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TRANSPORT FOR A GLOBAL ECONOMY
Challenges and Opportunities in the Downturn

International Transport Forum

RESEARCH FINDINGS ON THE EVOLUTION OF THE WORLD ECONOMY AND ITS LINKS WITH TRANSPORT

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ITF Secretariat

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The International Transport Forum is a global platform and meeting place at the highest level for transport, logistics and mobility. Key figures from government and politics, business and industry, research and civil society will meet in Leipzig each year to debate a transport topic of worldwide strategic importance.

This document was produced as background for the 2009 International Transport Forum, which focused on *Transport for a Global Economy: Challenges and Opportunities in the Downturn*.

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SUMMARY

Globalisation is linked to wage disparities between different economic regions. These disparities are set to remain in place for at least another decade, even if the very process of globalisation will eventually eliminate them. However, the differences between economic regions and areas will continue to be based on their respective abilities to innovate.

Globalisation is driven by efficiency gains in transport, movements of people and flows of information. These efficiency gains primarily arise through a reduction in the generalised cost of freight transport, which is attributable more to time and reliability gains in the transport of goods than in possible reductions in the relative prices of transport.

Globalisation is mainly based on maritime shipping. As the unit value of goods transported increases, the impact of the cost of maritime shipping on the price of the final goods made available to consumers is low, and in most cases will remain so. Furthermore, maritime shipping is not the mode of transport that is most sensitive to energy costs: oil consumption in the sector is relatively low given that it is used to transport the lion's share of world trade (measured in tonnages).

This means that for a long time to come, even though most experts concur that demand for oil products will in all likelihood exceed supply, particularly because oil is supplied by cartels, maritime shipping, and therefore globalisation, will not basically be challenged by the increased price of oil products. This has prompted certain experts to declare that in fact "globalisation is only just starting."

It nonetheless remains true that some regions such as North America or the European Union, which are highly integrated in economic terms, are areas where internal trade is particularly highly developed and where the issue of inland transport remains as topical as ever. This might suggest that to a certain extent the globalisation "battle" is being waged inland.

Moreover, the transport services proposed will have to be economically efficient. Increased competition, that is to say liberalisation of the services market, is synonymous with organisational and technological innovation, as well as commercial dynamism. The whole of economic history bears witness to the beneficial action of market competition in improving the performance of services, particularly in the transport sector.

In this respect, the example of air transport shows that liberalisation in the US has introduced a dynamic of organisational innovation and the creation of new services. If these transformations have seemingly arrived at maturity as far as the United States are concerned, the potential for development of air transport markets remains to be explored in Asia and, to a lesser extent, in Europe, as there the liberalisation process is already engaged.

The present economic crisis is giving rise to national economic support plans including, for the most part, a transport component. This question raises the issue of investment priorities, innovative financing mechanisms for such investment and relevant planning instruments, all of which, moreover, apply at an international level or to key links in the transport chain. In this context, it is essential to draw attention to the relevance of investment aimed at eliminating bottlenecks in international transport flows.

Market protectionism is a false temptation. Apart from the few obvious short-term benefits, national economies and their prospects for development would ultimately be held back by higher prices, a slowdown in innovation, the sapping of market vitality through removal of the spur of competition and the need to abandon markets closed in retaliation.

Once account is taken of the development potential of international trade, one outcome of which is that it is by no means certain that greenhouse gas emissions can be contained, it is clear that thought must be given to measures capable of making freight transport "sustainable". Some of the conclusions drawn at the 2008 Forum, which targeted the challenge of climate change, may nonetheless be recalled, namely that the energy efficiency of freight transport can be improved through a variety of levers of action and that achieving this calls more for an innovative policy approach than a fundamental rethinking of the options available. Creating a synergy between different approaches (technological, regulatory, investment decisions and charging) and ensuring that the measures adopted are mutually coherent is, in this respect, essential.

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INTRODUCTION

The main theme of the next Forum to be held in Leipzig will be "*Transport for a Global Economy – Challenges and Opportunities in the Downturn*". In order to fuel discussions on the links between transport modes and the current structure of the global economy – which is characterised by the acceleration of the globalisation process -- three research reports were commissioned by the Forum Secretariat:

-- "Globalisation and transport costs in maritime shipping and aviation", by D. Hummels [ITF/TMB/TF09(2009)1];

-- "Globalisation and its impact on inland and intermodal transport", by C. Reynaud [ITF/TMB/TF09(2009)2];

-- "Air transport regulatory liberalisation and its impacts on airline network competition and air traffic", by T. Oum, X. Fu and A. Zhang [ITF/TMB/TF09(2009)3].

