

Economic Cycles in Maritime Shipping and Ports: The Path to the Crisis of 2008

Gustaaf De Monie

Senior Director, Policy Research Corporation
Jan Moorkensstraat 68, B-2600 Antwerp, Belgium.
E-mail: Gustaaf.DeMonie@policyresearch.be

Jean-Paul Rodrigue

Department of Global Studies & Geography, Hofstra University
Hempstead, New York 11549, USA.
E-mail: Jean-paul.Rodrigue@Hofstra.edu

Theo Notteboom

Institute of Transport and Maritime Management Antwerp (ITMMA), University of Antwerp
Keizerstraat 64, B-2000 Antwerp, Belgium.
E-mail: theo.notteboom@ua.ac.be

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1. Introduction

The underlying fundamentals that have propelled the growth of global trade over the last decades beg to question their rationale and sustainability. The end of asset inflation, the decline in debt based consumption, the overreliance on export oriented strategies and the associated trade imbalances are imposing stringent readjustments on freight distribution systems and the global value chains they support. Yet, from a business cycle perspective periods of growth are commonly followed by adjustment phases where misallocations are corrected, particularly if based on credit. Thus, the wave that has led to impressive growth figures in transport demand may shift towards a new paradigm that could have substantial consequences on the operating conditions of maritime shipping companies and transport terminals. This phase of readjustment is even more exacerbated by the extended role that finance has taken in maritime shipping, trade and transport terminals in recent years.

The global economic crisis, which has been triggered in late 2008 by an unprecedented financial crisis, has soon taken on vast proportions. The crisis resulted in a generalized recession in all OECD countries and in most emerging economies, which is fundamentally challenging the direction of future trade flows and the sense of present trade organizational arrangements. Dependable factors (the stability of the world's financial institutions, continuous and sustainable GDP growth, the reliance on the backbone economies of the OECD) and unfailing certainties (government intervention on the economy, the superiority of widely applied logistics concepts) are put in question and contested if not opposed.

Since the financial industry has taken such an active role in global economic affairs, understanding global trade and transportation requires more than ever an insight into financial

issues and their impacts on transport operations. Paradoxically, this insight is weak in the contemporary analysis of both maritime shipping networks and port economics. For instance, the strategies of maritime shipping companies and of port operators and the sensitivity of supply chains to cost variations are fairly well known processes that have helped understand how maritime transport systems adapt to and shape changes. Yet, this perspective sheds limited light on one of the fastest and most radical changes ever to affect the maritime and port industries. Since the economic crisis that began in 2008 initially concerned the financial sector, it is through the lenses of financial issues that its consequences on the maritime industry are best understood. It can be seen as paradoxical that maritime transportation has become highly intertwined with the financial sector while its main drivers are not mainly financial, but macroeconomic issues.

To deal sensibly with the effects of changes in world trade, it is inevitable to investigate more in-depth the current and anticipated state of affairs regarding the world economy, value chains, the maritime transport industry, the ports and the terminal operations sector in order to identify the root causes for their present situation. This paper will, after an analysis of the evolution of world trade between 1990 and 2008, look into the reason for the dysfunctioning of the world economy since late 2008 and in particular of the three sectors mentioned above. Still, the process of globalization of trade that has surged since the 1990s, gave numerous reasons to support the impressive growth of the maritime and port industries.

2. Evolution of World Merchandise and Seaborne Trade

2.1. Unmitigated Growth in Global Trade

Looking at the evolution of international trade since the early 1990s underlines an unmitigated growth with short decline periods, such as during the Asian Financial Crisis of 1997 and the recession of 2000-2001. A convergence of factors supported this substantial growth. First, integration processes, namely various forms of regional and global trade agreements, promoted trade as regulatory regimes became better harmonized (e.g. tariffs). Examples include the accession of China to the World Trade Organization in 2001 and the creation of the European internal market in 1993. Second, production systems became more fragmented as it became easier to seek global comparative advantages in terms of labor and accessibility to markets notably through globally scattered production sites and global sourcing strategies. Third, international transportation systems, maritime shipping and port terminals saw a substantial development in capacity, connectivity and reliability. Fourth, the transactional efficiency of international trade was improved with ever more sophisticated and performing telecommunications and information technologies as well as a greater availability of capital to finance international trade transactions.

It comes as no surprise that the growth of maritime transportation is strongly correlated with the growth of international trade as maritime shipping and ports are the main physical support for international trade transactions. The value of global exports first exceeded \$US 1 trillion in 1977 and by 2008, more than \$US 16 trillion of merchandises were exported (Figure 1). During the same time period, the share of the world GDP accounted by merchandise trade, imports and exports combined, surged from 18% to 51%. As expected, major fluctuations in the value of exports in the 1970s and 1980s were mainly linked with economic cycles. More recently, the development of containerized maritime transportation was linked to a growing trade of value-added commodities. From the late 1990s, a growing disconnect took place

between the volume and value of maritime trade, mainly the outcome of the increasing sophistication of goods manufactured in Pacific Asia, rising energy (oil) prices as well as the spatial fragmentation of production since parts could be traded several times.

