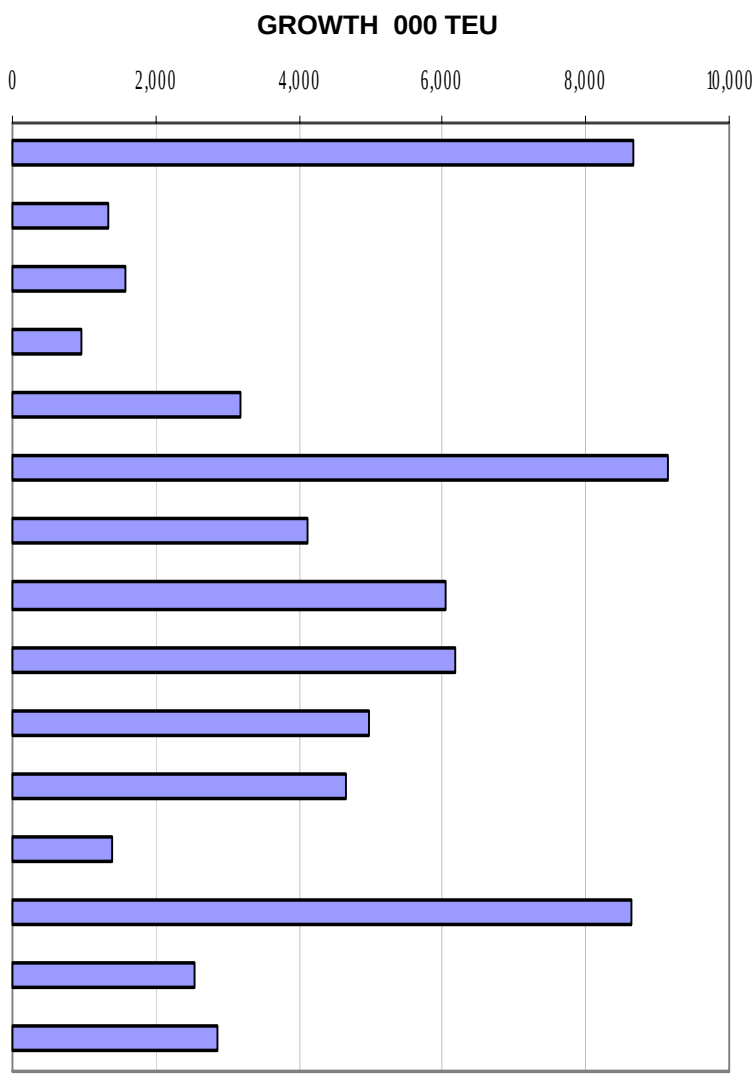
11. Fastest growing commodities at 2 digit level

Top 15 fastest growing SITC2 commods		2006 000 TEU	Growth 000 TEU
82	Furniture, Bedding, Cushions	10,858	8,665
83	Travel Goods	1,803	1,338
81	Prefabricated Buildings, Plumbing	2,177	1,573
87	Professional and scientific apparat.	1,337	952
85	Office machinery and computers	4,472	3,175
77	Other electrical machinery	13,191	9,149
25	Pulp and waste paper	6,080	4,130
84	Clothes	8,958	6,051
78	Road vehicles incl. parts	9,194	6,180
69	Metal Manufactures NES	7,417	4,956
57	Primary plastics	6,996	4,643
85	Footwear	2,112	1,384
89	Miscellaneous manufactures	13,167	8,625
76	Telecoms and audio machinery	3,885	2,543
51	Organic chemicals	4,386	2,869