At the same time, the Forum Secretariat invited its Member countries to supply any information or studies on the transport sector that would illustrate the challenges that globalisation poses for the sector.

This report attempts to summarise the above documents and includes excerpts from other research on the economic dimension of globalisation, the impact on transport and the role played by the transport sector, expressly in the context of globalisation.

The main body of the report is in two sections: the first gives a brief account of the major trends in the global economy and the underlying trends that characterise it. The second gives an overview of trends in the transport sector that are directly related to globalisation. The main points highlighted are changes in transport costs, the importance of time in transport, factors in the success of air freight transport, until recently, and the possibilities for developing inland alternatives to the major maritime trade corridors in response to the vulnerability of certain links.

The aim of this report is to build a picture of the fundamental issues and the main economic trends that result from globalisation and to see the links between globalisation and the transport sector.

2. SOME MAJOR TRENDS IN THE ECONOMY AND IN WORLD TRADE

2.1. Snapshots of a globalised economic world

It would certainly be useful here to outline some of the distinctive characteristics of the global economy, particularly in view of the topicality of "globalisation" as a news issue, since it is here that the original cause is to be found of the extreme financial and economic turbulence that has rocked the world economy since the failure of Lehman Brothers bank in the United States on 15 September 2008. Box 1 presents some of the most striking information on developments in the global economy in recent months.

Box 1: **Striking aspects of recent developments in the world economy**

Starting with the so-called "subprime" crisis in the summer of 2007, or to be more precise that of high-risk mortgage loans in the USA, loans that have partly become unrecoverable with the downturn in the US property market and that were granted to low-income households, the global financial sector was rapidly and very severely undermined, leading to a crisis of confidence among financial institutions. This crisis of confidence initially engendered a slowdown in interbank lending, followed by a slowdown in lending to firms and then individuals. This came about despite unprecedented injections of cash by the central banks in major global trading centres and the introduction of rescue plans by the public authorities in charge of financial establishments.

The US economy officially entered into recession in December 2007 and during the final quarter of 2007 lost 1.2 million jobs, which meant that the economy was contracting at an annual rate of over 4%. The US economy thus entered into a negative spiral in which expectations of job losses fuelled a decline in consumption which in turn triggered a decline in demand and a downwards adjustment in production. All of this was taking place in a context in which highly fragile financial establishments were holding vast amounts of unrecoverable assets. By way of example, on 19 December 2008, the United States government announced that it was willing to provide 17.4 billion dollars to rescue the automobile manufacturers General Motors, Chrysler and possibly Ford, all of which were on the verge of bankruptcy. Short of cash, General Motors immediately received 9.4 billion dollars and Chrysler 4 billion dollars. This money was in fact taken from the 700 billion dollars provided for the bail-out of US banks under the Paulson plan.

All the major stock exchanges suffered substantial losses: from 01/01/2008 to 24/10/2008, the CaC 40 fell by 43.11%, the Dax (Germany) by 46.75%, the FTSE 100 (United Kingdom) by 39.86%, the Nikkei (Japan) by 50.03% and the Dow Jones (United States) by 36.83%.

The spreading of the financial crisis of 2008 to the tangible spheres of the economy, namely production and consumption within different national economies, created a situation in which, for example, between July and September 2008 the 15 economies in the Eurozone reported, for the second consecutive quarter, a decline of 0.2% in their aggregate GDP. In consequence, on 14 November 2008, Eurostat officially announced that the Eurozone was in recession.
By the end of 2008, industrial output had fallen substantially in the Eurozone: there was a historical decline in December, when output fell by 2.6% compared with November 2008, and above all an annual decline of 12%. These were the sharpest monthly and annual declines recorded since statistics for the