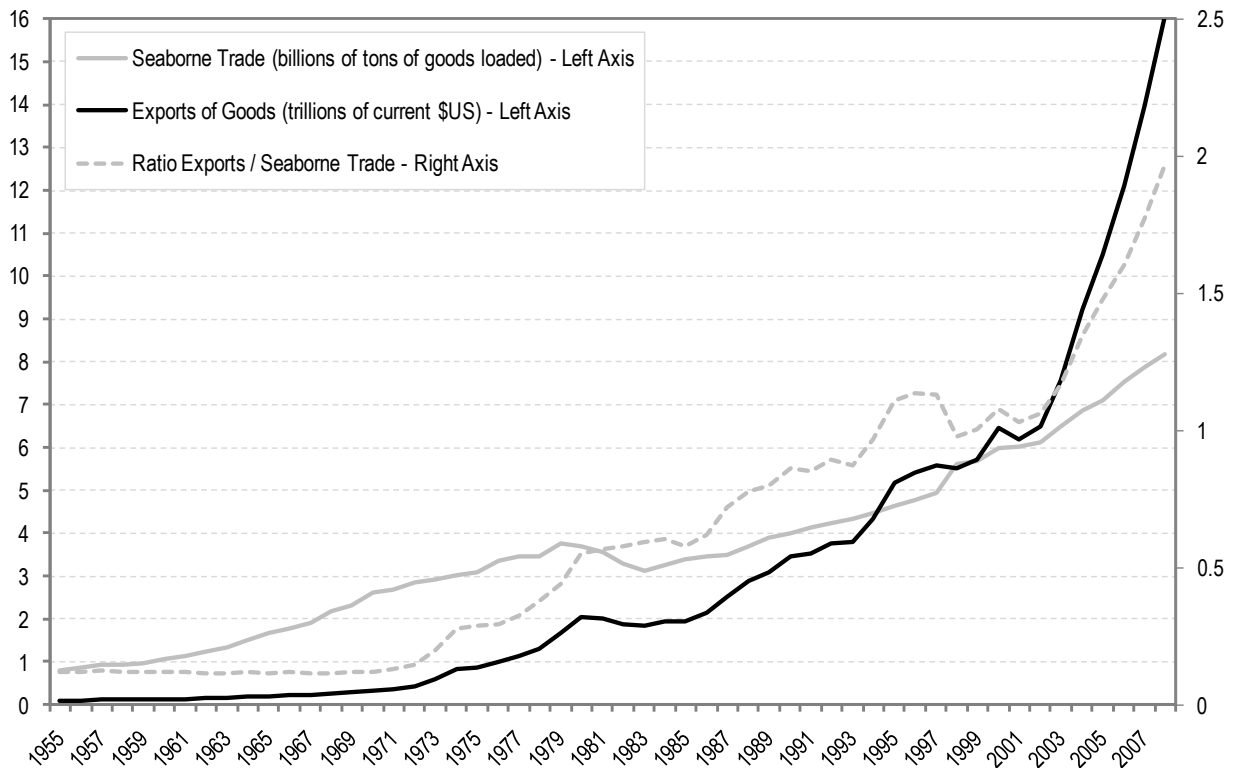


Figure 1 International Seaborne Trade and Exports of Goods, 1955-2008. Source: Source: WTO and United Nations, Review of Maritime Transport. Data in current USD.

The ratio between value of exports and volume of seaborne trade remained constant until the first oil shock in 1973, underlining little changes in the composition of maritime shipping. The first two significant changes in this ratio correspond to the first and second oil shocks, implying that higher oil prices directly impacted the global value of exports. Afterwards, the steady growth of the ratio is mainly attributed to the growth in the containerized trade of high value merchandise, particularly at the beginning of the 21st century.

2.2. Unmitigated Growth in Containerization...

The world container throughput is the summation of all containers handled by ports, either as imports, exports or transshipment (Figure 2). This means that a container is at least counted twice; as an import and as an export, but also each time it is handled at the ship-to-shore interface (e.g. at an intermediary location). Thus throughput should ideally be counted in container moves, but for basic commercial-strategic reasons, both port authorities and terminal operators prefer to communicate throughput figures in TEU. The world container traffic is the absolute number of containers being carried by sea, excluding the double counts of imports and exports as well as the number of involved transshipments. The throughput reflects the level of transport activity while the traffic reflects the level of trade activity. The trend underlines a divergence between both as global supply chains and liner shipping networks (e.g. hub-and-spoke systems) became more complex.

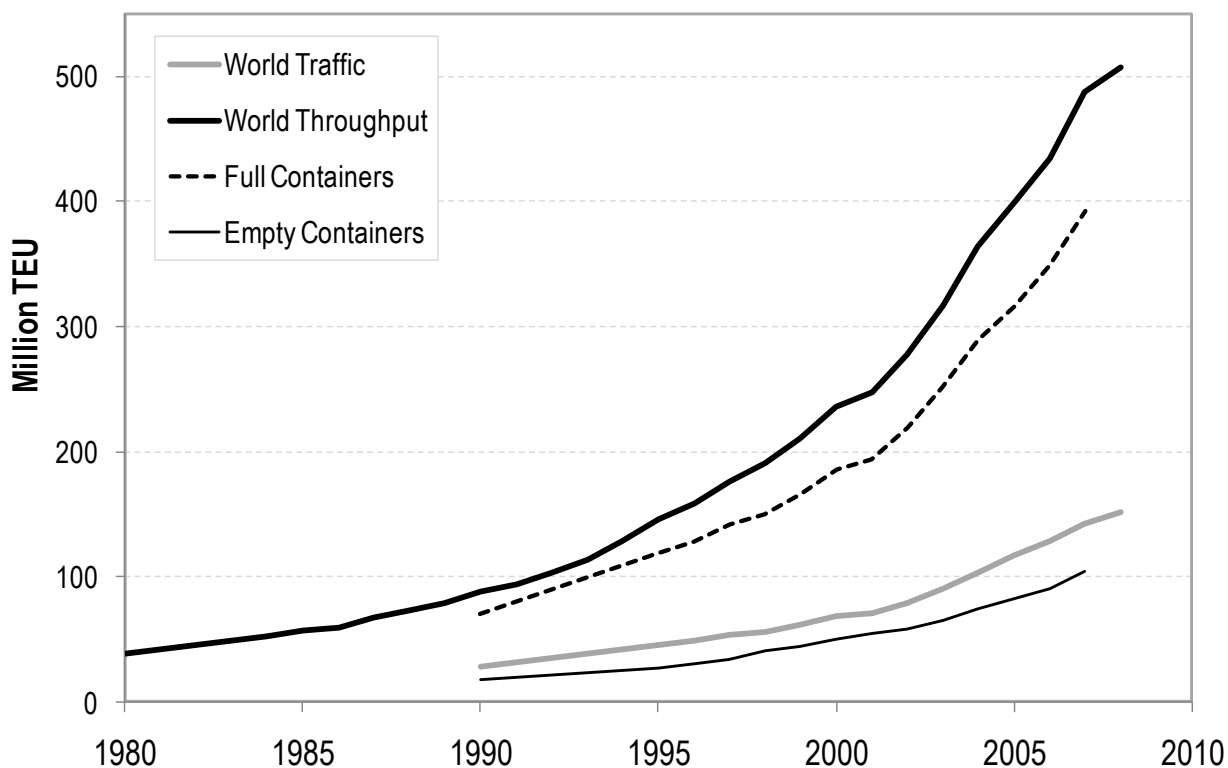


Figure 2: World Container Traffic and Throughput, 1980-2008

Between 1990 and 2008, container *traffic* has grown from 28.7 million TEU to 152.0 million TEU, an increase by about 430%. This corresponds to an average annual compound growth of 9.5%. In the same period, container *throughput* went from 88 million to 530 million TEU, an increase of 500%, equivalent to an average annual compound growth of 10.5%. Consequently, the ratio of container traffic over container throughput was around 3.5 in 2008, whereas this ratio stood at 3.0 in 1990. The surge of both container traffic and throughput is linked with the growth of international trade in addition to the adoption of containerization as privileged vector for maritime shipping and inland transportation. So far, the growth of container throughput behaves according to the standard technological diffusion (or product life cycle) curve, which is “S” shaped. Temptation has been great for forecasters to extrapolate such exponential growth for the next fifteen to twenty years resulting in phenomenal throughput levels. Unfortunately, too many forecasts are exclusively developed from a top-down perspective, too few consider the physical cargo flows that external trade will be able to generate and the inevitable shifts in cargo types, routes and packaging. This also means that a small drop in traffic can result in a significant drop in throughput.