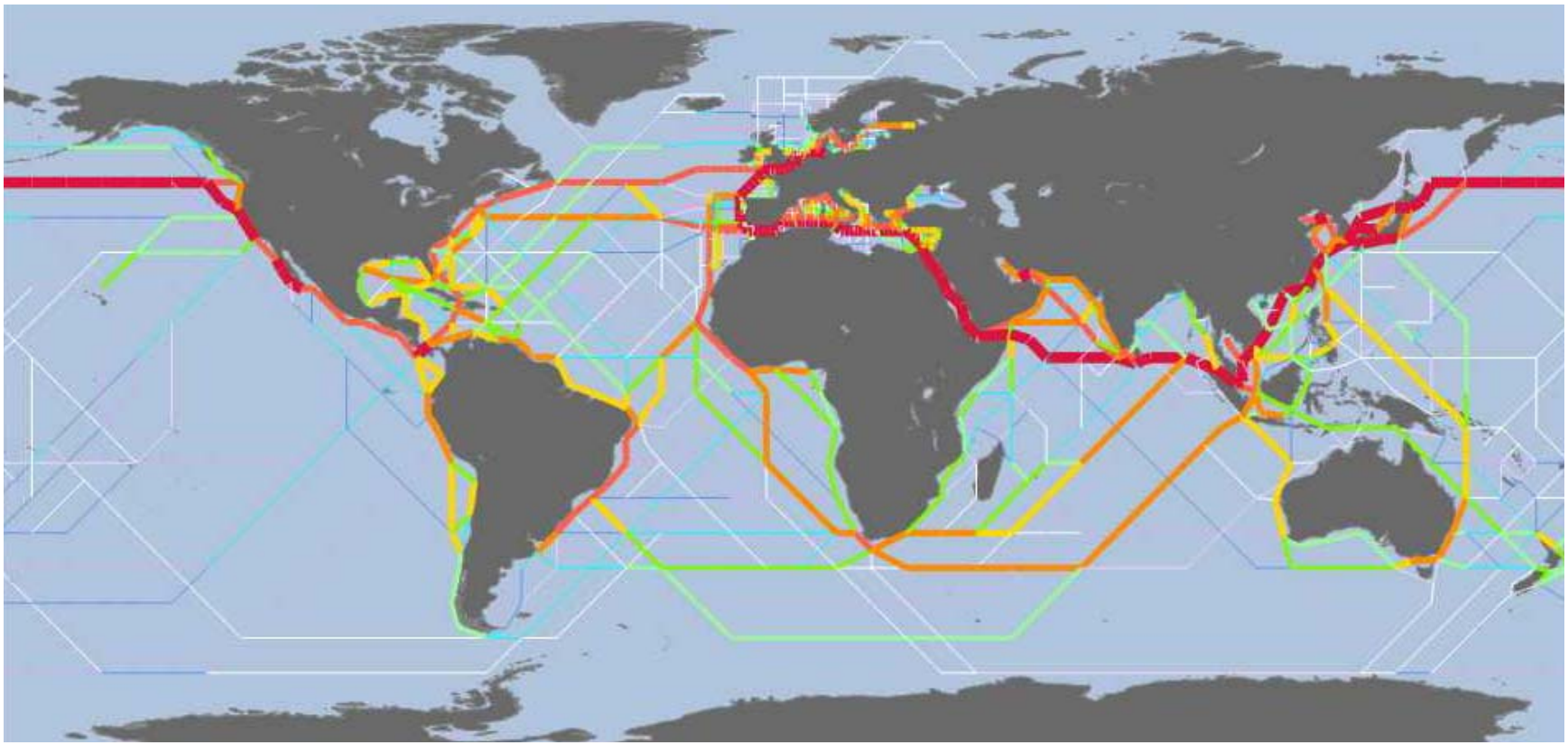


12. Estimated growth at 5 digit level

- Specific fastest growing commodities at 5 digit level of SITC 82

Imports + exports	SITC 5 digit level of commodity description		96 – 06 volume growth TEU
CHINA	82159	WOODEN FURNITURE	470,664
CHINA	82139	METAL FURNITURE	334,925
CANADA	82119	PARTS OF SEATS	285,954
USA	82159	WOODEN FURNITURE	282,171
CHINA	82117	SEATS WITH METAL FRAMES	261,768
USA	82155	WOOD BEDROOM FURNITURE	214,564
MEXICO	82119	PARTS OF SEATS	208,270
CHINA	82116	SEATS WITH WOODEN FRAMES	207,848
CHINA	82119	PARTS OF SEATS	207,609
CHINA	82155	WOOD BEDROOM FURNITURE	205,574
USA	82119	PARTS OF SEATS	190,338
USA	82139	METAL FURNITURE	148,326
USA	82117	SEATS WITH METAL FRAMES	130,298
CHINA	82180	PARTS OF THE FURNITURE OF HEADINGS 821.30 821.50	127,863
CHINA	82129	OTHER ARTICLES OF BEDDING	123,401