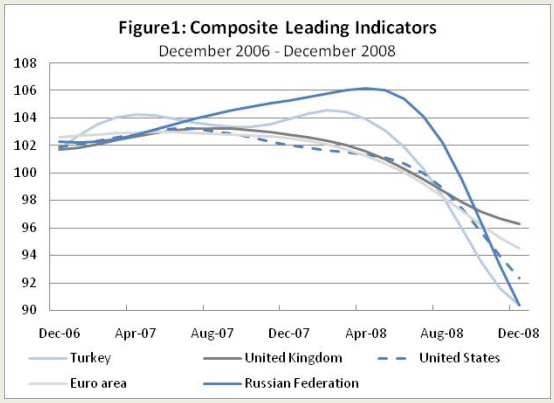
Eurozone were first recorded in 1991. In all, industrial output in the final quarter of 2008 was 5.1% down on the previous quarter, another record for the Eurozone. In fact, all major economies in the Eurozone came to a standstill in December 2008: Germany reported a monthly decline in industrial output of 4.9%, France a decline of 1.8%, Italy a decline of 2.5% and Spain a decline of 3.5%. The banks sharply reined in their lending, and households, fearful of the future, applied for fewer loans. Firms there had less access to cash and sold off their stocks, reducing their output commensurately. Some economies, such as Germany, that are highly dependent on external demand, were hit very badly by the global context of recession: in the fourth quarter of 2008, export orders collapsed by almost 18% in Germany. At the same time, the Eastern European economies, after enjoying very vigorous growth, suffered from trade and budget imbalances, against a background of falling exports to Western Europe, thereby weakening the trade and budget balances of the banks involved in the region.

In a document entitled "The Economic Landscape in 2009" the Reserve Bank of Australia underlined that at the end of 2008 GDP in Australia's major trading partners contracted by 1½ per cent. The falls in output were widespread, but they were particularly pronounced in the Asian region. Output in Japan fell by 3 per cent in the quarter, and contractions of the order of 6 per cent were recorded for example in Korea and Thailand. China's economy continued to grow, but at a much reduced pace. For the smaller Asian economies, these recent falls in output are comparable to what occurred in the 1997 crisis period.

The strong export dependency of Japan, too, explains why, with a 3.3% decline in GDP in the last quarter of 2008 and a 12.7% decline year-on-year, the Japanese economy reported its worst performance since 1974. The Japanese economy therefore seems to be affected more severely than the US economy, whose year-on-year decline in GDP in the last quarter of 2008 amounted to around 4%. In the case of Japan, exports account for 20% of GDP and exports plummeted in the final quarter of 2008 by almost 14%.

Industrial out in Russia fell by 20% in January 2009 in response to tighter credit and a sharp decline in both domestic and foreign demand. Compared to the year before, the decline in January 2009 amounted to around 16%, following a fall that already amounted to around 10% in December 2008. Russia has therefore been severely affected by both the financial crisis and the fall in the prices of raw materials and, in particular, oil.

Figure 1 below, which is an advanced OECD indicator on the economic climate, shows its degradation at the end of 2008.



The statistics presented above demonstrate the systemic nature of the crisis affecting the global economy, marked by the dual impact of a financial crisis and a decline in global trade in goods.

The point is that, prior to these events, all eyes were on China, whose economic dynamism lent credibility to the eastward shift in the economic epicentre of the world. A few figures may prove useful here. In 2007, the growth in China's GDP was estimated at practically 12 per cent. This was the fifth consecutive year of two-figure growth and a 13-year plus record. The strong growth of 2007 can be explained by a combination of foreign direct investment in China, up by almost 25 per cent on 2006, a record trade surplus of over USD 262 billion and an increase of 18.5 per cent in industrial output. Yet, because of the rise in world commodity prices – a rise not entirely uninfluenced by increasing demand in China, in point of fact -- inflation increased sharply in 2007. It soared to its highest level in 11 years and was the reason for the introduction a partial cooling policy that deployed a range of measures, including restrictions on access to credit. Despite these measures, China's economic performance set it well on the way to overtaking Germany as the world's third leading economy, after the United States and Japan.

In contrast, in the United States, the beginning of 2008 brought uncertainties on three counts: an economic slowdown that was gradually turning into a recession; economic indicators that were beginning to look worrying in the property and credit sectors and the labour market; and a world rise in the rate for energy products, which brought an unprecedented hike in the pump price of petrol. The fact remains that one of the mainsprings of growth in the US was that its economy ran on credit, relying on drawing in global savings to make up its deficits.

Japan saw stronger economic growth at the beginning of 2008 than had been forecast: 0.8 per cent up in the first quarter of 2008 compared with the previous quarter. This marked a third consecutive quarter of GDP growth. Essentially, this performance could be put down to exports and household consumption. Hence, Japan's trade surplus rose by more than 35 per cent in one year, compared with 2007. However, despite Japan's the privatisation of its post-office – which had been considered the largest bank in the world and had enabled the Japanese Government to finance its debt up to then – the country's debt amounted to over 180 per cent of its GDP at a time when the ageing of the Japanese population will have an impact on public finances.