2.3. ... and the Surge of Trade Imbalances

An overview of world's largest exporters and importers underlines a unique situation. Some countries, notably the United States and the United Kingdom, have significant merchandise trade deficits which are reflected in their balance of payments. Three main causes explain these trade imbalances:

- *Comparative advantages* and the search for lower input costs have provided powerful incentives to consider new locations for production. This enabled production costs

to be kept low for a wide array of manufacturing activities, notably because of a “Chinese price” that became a frame of reference for labor intensive manufacturing activities. Not only did this keep production costs low, but it greatly helped to offer consumption at cheap thus attractive prices, thereby fuelling demand in countries already facing serious trade deficits. Thus, the redistribution of production was a very unequal process, while comparatively consumption at a global level remained more stable.

- *Foreign direct investments* were the main means used to support comparative advantages and implied a transfer of capital and technology as well as its accumulation as infrastructure and means of production. This process combined with global sourcing strategies accelerated global trade, but also the setting of imbalances.
- *Debt and asset inflation* are a much less known cause, but of prime importance. The growth of international trade, notably after 2002, was correlated with a phase of asset inflation, particularly real estate. The real estate bubble that took place in the United States and several other countries (Canada, United Kingdom, and Spain) between 2001 and 2006 was accompanied by a staggering growth of debt using assets as collateral. A share of this debt though was used to consume imported goods, impacting trade balances.

In 2008, six countries accounted for close to 70% of global trade deficits; the United States, France, Italy, the United Kingdom and Australia. Inversely, countries having a positive trade balance tend to be export-oriented and dependent on international trade for their economic growth. Taken together, they generated 83% of the global financial surplus in 2008. Economic history teaches that acute imbalances cannot be maintained indefinitely without a readjustment. This commonly emanates in a sharp and rapid correction.

3. The Economic Crisis Unraveled

3.1. Shifting Relations between Maritime Transportation, Trade and Finance

The links between the financial industry and maritime shipping are very old. Shippers have a long tradition of interaction with the financial industry as funding was required to build ships and to purchase trade cargo, while mitigating the risks related to shipping led to the creation of the insurance industry (e.g. Lloyd’s of London in 1871). The traditional role of the financial industry was a more passive one, providing capital and minimizing risk when needed. This capital was often paid back once a voyage was completed and the cargo sold. Finance was used to leverage the opportunities of international transportation. Yet, in the last decade this relationship has become more acute because it was inverted. Indeed, transportation became a mean to leverage financial opportunities for the following reasons:

- Transport modes and terminals are very *capital intensive*. The substantial levels of productivity brought by containerization have resulted in a much more capital intensive industry depending on financing not just for the acquisition of maritime assets, but also for operations. The amortization of investments tends to take place over longer periods of time implying a more direct involvement and oversight of financial firms.

- Financial firms are more involved in the *ownership and operation of intermodal assets*. With the growth of international trade, shipping and port operations became an increasingly profitable industry, if not always in terms of rate of return then surely in terms of the volume of this return. This attracted the attention of financial firms, such as banks, insurance companies and even pension funds, seeing transportation assets, such as port terminals, as an investment class part of a diversified global portfolio. This provided large quantities of capital to develop intermodal assets and an increase of their “spot” value. Global financial firms were also looking at opportunities large enough to accommodate the vast quantities of capital at their disposal and terminals represented an asset class that suited well the scale of this allocation.
- *Financing international transactions*. With the growth of international trade, transactions between commercial actors became increasingly complex and reliant on financing. The main form is known as a letter of credit which is a document issued by a financial institution that provides a promise of payment for a trade transaction, implying that it can be redeemed if certain conditions are satisfied. Letters of credit are mainly used for transactions between actors, such as a buyer and a seller, in different countries. Large commercial banks commonly finance about 90% of all the global trade transactions.
- *Shipping derivatives*. During the last decade, the maritime and port industry got increasingly intertwined with the financial world. The high volatility in the shipping markets, exemplified by sharp fluctuations and sudden changes, has supported the emergence and growth of a paper market on shipping freight. Complex financial products and derivatives have been developed to support the growth in shipping (Kavussanos and Visvikis, 2006). Shipping derivatives have been developed in order to manage risks, emanating from fluctuations in freight rates, bunker prices, vessel prices, scrap prices, interest rates, and foreign exchange rates, more effectively, in a cheaper and more flexible manner. The shipping market now makes extensive use of risk management techniques and instruments attracting trading houses, energy companies as well as investment banks and hedge funds. The risks, if managed effectively, can stabilize cash-flows, with positive repercussions for business.

Until late 2008, these issues substantially benefited the maritime and ports industry as large sums of capital became available for a variety of intermodal improvements such as a new generation of containerships, the development of new and more advanced port terminal facilities worldwide to support export-oriented strategies (as illustrated by those in East Asia) as well as inland ports to better access regional markets (for example in North America and Europe). The perverse consequence was that transportation became increasingly perceived solely from a financial perspective, particularly since a large number of stakeholders and decision makers were coming from the financial sector as opposed from the transportation sector. Terminals became a financial product part of a global asset portfolio, whose performance was often seen in terms of price to earnings ratios. Another perverse effect was that terminal assets came to be perceived as liquid, a perception encouraged by the active involvement of a variety of financial firms so that terminal assets for sale (or lease) could readily find an acquirer. The problem is that financial considerations can shift rapidly as the horizon is commonly short term, while intermodal assets have a planning and operational horizon that can easily span a decade even for its most “volatile” elements, namely ships and

several decades for its less “volatile” elements namely terminal infrastructure. The volatility that characterizes financial markets permeated the maritime shipping industry and as the global economy surged under a flood of cheap credit coupled with asset inflation, so did the shipping and port industries.

3.2. The Underlying Dynamics behind the Economic Crisis

The world reserve currency status of the Dollar conferred to the United States much flexibility in its monetary policy with the capacity to issue large amounts of debt without raising much concern from its creditors. This advantage was however heavily abused after the stock market contraction of 2001, when the Federal Reserve lowered considerably interest rates with the expectation that it would trigger a new wave of investments in productive activities and therefore a new cycle of economic growth. While central banks have a level of control over interest rates, they have limited if any control over the economic sectors that accumulate the credit they create. For this cycle, credit accumulated in the real estate sector, thereby creating the most important speculative bubble in history. Facing rapid inflation of their real estate assets, millions of consumers contracted additional debt, which otherwise would not have been possible. A significant share of this debt went into consumption.

Many trade partners, namely Asian, took part in the accumulation of this debt by financing it, creating a perverse commercial and financial dynamic. Under normal circumstances, a negative trade balance creates strong pressures on the concerned currency to be devaluated. This decline renders imported goods more expensive and exported goods cheaper. Therefore, imports should drop and exports should rise until a new equilibrium is reached. Since Asian economies, notably Japan, China and South Korea, have an export-oriented economic development strategy, they prevented with the implicit complicity of their debtors as much as possible this corrective process to take place by establishing the largest buyer financing scheme in history.