13. Deployment of Container Ships in Autumn 2006



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14. Shipping Capacity: the fleet and services

- Comprehensive database maintained since 1985 to present day
- Each ship identified by operator and capacity
- Each ship associated with route/service/ports
- Output by route and service capacity
- Output for 2009 estimated on the basis of new building deployment
- Mix of vessels for 2014 determined on basis of demand/vessel size relationship and impact of Panama Canal upgrade/port deepenings

15. The supply of container service capacity

- Excluding transhipment, demand 1996-2006 (loaded + empty) has grown by 162%
  - closely matched by growth in aggregate container service capacity

Containership deployment 1996-2006

m TEU

				1996 – 2006	
Two-way deployment	1996	2001	2006	Supply growth	Demand growth
Asia – Europe / Med.	11	15	33	22	18
Asia – Americas	15	24	43	29	27
Transatlantic	8	12	19	10	5
- Africa	5	7	12	7	4
- Australasia	3	5	7	4	3
Total	**42**	**62**	**114**	**72**	**57**
Intra-Continental	74	105	156	82	30

- In the medium term the market very effective in adjusting supply to demand

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16. The supply of container ships 1996 - 2006

- Growth catered for by increase of:
  - 38% in mean ship capacity
  - 63% in the number of strings

Fully cellular vessels

	1996	**2001**	**2006**
1-3000 TEU	968	1323	1745
3-5000 TEU	256	403	627
5-8000 TEU	13	153	372
8000 TEU +	-	-	115
Total number of vessels	**1237**	**1879**	**2859**
Mean TEU/ship*	2230	2548	3092
Total strings	246	299	400
% chartered	32	46	52

- Coupled with transhipment and inter lining, variety of services offered by the lines has expanded rapidly
- Future development likely to concentrate more heavily on exploiting economies of scale

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17. The supply of container services: market concentration

- Transition towards individual major suppliers
- Increase in market concentration

Global fleet capacity supplied

	2006	2001	1996
Total (millions TEU):	9.142	5.291	3.163
of which %:			
Maersk (*Maersk Sealand in 2001*)	17.9	11.9	6.1
MSC	10.0	4.7	2.7
CMA–CGM	6.4	3.0	2.0
Evergreen	5.9	6.6	6.1
Hapag-Lloyd	4.8	2.4	2.4
Cosco	4.0	3.9	5.0
China Shipping	3.8	1.7	0.0
Hanjin	3.8	5.6	3.4
Total % of the above	56.6	39.8	27.7
Total % of top 8	56.6	46.5	36.8

18. Funding expansion: chartering

- In 1992 14% of world container fleet chartered
- By 2006, 52% chartered providing:
  - The flexibility for leading carriers to grow share
  - The means to concentrate funding on the largest of new ships, takeovers and terminals
- Therefore increasingly important for financial institutions to have confidence in the industry's projections

19. Forecasting port lifts demand

- Underlying growth in demand by TEU approximately 7 - 8% per annum
- Growth continuing to be concentrated on Far East routes

million TEU

	2006	2009	2014
Asia – Europe/Med	53	69	90
Asia – Americas	74	95	123
Transatlantic	23	27	32
To/from Africa	16	20	25
To/from Australasia	12	15	18
Intra-Continental	105	135	174
Total long haul port-to-port	**283**	**360**	**463**
Transhipment	**103**	**134**	**174**
Domestic	**57**	**73**	**94**

- Further penetration of bulk cargo markets in backload direction will not affect this growth rate

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20. Forecasting shipping supply: impact of rising bunker prices on need for more vessels

- Newbuildings to end 2009 relatively predictable by route deployed;
- Continuing high bunker costs may encourage chartering extra vessels to reduce energy costs:

Cost per round voyage for Panamax ships on Europe – Far East route

Bunkers $/tonne	$150 (2003)		$300 (2006)	
Vessels/string	8	9	8	9
Charter * $m	1.51	1.70	1.51	1.70
Bunkers $m	0.88	0.73	1.76	1.46
Total $m	**2.39**	**2.43**	**3.27**	**3.16**
Saving through slow sailing		-2%		+3%

* at $27,000/day = long run replacement cost

- Significant savings from slower sailing speeds given higher bunker costs
- Adjustments over all routes could add 10% to optimum world fleet required
- Long term rise in energy costs will lead to increased demand for ship capacity