Europe, in turn in early 2008, was having a difficult time defining its own rules of governance (rejection of the Lisbon Treaty), although East-West economic integration was proceeding just as the stock market crisis was exposing the fragility of even the most dynamic of the new Member states, such as the Baltic countries. On an economic level, the fact remains that although growth in Germany reached 2.5 per cent in 2007 -- the best performance in all of the Euro area, thanks to its industry's prowess in innovation and exporting -- the performances put in by most other European countries, such as Italy, Spain, Portugal and Greece or France, were uneven.

Beneath the factors outlined above all the frailties of the world economy is discernable: frailties that were only partly brought to light by analysis of world trade flows for 2007, the most recent year for which comprehensive data on world trade are available (cf. Box 2).

Box 2. **Most recent data on developments in world trade**

In 2007, weaker demand in developed countries created a less **favourable climate for world trade**: world exports of goods grew by only 5.5 per cent in real terms (value) in 2007 compared with 8.5 per cent 2006. Lower import growth than in the preceding year was observed in North America, Europe, Japan and the net oil importing developing countries in Asia in 2006. Nevertheless, growth in trade exceeded that of world output by 2 percentage points.

Among the nations that play a leading role in world trade, **trade expansion in China continued to be**

outstandingly strong in 2007. The deceleration in exports to the United States and Japan was offset by higher export growth to Europe and to the oil-exporting regions. Despite a booming domestic economy in China and the effective, if moderate, appreciation of the yuan, import growth continued to trail behind export growth. **In 2007, China's export growth was close to 20 per cent** in real terms while its imports recorded growth of only 13.5 per cent.

There were nevertheless wide variations in trade growth across world economic regions. Major Improvements in the terms of trade was noted in **countries and regions exporting primarily fuels or minerals**. Countries exporting food products also benefited from pressures on the price of staple food products on world markets.

Exports from the Commonwealth of Independent States (CIS), for their part, were up by 6 per cent in volume terms, while **in Asia**, export growth rose by over 11 per cent in real terms, i.e. very much higher than import growth (+8.5 per cent).

North America's exports rose less than global trade, but more than its own imports. This can be attributed largely to the United States, where import volumes increased only marginally (1 per cent) while exports expanded by 7 per cent in 2007.

In Europe, subsequent to a noticeable deceleration in economic growth the slowdown in European trade was particularly pronounced for intra-EU trade. In fact, the growth of exports and imports of goods in Europe, which had been 3.5 per cent in 2007, was the result of wide variations in national performance: most of the new EU member states, along with Turkey, expanded their exports by more than 10 per cent, while countries such as France, Spain, Ireland and Malta reported only stagnant trade. Germany, the Netherlands, Belgium and Switzerland recorded trade growth of around 5 per cent.

The figures in Box 2 show that the trading relationships between economies in different areas of the world are heavily interdependent. The following subsection illustrates that one country's output is in reality another country's production input. Figure 2 below is revealing of the importance of world trends in goods trading. The transport sector is omnipresent in the functioning of the world economy, whether through the movement of goods or by facilitating interpersonal contacts, which constitute the basis of trade relations. It is not surprising therefore, as Box 3 illustrates, that the transport sector should have been strongly affected by the brutal economic slump at the end of 2008. The interdependency of economies all over the world would also prove to be an Achilles' heel when it came to finance: certain countries' very high consumption propensity was facilitated by financing the ensuing deficit through attracting the savings generated by the trade surpluses of other countries. These savings were in turn invested in highly sophisticated financial products, and the lack of transparency of the latter did not appear to be a major problem or to be in need of strict regulation.

Figure 2. **Main flows of container movements**


North America
East Asia
Europe
Southern Asia
Oceania
South/Central America & Caribean
West Africa
South/East Africa
Thousand TEUs by Region of Origin
531
1117
1971
5043
6586
11148
18553
43690
W.Africa
E. & S. Africa
Oceania
S. Asia
L.America
North America
Europe
Far East

Box 3. **The sudden economic slowdown and its impact on the transport sector**

All of the indicators converge to show that liner shipping will have to cope with heavy turbulence in early 2009: the loss of consumer confidence in the developed economies has resulted in plummeting consumption of manufactured goods and consequently in container freight transport at a time when the commissioning of new vessel capacity is reaching a peak. Freight rates are falling at the fastest speed ever recorded, particularly for bulk freight and container freight. For instance, the "Baltic Dry Sea Freight Index", which measures freight rates for dry bulk commodities, has fallen by more than 90 per cent since mid 2008. The "spot" market for containers has seen the price of container transport fall by almost as much over the same period on Europe-Asia links.