A share of the dollars traded for goods have accumulated as monetary reserves and served as investment capital for production and distribution infrastructures across the world. China and other Asian export-oriented economies understand well that no other markets than the United States and the European Union are large enough to consume the flows of goods they generate. It was perceived as in their strategic interest to prop foreign consumption and find venues to invest trade surpluses, particularly in a period when China’s domestic demand was not high enough to sustain a strong economic growth pattern. A share of the positive balance of payments thus came back to the United States in the form of the purchase of financial assets (treasuries, mortgage backed securities, bonds, etc.), supporting the dollar and indirectly favoring the continuation of the real estate bubble and the consumption derived debt it created. This process could however not endure forever and thus the stage was set for one of the largest financial collapses in history.

3.3. Enter the Crisis

The economic crisis of 2008-09 induced by the huge toxic debts of financial institutions is indicative of a correction that is having fundamental consequences on international trade. As stated in the previous section, the emergence of acute imbalances has been an enduring characteristic of global trade patterns for at least a decade. Many explanations can be offered to what caused this rapid and unprecedented collapse of the main world economies. Following are some of the more obvious and less contentious:

- The *huge balance of payments deficit* of the U.S. and the resulting weakness of the U.S. dollar that was mitigated by large purchases of American debt instruments by foreign financial institutions;
- The *deflation of real estate assets* (e.g. massive defaults in sub-prime loans) resulting in a full-fledged financial disaster for major banks around the world as they were forced to re-price underlying assets to levels triggering the insolvency of many;
- *Overstocking* induced by cheap credit and generous rebates and the expectation in 2007 that inflation would sharply rise following massive increases in oil prices;
- *Recession delay tactics* strongly promoted by the U.S. government therein followed by most other traditional industrialized countries;
- Creation of *excess capacities* in many countries and sectors, following the artificially sustained boom created by delay tactics, thereby helped by low interest rates available to borrowers which were part and parcel of the slump delay tactics.

Each of these causes can on its own bring about a serious economic decline, but it is their inter-relationship and combined impact that have pushed all major economic indicators (GDP growth, trade growth, employment) into negative values. The above observations thus underline that global trade was built in the late 1990's and up to 2008 under unsustainable economic and financial foundations. Asset inflation has reversed and large segments of debt obligations are being defaulted on. Although this pattern has taken place on many occasions in the past, the present correction is beyond anything ever observed.

3.4. Reaping the Macroeconomic Storm that has been Sowed

The accumulation and the subsequent defaults on massive amounts of debt played a fundamental role in the financial crisis. Since debt can be defined as present consumption at the expense of future consumption, a debt based bubble “steals” a large amount of consumption from the future and compress it in a short lapse of time. Bubbles, which are nothing more than credit-driven booms, thus give wrong signals to the economy by misguiding investment and capital accumulation processes since fundamentals are distorted and appear more significant than they really are (Figure 3). More capital than required is accumulated in activities related to the bubble, creating a hidden overcapacity linked to an artificially induced peak in demand. In North America and a number of European countries the credit bubble resulted in an overcapacity in residential and commercial real estate and created an artificial level of consumption. For export-oriented economies, overcapacity took place in the setting of production and distribution assets incited by the debt-derived growth of consumption taking place because of asset inflation.

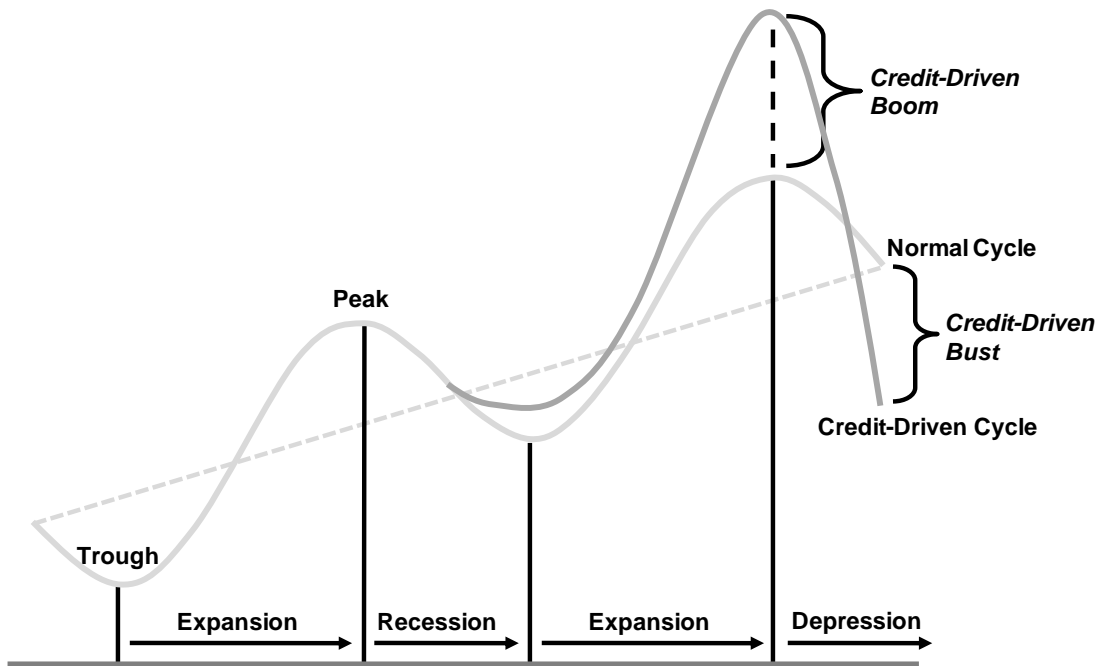


Figure 3: Impact of a Credit-Driven Boom on Economic Cycles

Towards the end of 2008, credit suddenly became scarce as many debt instruments, particularly those related to real estate, started to experience excessive default levels, beyond anything expected in risk assessment models. This created massive cross-defaults within an over-leveraged financial system and forced the downward re-pricing of whole asset classes, pushing many institutions into insolvency, unable to service the massive debt obligations they contracted under the assumption that the underlying assets were liquid and rising in value. Many financial institutions became excessively unwilling to lend, uncertain about who would be next to default while experiencing a deflation of their own assets and balance sheets. The outcome was a self-reinforcing vicious circle that began in the financial sector and rapidly spilled over in the material economy, triggering a global recession that began to be felt in the fall of 2007 and a global collapse of equity markets a year later. Recessions have substantial impacts on the freight transport sector, as articulated on Figure 4.