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21. Forecast demand and service capacity

m TEU

	2006		2009		2014	
	Demand	**Supply**	**Demand**	**Supply**	**Demand**	**Supply**
Asia – Europe/Med	27	33	35	43	45	55
Asia – Americas	37	43	48	56	62	72
Transatlantic	11	19	14	24	16	28
To/from Africa	8	12	10	15	13	19
To/from Australasia	6	7	8	9	9	11
Total	**89**	**114**	**113**	**147**	**144**	**185**
Load factor		*78%*		*78%*		*78%*

Excludes intra-continental

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22. Forecast demand, service capacity and fleet required for 2014

- On the basis of assessing each group of routes separately; following fleet could address projected demand

m TEU

[Loaded + empty]	**2006**	**2009**	**2014**
Demand (m TEU) inter Continental	89	114	144
Intra Continental	52	67	87
Forecast long-haul demand	**142**	**180**	**231**
To be served by a fleet of:	Present	+Ordered	+extra needed
1000 - 3000 TEU	1745	2161	2400
3000 – 5000 TEU	627	873	1000
>5000 TEU	487	786	1100
Mean vessel capacity (TEU)	3092	3362	3670

23. Implications for supply

- Based upon load factors remaining consistent from 2009
- Forecast further increase in demand between 2009 and 2014 could be catered for by further 18% vessels (+40% ships of greater than 5000 TEU capacity)
- 2014 a key year: the planned inauguration of new Panama Locks
- Implication is a need for 700 more deep sea vessels (>1000 TEU) 2009-14 of which 300 Post Panamax (>5000 TEU)

24. The supply of port terminals

- Ports compete through offering
  - a competitive location
  - connectivity
  - capacity
  - capability (to accommodate larger vessels)
- Location (geography) is specific and not for discussion here in a short and generic paper
- Connectivity a key feature given 23% of container movements are transhipments

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25. Port connectivity: an index of port attractiveness

- The connectivity of a port to other ports therefore an important aspect of its competitiveness
- We have developed a **connectivity index** taking account
  - no. of destinations served
  - vessel capacity on offer
- Connectivity index shows important changes in rankings - examples
  - potentially important marketing opportunity

	2005 connections	Index	2005 rank	1990 rank
Hong Kong	2036	292	1	1
Shanghai	1424	195	2	91
Yantian	595	146	6	-
Hamburg	943	127	9	8
Barcelona	461	51	29	34

- Issue of capability will extend to smaller ports needing to accommodate ever larger ships yet with lower cargo volumes available to fund upgrades

26. Determining a benchmark for terminal productivity

- However, principal challenge will be for ports to offer adequate capacity
- To take a global view we have established simple benchmarking for a port offering Panamax parameters
  - 1100 TEU/quay metre for terminating cargo
  - 3300 TEU/quay metre for transhipped cargo
- These benchmarks reflect performance for the most efficient container ports
  - Only 12 major ports exceed this performance representing 4% of world throughput
  - Many ports cannot achieve these benchmarks because hinterlands generate inadequate traffic
  - Theoretical capacity of 800m TEU through all 800 terminals analysed cannot therefore be achieved
- To ensure results not distorted by factoring in minor ports unable to address main markets, we have defined major ports as:
  - Offering minimum 13m draft
  - Already handling >1m TEU

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27. Potential port terminal shortfall

- The 64 major ports handle 69% of global throughput
- Methodology assumed no change in market share between ports within regions and no account taken of the further application of “new technology”
- Continuing growth implies a shortfall of 167m TEU handling capacity in the major ports by 2014

Regions	**2006** Major Ports		**2014** Major Ports		
	Benchmark capacity	Throughput	Benchmark capacity	Throughput	**Shortfall**
Asia	225	199	225	330	**132**
Europe/Med	95	61	95	98	**26**
Americas	70	43	70	68	**8**
Africa	0	0	0	0	**-**
Australasia	7	4	7	6	**-**
Total	**397**	**307**	**397**	**502**	**167**