In November 2008, the ports of Singapore and Hong Kong posted a two-figure decline in the volume of containers handled. For 2008 overall, the port of Hong Kong is expecting a decline of over 4.5 per cent container throughput, attributable only in part to the commissioning of new port terminals in South China. In early 2009, there were no signs of activity picking up again. Consequently, Maersk decided to withdraw eight 6 500 TEU vessels that had been deployed on routes between Europe and Asia. CMA CGM, the world's third top container transport company, followed Maersk's lead and decided to suspend a service introduced in July 2008 which had deployed eight 9 7000 TEU vessels on the France-Asia link. In addition, in early 2009, the New World Alliance and Grand Alliance, the two largest maritime company alliances announced that they were indefinitely suspending their joint service between Asia and ports in the Black Sea and the Mediterranean. Together, these two alliances operate eight ships each with a capacity of 5 000 TEU. According to analysts, the excess transport capacity in TEU was of the order of 10 to 15 per cent at the end of 2008 on links to Asia, despite the fact that these are the most dynamic links.

One unexpected impact of the changes in freight rates is that, for many operators, it is becoming less expensive to round the Cape of Good Hope rather than taking the Suez canal. The cost per day of chartering a 170 000 tonne bulk carrier declined from USD 200 000 in August 2008 to USD 22 000 in February 2009. The longer voyage via the Cape of Good Hope is now less expensive than taking the Suez Canal (US 600 000 for a 9 000 TEU container carrier). At the same time, the price of diesel for ships has fallen by nearly two-thirds (from USD 700 per tonne to USD 230) and, counting savings on insurance costs by avoiding passage through the Gulf of Aden, the extra seven days via the Cape of Good Hope can produce substantial savings in money terms.

One of the consequences of the downturn in port activity is that there are fewer goods vehicles on motorways. For instance, ANWB, the Dutch road users' association, has reported "a significant decline in mobility", noting that tailback indicators (longer tailbacks increase waiting time) have been significantly lower overall throughout the Netherlands since November 2008. In January 2009, road traffic tailbacks were down by 14 per cent in minute-kilometres on January 2008. This is borne out by the VID traffic information service, which reports a substantial decline in traffic over the previous three months, adding that the decline in port traffic appears to have played a major part in this. Large flows of goods normally transit through Rotterdam and Antwerp en route to the Netherlands' Eastern neighbours. Now, both of these world ports are seeing their business decline and that has an impact on road transport.

In the United States, the information available shows signs of a decline of around 7 per cent in container throughput in the top 10 ports in 2008 for the full year. By way of illustration, container throughput in these ports in October 2008 was down by more than 5 per cent on the figures for October 2007, while in November 2008, the decline was over 8.5 per cent. The loss of US consumer

confidence led to cautious behaviour by retail chain stores and therefore to low inventories and orders. The port of Long Beach in California, for instance, recorded a decline of over 25 per cent in the number of containers handled in December 2008 compared with December 2007. In 2008, figures for the full year show that the port of Long Beach saw a reduction of more than 11 per cent in container throughput, which is the largest annual contraction in the past 20 years.

In the air freight transport sector, freight grew by only 0.1 per cent for IATA member airlines in the first nine months of 2008. All of the regions of the world, except for the Middle East and Africa posted negative results. The Asia-Pacific region, where there is a concentration of the world's largest airlines, was also the most badly hit with a decline of over 10.5 per cent. The contraction recorded by the airlines in September 2008 is the worst slump that air freight has seen since the attacks of the 11 September 2001 and the bursting of the "dot.com" bubble. The decline in freight traffic for Air France-KLM, for instance, was 12 per cent in September 2008 compared with the previous year. Although the freight business of Air France-KLM still made a profit of EUR 22 million in the first half of 2008, the group is ultimately looking at an operating loss of the order of EUR 200 for its freight business in 2008. Since the second half of 2008, airlines have been slashing prices in a bid to stop air freight business switching to maritime transport, which is cheaper. The "passenger" business is also feeling the effects and, by the summer of 2009, Air France is considering reducing capacity by around 4 per cent on its short-haul network, stabilising it on medium-haul routes and reducing it by 2 per cent on long-haul routes, notably by taking a B747-400 out of the fleet and postponing the delivery of a Boeing 777-300 ER for a year. Worldwide, some thirty airline companies went bankrupt in the first 10 months of 2008 and the plight of 20 more is critical. Some experts think that this foreshadows a new wave of cost cuts, mergers and closures.