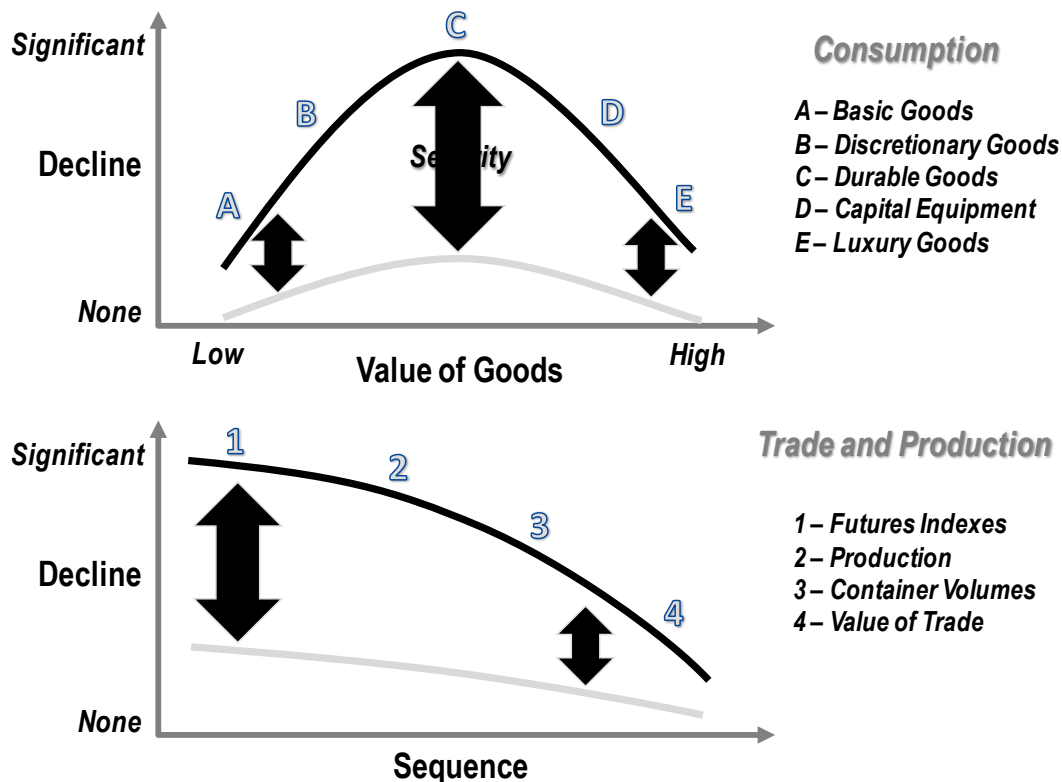


Figure 4 - Potential Impacts of Recessions on Trade and Freight Transportation by Level of Severity (Low and High Scenarios)

The impact level of a recession on many sectors of the economy involves downward pressures on prices in view of a collapsing demand. Basic goods (e.g. food) and luxury goods tend to be the most resilient, so their respective supply chains tend to be impacted marginally by recessions. However, it is over durable goods (e.g. cars), discretionary goods (e.g. electronics) and capital equipment (e.g. ships, port infrastructure), that recessionary forces can have significant impacts in lowering their respective levels of consumption. It is precisely over these product classes that export oriented economies have focused their development strategies. Stock market valuations and freight rates (futures indexes) tend to be leading forces in the decline of international trade, followed by income, spending and seaborne freight (particularly container volumes). What is notable for the correction that began in 2008 is the extreme rapidity at which the sequence unfolded, implying that while future (forward looking) indexes first collapsed, so did container volumes and global trade immediately afterwards, confirming the inevitability of the collapse of the material economy and the temporary and for some freight segments the permanent disappearance of substantial portions of merchandise volume.

4. Maritime Shipping and Ports in a Flux

4.1. Future Indexes, Shipping and Trade: Falling Off a Cliff

The Baltic Dry Index (BDI) is an assessment of the average price to ship raw materials (such as coal, iron ore, cement and grains) on a number of shipping routes and by ship size. It is thus an indicator of the cost paid to ship raw materials on global markets and an important

component of input costs. As such, the index is considered as a leading indicator (forward looking) of economic activity since it involves events taking place at the earlier stages of global commodity chains. A high BDI is an indication of a tight shipping supply and is likely to create inflationary pressures along supply chains. A sudden and sharp decline of the BDI is likely to foretell a recession since producers have substantially curtailed their demand leaving shippers to substantially reduce their rates as maritime capacity cannot be rapidly reduced.

Between mid 2005 and mid 2008 the BDI grew by a factor of about 5.5 times, reflecting an almost surreal surge in global trade and expectations of additional growth, mainly fuelled by a Chinese economy hungry for raw materials and energy. The shipping industry was increasingly facing limited extra capacity and port congestion or the expectation of congestion. The existing capacity shortages in vessels and terminals pushed rates up to unparalleled heights. The index peaked in the spring of 2008 as China was stockpiling large quantities of commodities in preparation for the Olympics. Afterwards, the BDI reflected the full fledge of the unfolding recession and collapsed by 94% between July and December 2008 (Figure 5). Never before was such a sharp correction observed, an indication that maritime shipping and global trade was brought to a full recession. Then, the BDI corrected to attain a level reflecting pre-bubble valuations.

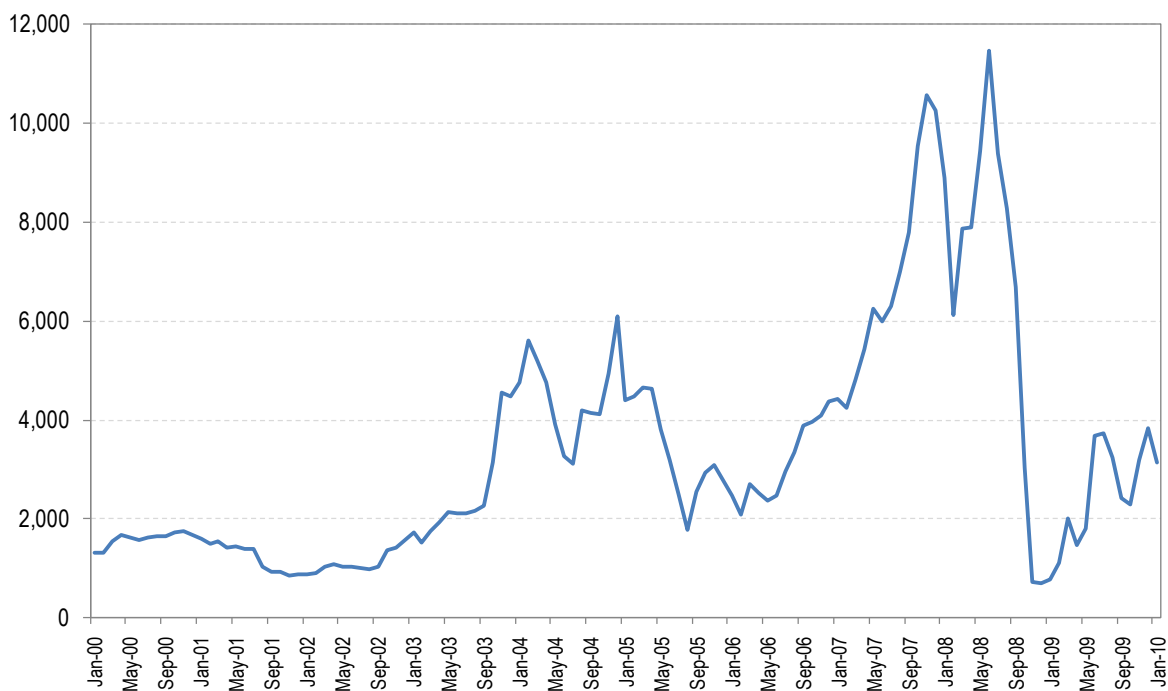


Figure 5 - Baltic Dry Index, 2000-2009 (Monthly Value). Source: The Baltic Exchange.