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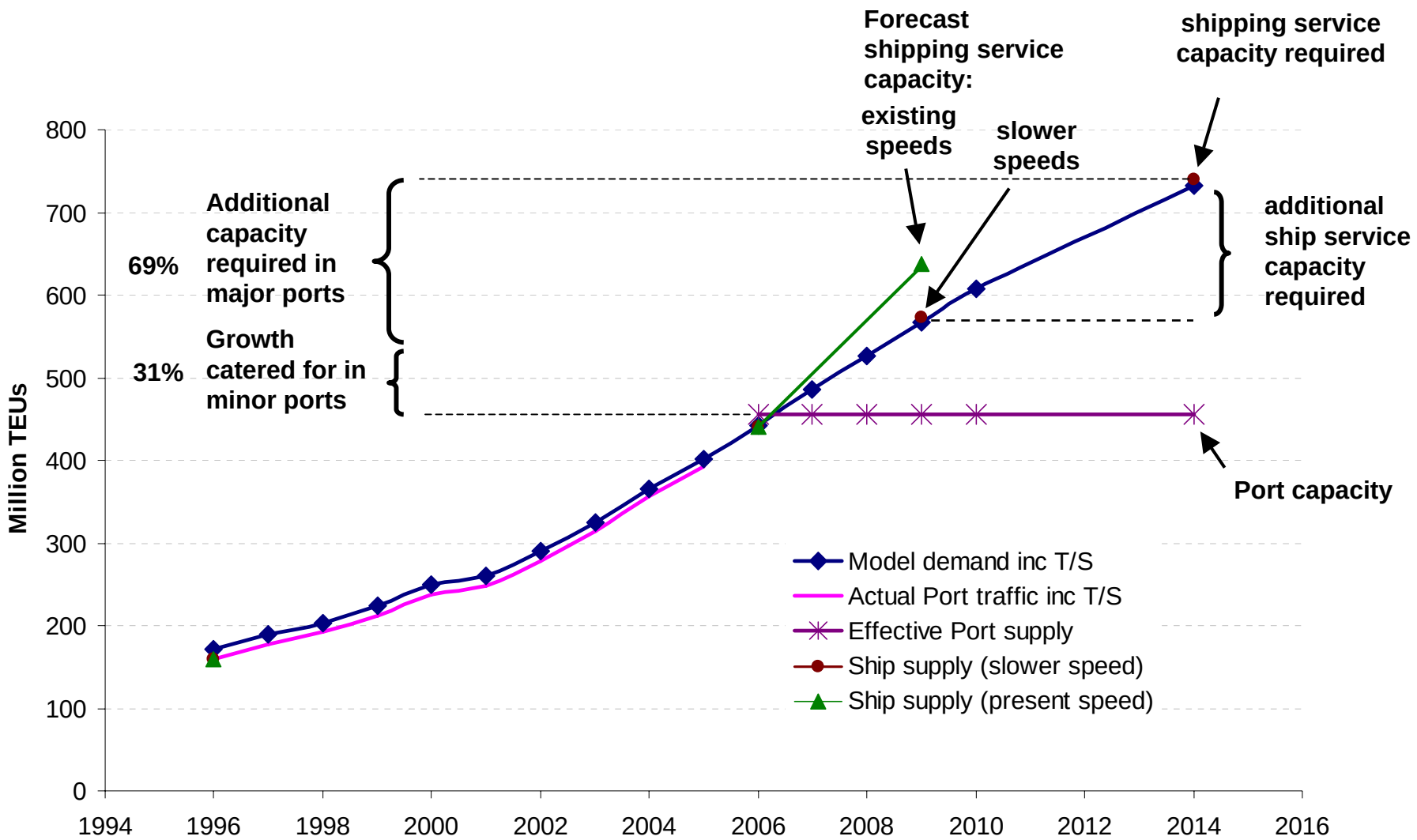
28: Holistic analysis: Worldwide



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29. Towards an overview

- The overall market will continue to grow based upon underlying growth in goods moved in head-haul direction
- Short term over supply can be absorbed by slower sailing at charter rates that still cover replacement costs
- Apparent need for more port capacity – taking care to monitor the multiple between loaded containers and total TEU handled
- Further expansion in ship capacity will be required 2009–14 of around 2.5m ship TEU (approx 700 vessels)
- Important to recognise trade offs between vessel capacity, sailing speeds and transhipment strategies
- A substantial expansion will be required in the major ports even if they are all able to achieve benchmark productivity

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