Inland freight transport is also going through a difficult situation. In France, for example, the number of Small and Medium-sized Enterprises in the road freight transport sector declaring bankruptcy in 2008 was double the 2007 figure, resulting in the loss of over 10 000 jobs. In Russia, a decline in rail-borne exports, particularly of metal, coal and cement, signalled a loss of the order of RUB 30 billion for Russia's railways for 2008 at a time when private rail operators are also announcing financial losses.

2.2. Analytical overview of trends in the global economy: the transition from the international division of labour to the international division of production processes

2.2.1 Broad overview

It is difficult to give a comprehensive overview of trends in world trade over a long period. This is because the goods being traded are not the same as before: the type, value and relative price of traded goods have all changed substantially (for instance, because of advances in technology since World War II). Moreover, flows have been disrupted by economic factors just as much as by geopolitical factors. Rather than attempting to give an exact account of these developments in world trade, Box 4 gives some stylised facts, which retrace some of the most significant aspects of trends in world trade.

Box 4. **Some trends that shed light on developments in world trade**

The average annual percentage change in the volume of world trade was of the order of 6 per cent between 1950 and 2006. Manufactured products were the most dynamic product group, with an average annual growth rate of over 7.5 per cent. During the same period, this rate was no more than around 4 per cent for the mining industry and 3.5 per cent for agricultural products.

More striking is the fact that world trade in goods has grown at twice the rate of world output since 2000. Since the same year, growth in imports has been higher than that of exports, particularly in North America. The same trend towards a higher increase in imports over exports has been observed in the Commonwealth of Independent States (CIS), the Middle East and Africa. It was in the CIS that this trend was the most marked with imports growing at double the rate of exports from 2002 to 2006 (17 per cent compared with 8 per cent).

Europe and Asia are the only regions where export growth has outstripped import growth since 2000.

However, distance still appears to be a barrier to world trade: trade in goods is still characterised by large intra-regional flows. In actual fact, inter-regional trade flows between North America, Europe and Asia accounted for only 23 per cent of world trade in 2006 as opposed to 53 per cent for intraregional trade flows. Europe is the region with the highest intra-regional flows (31 per cent of world trade flows in 2006), followed by Asia (14 per cent) and North America (8 per cent).

Although small economies participate in world trade in goods, the major economies predominate: in 2006, 80 per cent of the smallest exporting countries accounted for only 10 per cent of world trade in goods. However, this latter figure does not take account of country population: per capita, the smallest economies contributed more to world trade than the value of their exports suggest. For example, the smallest economies, representing some 20 per cent of the world's population in 2006, accounted for practically 40 per cent of the value of world goods exports.

Asia is one region in which the share of manufactured products in total exports is in excess of 80 per cent. In contrast, the Middle East, Africa and the CIS are heavily dependent on mining industry products and fuel in their exports whereas in the less-developed countries, nearly three-quarters of export revenue is from primary industries and only one-quarter is manufactured goods (essentially clothing).

2.2.2 Basic trends

As Lionel Fontagné (2007) points out, trade in goods between distant societies goes back to ancient times. The deeper division of tasks between nations is a more recent development and was facilitated by the decline in the costs of transport, transactions and information and communications. The end result of a division of labour in which developing countries specialised in exporting commodities and industrial activity was concentrated in the "developed" countries, as they are called, was that these two types of economy became very heavily interdependent. What we saw here was the "value-added chain", being spliced up, which led to one economy being integrated or inextricably "interlinked" with another. Alongside this came the mobility of production factors and an allocation of capital that saw countries (totally or partially) abandon the least economically efficient activities, which were then replaced by imports, and the reallocation of resources (labour, capital and natural resources) to more efficient activities, some of which would be exported. This new division of labour has been accelerating very rapidly recently.

However, it should be noted that the intensity of trade between industrial countries at the outbreak of the First World War had reached a height that it would not again attain until the 1970s, i.e. towards the end of the thirty-year period known as "les Trente Glorieuses" in France. Quite clearly, the internationalisation of the economy is not a one-way street. In other words, historically there have been reversals. If the "inward looking" policy approach has failed it is precisely because in the long run, given the increasing returns to scale gained by stepping up production, unit cost ultimately declines. Hence, it is more profitable to develop large-scale production units that are geared for export, moreover. In return, for the

trading partner it becomes more profitable to import and benefit from the influx of technology than to produce locally, even if it does mean specialising in other activities.