The collapse of global shipping observed in the BDI, which was further confirmed by the simultaneous downfall of container freight rates on all major routes, is the outcome of two consecutive storms:

- The *credit storm*: In the fall of 2008 the credit freeze implied that several financial transactions in international trade could no longer be cleared under normal conditions. For instance, the terms to obtain a letter of credit became much more

stringent, with some financial institutions refusing to honor letters of credit issued by foreign banks and others simply refusing to issue credit to their customers perceived to be at risk. Therefore, containerized trade volumes started dropping precipitously because transactions could not be cleared. Access to credit was thus a temporary explanation in the collapse of maritime shipping as several transactions between developed and developing countries were perceived as risky and could not be financed, at least in terms traders were accustomed to. The weakness of the financial sector, particularly in developing countries that have become important traders, compounded the collapse. However, this was a temporary condition reflecting a sudden change in the global financial industry as it absorbed a new reality, assessed risk and provided financing accordingly.

- The *macroeconomic storm*. The next downward pressure on maritime shipping is linked with a decline in aggregate demand, which is a standard macroeconomic impact of a recession. Severe drops in consumption in North America and Europe are likely to continue until consumption is more in synchronism with income as opposed to debt accumulation. There are many forecasts made about the expected economic recovery with its associated growth in consumption, but these forecasts are constantly revised downward and recovery is pushed further up the calendar. The credibility of analysts that did not foresee or even anticipate the possibility of the largest financial and economic correction since the Great Depression begs to place limited value on their expectations about the potential timing and scale of the recovery. To this, the compounding medium term effects of an emerging pension crisis, the aging of the global population in the traditional industrialized countries and serious levels of debt defaults are to be added.

Both of these storms have readily been felt in international trade and container port volumes (Figure 6) as in the fall of 2008 there was a systematic and correlated drop among all major trade partners and gateways.

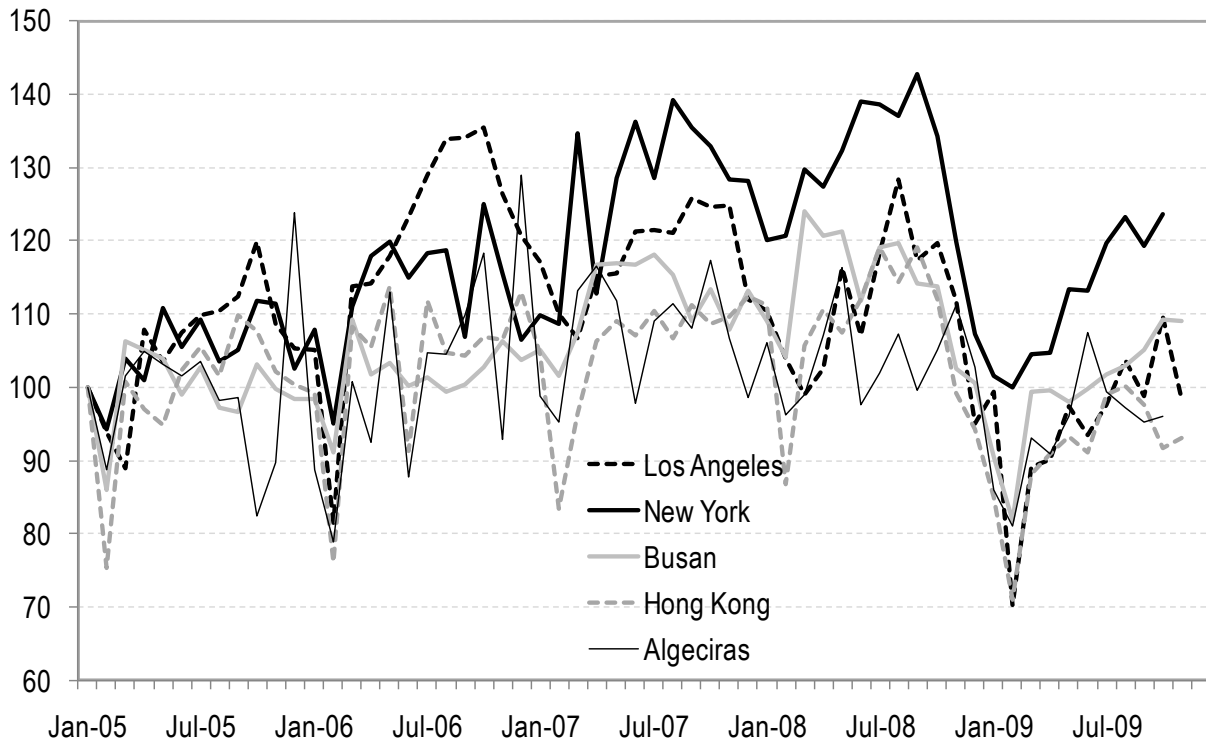


Figure 6: Monthly Total Container Traffic at Selected Ports (Jan 2005=100)

The pattern observed in Figure 6 underlines a reassessment of neo-mercantilism trade policies, particularly for export-oriented economies. While the financial storm had a sharp and sudden impact on volumes, the macro-economic storm will span several years and will involve several phases of growth and decline. It will endure until trade and macroeconomic imbalances have been substantially rectified.

4.2. A Double Squeeze between Supply and Demand

Maritime shipping benefited from the prevailing growth in traffic and in particular from the almost unlimited supply of credit for building new vessels. Table 1 shows the order book for major classes of ships as it stood on 1st July 2008 just before the world economic crisis started to unfold. The ships and deadweight on order are then compared with the total number of ships and the total deadweight in service at that date. This comparison confirms the magnitude of the order book in particular for bulk carriers and containerships, with orders for new such ship types totaling respectively 67.6% and 53.2% of existing capacity.