The basis of the international division of labour (IDL) is fundamentally no different now than it was last century, as is borne out by the arguments set out above. One can safely say, for example that the goods that countries import and export are a rather accurate reflection of the differences in natural resources, productivity and technology from one country to another.

On the other hand, what is new about IDL this time is its extent and form, which have resulted in the unprecedented interdependency of national economies.

Rather than duplicate their production units in different geographical sites, what multinational firms have done is to reorganise their production on a global basis. They have been able to do so by splitting up the value added chain among their various subsidiaries. All of this went hand in hand with a process off-shoring and outsourcing part of their production.

The integration of emerging countries into the international division of labour first began with a succession of assembly industries (clothing industry, consumer electronics, computers, cars, etc.). Hence, there was a progression from clothing production to the production of radio and television sets, then computers, cars, etc. All of these activities had traditionally been the sole preserve of the economies of the North.

Until the mid-1990s, although a few sectors such as the clothing or toys sectors had suffered, the impact of the emerging economies on the volume of world trade continued to be contained. This limited the need to make adjustments to the industrial fabric of developed economies and consequently the need to remove the threat of new competitors through high-end specialisation.

Observation of these processes shows that in Europe, for instance, despite the rise of the Common Market and then the Single Market, the economic trend had led essentially to the phenomenal development of reciprocal trade within industry (with the same country being both importer and exporter of the same type of good). This was not specifically related to economic specialisation. On closer examination, it seems that European integration led to the development of intra-sector trade between Member countries while trade with third parties was more often inter-sector. Europe remained characterised by intra-sector trade with vertical differentiation (high end of the market products produced in Northern Europe and basic or entry-level models of the same product produced in Southern Europe) which, for that reason, required only a mild adjustment of the economy.

However, at the present time, several factors are conspiring to bring about a radical transformation of the global industrial landscape: modular products, which can be broken down into independently constructed sub-assemblies, are paving the way for the reorganisation of production processes on a global scale. Design and fabrication of components and final assembly are just so many stages that can be performed by separate units of a group in distant geographical locations. The decline in customs duties, containerisation and more reliable transport, the Internet, information and communication technologies and intercontinental business trips by air have made these strategies particularly attractive. On this latter point, Box 5 presents the main conclusions of the report by Tae Oum, Xiaowen Fu and Anming Zhang on changes in the air transport market since liberalisation began in the United States in 1978.

Box 5. **Air transport liberalisation and its impacts**

In this report, Tae Oum, Xiaowen Fu and Anming Zhang review major regulatory policy changes on the liberalisation of air transport that have taken place in the past 20 years and give an overview of the impact of those changes. The authors point out that air transport facilitates trade, foreign direct

investment, tourism and economic development. Hence, air transport is a crucial player in globalisation.

In the United States from 1978 to 1988, i.e., over the first 10 years of deregulation, passenger traffic increased by 55 per cent while scheduled airline passenger-miles grew by over 60 per cent. The real cost of air travel fell by about 17 per cent, yielding welfare gains of USD 6 billion (1986) to passengers. This was the result of improved airline efficiency (optimised services and pricing), which also led to job creation in the sector.

As regards providing a wider choice, the analyses show that low-cost carriers have had a dramatic and, moreover, lasting impact in lowering fares. On routes on which they have a presence, fares are 20 to 50 per cent lower than before. The impact on fares is even detectable on routes where there is a low-cost carrier operating in the proximity: fare reductions ranging from 6 to 36 percent have been observed in the United States depending on the substitutability of the route. Hence, the emergence of low-cost carriers -- one of the changes wrought by liberalisation in the air sector – has been a powerful stimulus for the development of air transport.

In the United States, itself, liberalisation prompted US airlines to set up the most efficient continental network ever, although the airline industry there is still going through another round of consolidation 30 years after the process was begun. The US market grew much more than the European market during the 1980s and 1990s, for instance. This was a direct result of liberalisation: increased competition, restructuring of hub-and–spoke networks), the emergence of low-cost carriers, new services, lower prices, etc. According to the report, it will probably take another 10 years for the European airline industry to adjust to the dynamic of change that began with its liberalisation in the early 1990s. Eventually, the surviving network carriers will need to organise around a "super-hub" and set up secondary hubs to attract passengers from wider geographical areas. Such multiple hub networks are as likely to be created via organic growth as via company mergers/ acquisitions.