Table 1: Ships on order and in service on 1st July 2008 by main class of ship

Ship type	N° of ships on order	Total dwt (1,000 tons)	Total n° of ships in world fleet	Total dwt in world fleet (1,000 tons)	Ratio ships on order to ships in world fleet	Ratio dwt on order to total dwt of world fleet
Tankers	2 956	193 652	11 525	404 891	25.6%	47.8%
Bulk carriers	3 118	271 713	7 357	401 949	42.4%	67.6%
Container	1 451	82 185	4 475	154 396	32.4%	53.2%

ships						
General cargo ships	1 714	22 095	17 756	105 101	9.6%	21.0%

Source: ISL Bremen

For cellular container ships the level of extra capacity that was planned to be added can equally be illustrated by the number of ships and TEU capacity for each vessel size. The cellular container ship order book as of 1st August 2008 is shown on the left side of Figure 7. There was an expected increase of 36% in number of ships and of 67% in carrying capacity expressed in number of TEUs (equivalent to a compound growth rate of 14.7% per annum). Moreover, the greatest number of additions to the fleet was expected to occur in the ship classes with capacities of over 5,000 TEU.

The economic crisis faces the shipping sector with a double threat. The first is posed by a significant drop in demand as a result of the serious slump in global trade witnessed worldwide. Not all goods and all ship types feel this slump in the same proportions. Very seriously affected are all classes of bulk carriers and most classes of cellular containerships. Tankers and in particular VLCCs have until recently been much in demand, but other tanker types and classes have had a rough ride in early 2009.

The second threat comes from ship owners massively ordering new ships for which they believed, at the time the orders were placed, that there would be much demand. The ease with which ship financing was possible up to the second half of 2008 and the low interest rates induced many to go into investments for which demand had been unproven. But the prevailing mood at the time was one of over optimism based on the belief that world trade would continue to grow without relenting. This optimism pervaded in the forecasting of future shipping volumes and their underlying growth rates.

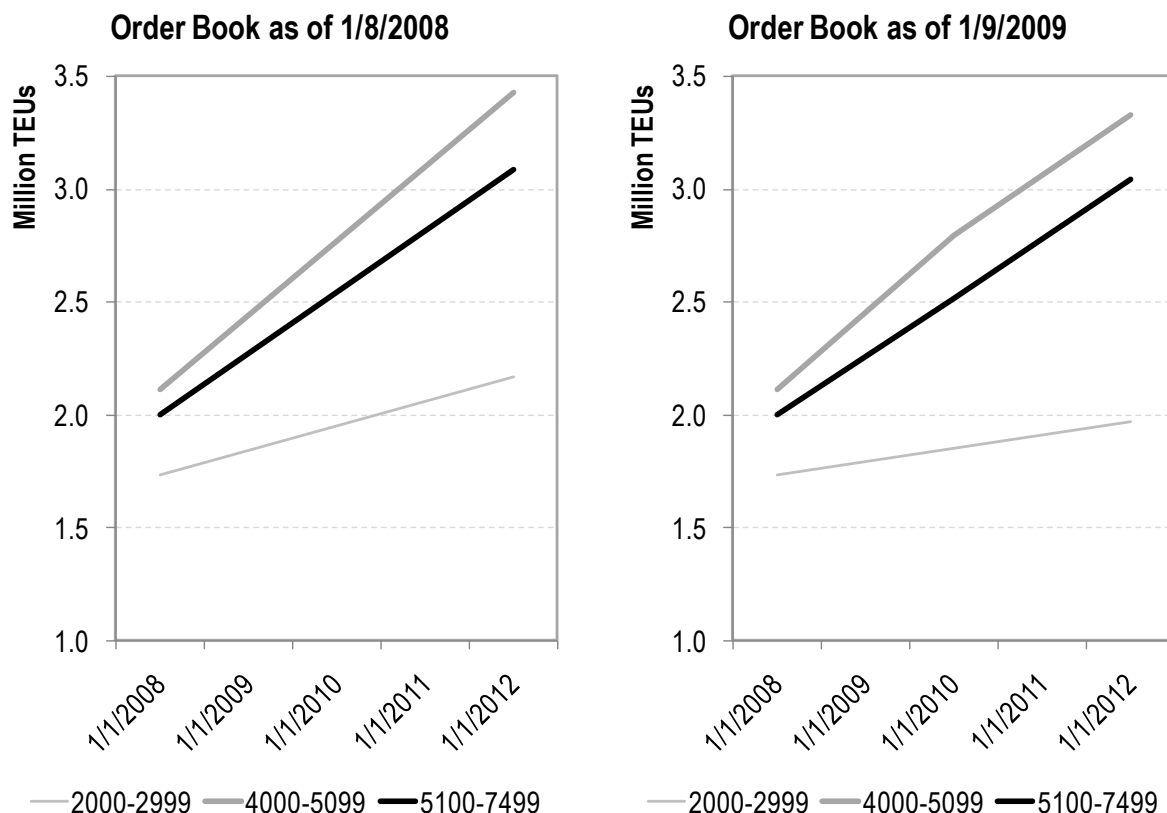


Figure 7 - Cellular Containership Fleet Projection up to 2012 for Three Selected Classes. Source: AXS Alphaliner.

By September 2009 container line operators had re-assessed the market situation and introduced a host of measures to reduce capacity, including delaying delivery dates of ordered vessels, returning chartered vessels to their owners and canceling when possible new-building orders. The right side of Figure 7 shows the cellular containership fleet projection but based on the fleet in service on September first 2009 and the revised order book at the same date. It underlines that the greatest changes in total capacity are observed for ships below 5,000 TEU.

A comparison of the expected fleet figures on 1 January 2010 (based on the fleet on 1 September 2009) with the fleet figures on 1 August 2008 shows the extent of capacity control exerted by the container ship owners and container line operators. Total number of ships by 1 January 2012 is expected to be down by 437 whilst TEU capacity will be 1 476 425 TEU less. Although these are significant reductions, the fleet is still to grow by 24% in TEU capacity in the two-year period 1 January 2010 to 1 January 2012. Without a further strong reduction in number of vessels and TEU capacity of the fleet, there can be little doubt that serious overcapacity will remain a major problem for the container shipping industry, even if containerized trade volumes would come back with moderate growth over and above 2008 levels.

4.3. Forecasting and Growth Assumptions Revisited

The problem of short, medium and long-term forecasting of the demand for shipping is not new, but made particularly acute in the current context. In the past, decisions were made by people having been directly involved in shipping, many with a sea-going experience and

solid connections in the maritime community. Today, many of the decision-makers in shipping have a non-maritime background. They rarely represent the ship operator's interest. They rather defend the cause of others (such as specialized maritime lending institutions or merchant bankers) and frequently have different viewpoints and objectives from those involved in the day-to-day running of shipping services. They tend to defend the interest of shareholders which have limited understanding of the shipping business and mainly look for short-term returns on their invested capital.

To the growing gap between the genuine maritime operator and the CEO's running shipping companies, there remains also the uncertainty of future demand for shipping. Many forecasts are prepared (frequently by bankers and economic advisers) without given much attention to the physical cargo flows that are the generators of the demand for shipping services. This is particularly evident in the forecasting of container volumes, whereby these forecasts suffer from at least two major flaws:

- The *disconnection* between the physical cargo flow (what cargo is carried in the box) and the top-down forecasting of number of boxes inevitably induces parties with a vested interest to bend the container figures in their favor. This is the more frequently done if no regard has to be paid to real physical cargoes to be carried;
- The *confusion* that continues to exist with respect to the notion of seaborne traffic (what is carried by sea in international trade) and that of throughput (the effort required in ports or terminals to handle the seaborne traffic). Many studies, reports and miscellaneous publications present maritime or seaborne traffic values whilst effectively referring to port throughput values.

Thus, forecasting future container port volumes, while in the best of times a risky proposition, has been compounded in recent years by several factors that may have further contributed to extrapolation fallacies and led to overestimations of future traffic. By using a sample of large ports, Table 2 underlines that using compound annual growth (CAG), a commonly used method in finance and business, for forecasting container volumes can lead to staggering overestimations of future growth potential. Such an approach is commonly justified by the growth pattern that took place since the early 1990s and which effectively mimic this behavior until 2007. Yet, using CAG for port volumes forecasting is a dangerous fallacy.

Table 2: 2020 Throughput Forecast, Selected Ports, Linear and CAG Scenario

Port / Traffic 2007	R ² / CAG (1998-2007)	Traffic 2020 (Linear Scenario) / CAG	Traffic 2020 (CAG 1998-2007 Scenario)
New York / 5.3	0.996 / +7.9%	9.6 / +4.7%	14.2
Savannah / 2.6	0.968 / +13.5%	4.9 / +5.1%	13.6
Los Angeles / 8.3	0.966 / +9.5%	16.6 / +5.4%	27.1
Antwerp / 8.2	0.974 / +9.6%	14.5 / +4.5%	26.9
Algeciras / 3.4	0.961 / +6.5%	6.0 / +4.4%	7.7
Busan / 13.3	0.983 / +8.4%	24.3 / +4.8%	38.1
Shanghai / 26.1	0.948 / +23.9%	56.5 / +6.1%	423.8
Montreal / 1.4	0.944 / +3.8	1.9 / +2.8%	2.2

Note: All traffic figures are in million TEU. CAG: Compound Annual Growth. Forecast does not consider port capacity constraints.

The following observations can be made:

- A linear regression analysis of a 10 year period between 1998 and 2007 with volume as a dependent variable and year as an independent variable reveals that all ports have a very high coefficient of determination (R^2) of their annual throughput. This implies that the growth pattern for container throughput was mostly *linear* for that decade and would thus incite using linear forecasting methods to assess future volumes. For instance, for the port of New York, throughput growth between 1998 and 2007 took place in a nearly perfect linear fashion (R^2 of 0.996), which corresponds to a CAG of 7.9% for the same time period.
- *Throughput differences* between the linear scenario and the CAG scenario are substantial. While the linear scenario reflects well past growth figures, as evidenced by the very high coefficients of determination, CAG scenarios abound in the port traffic forecasting literature. The case of New York underlines that for 2020 the linear growth expectations would place the throughput at 9.6 million TEU, while using the observed CAG of the period 1998-2007, standing at 7.9%, would place throughput at 14.2 million TEU, a difference of 4.6 million TEU. This simple difference in forecasting methodology for a period of 13 years (2007 to 2020) accounts close to the existing volume of the port. The case of Shanghai is absolute and obviously completely unrealistic, as the CAG scenario based on the fast growth figures between 1998 and 2007 (23.9%), would place the port with a throughput in 2020 similar to the *global* container port throughput in 2005.
- Forecasts are commonly done by port authorities (or hired consultants) and tend to have a “*pro growth*” bias. This bias assumes that growth implicitly comes from new volume and that port competition and alternate shipping options are not at play. Sometimes, the fast growth taking place in a sample of large ports is taken over by smaller ports as part of their business plans. For instance, the Montreal 2020 plan was expecting a throughput of 3.6 million TEUs by 2020 (from 1.4 M TEU in 2006), which accounts for a CAG of 7%, double the 3.8% CAG rate observed between 1998 and 2007 for that port.

There are many shortcomings behind using CAG for container volume forecasting. First, CAG assumes a steady growth rate where volatility and market changes cannot be effectively captured. Second, CAG is based on a past time series that does not necessarily warrant future expectations. Last, and not least, the time series used to calculate CAG can be selected to skew results according to preferences. The time series of Table 2 (1998 to 2007) were deliberately selected to correspond to the most significant growth in container port volumes. Therefore, the issue is not the errors compounded by the forecasting methodologies, as it remains just a quantitative exercise, but the misallocation and overinvestment that they incite, can lead several segments of the maritime industry in dire financial strain. It is evident that during the decade prior to 2007-2008, growth in the maritime shipping and port industries has incited the most positive forecasting prospects and that methodologies can be very easily bent to rationally provide astounding figures. This perspective can no longer prevail and a new reality for ports and maritime shipping will need to be the order of the day.

5. Conclusion: Rediscovering Reality

The unprecedented economic downturn is fundamentally challenging the direction of future trade relations and their corresponding physical flows. From this paradigm shift in globalization lessons can thus be drawn with respect to traffic and throughput forecasting. First it would suit all those that try to develop prognoses of future activity to be extremely modest. The likelihood that the estimated figures really will be achieved is virtually nonexistent and yet too many factors influence results. After all seaborne traffic and demand for port handling are derived demands, a factor that has frequently been overlooked in a recent past. It is as if it was implied that any additional capacity would be fulfilled with a corresponding demand. But, one has also to acknowledge that even a general economic downturn has very different effects in various parts of the world.

The second lesson that can be learnt from recent events is the risk to exclusively rely both on perception (based on statements such as “there is a general belief that”, “the consensus between stakeholders is”, etc.) and on general but unproven statements (“de-stocking is now over and traffic will pick up again” etc.) rather than on hard facts and a close monitoring of developments at the grass root level. Moreover, there are far too many forecasts based on complex but unproven models and far too few that start from painstaking and difficult bottom-up research.

The third lesson is one of realism. Those that are closest to the trade have the greatest interest to keep their information confidential and possibly to circulate a certain level of disinformation. This Achilles' heel is further exposed by a complete lack of uniformity and conformity in reporting by various international organizations and sector specialists. It makes data comparison extremely precarious if not misleading.

The impact of the global economic downturn, the crisis in the main shipping sectors and the changes in the pattern of world trade all profoundly affect the maritime transport industry. The resulting consequences for shipping in general and ports in particular have both long-term and short-term policy and strategy implications. These will be considered in more detail in the next chapter.

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