In terms of future traffic, the authors of the report think that the markets of the Asia-Pacific region will be the fastest-growing over the next 20 years, followed by the markets of Europe, where liberalisation has not yet produced its full effects, in contrast to North American markets, particularly the United States, where liberalisation began as early as 1978. Figures 3 and 4 show the way in which air services developed in North America after liberalisation.

Figure 3. **Vancouver – U.S. Routes Before 1995**

Source: Supplied by YVR Airport Authority

Figure 4. **Vancouver – US Routes 2008**

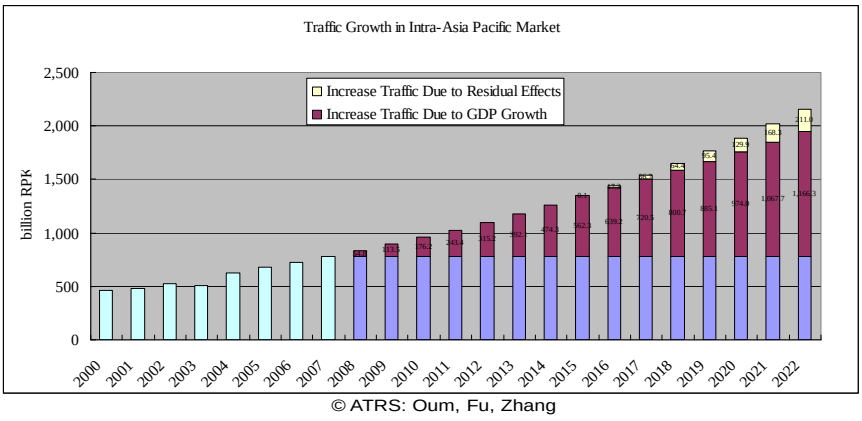
Source: YVR Airport Authority (2006)

As regards the Asia-Pacific region, the bulk of the growth in traffic inside the region and intercontinental traffic from and to the region can be attributed to a higher standard of living rather than

to the restructuring of service delivery conditions, although some steps have been taken towards greater liberalisation of air services. In the North-East Asia region, China, Japan and South Korea may be expected to enter into open skies agreements, particularly bilateral agreements. This is because the sheer size of China's population, its economic growth and its integration into the world economy pose as much of a threat of dominance as an opportunity with respect to integration of the North-East Asian air transport market. Substantial increases in traffic are to be expected.

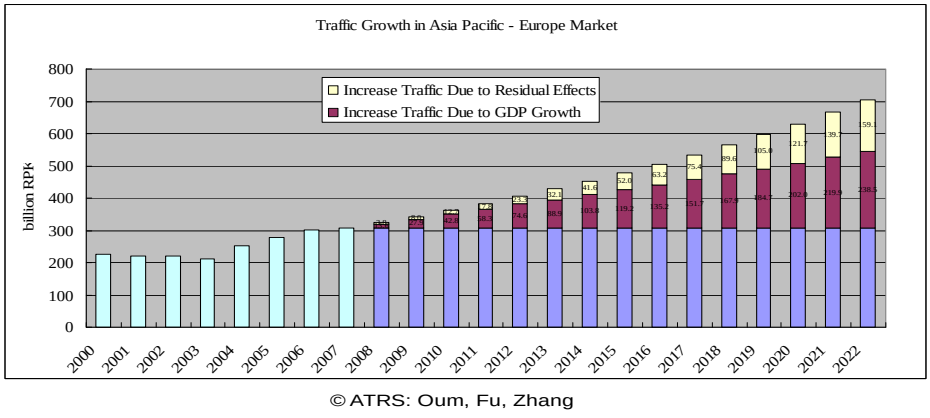
Figure 5 illustrates the important growth potential of air passenger traffic in the Asia-Pacific zone, when purely due to the effect of economic growth.

Figure 5. Expected Passenger Traffic Growth:
Intra-Asia Pacific Market – **GDP effect + Residual**



On the Asia-Europe markets, where factors leading to liberalisation are stronger, Figure 6 shows an important residual effect until 2022, linked to the deregulation process.

Figure 6. Expected Passenger Traffic Growth:
AP-Europe Market - GDP effect + Residual



At the same time, firms have had to make trade-offs between the benefits of returns to scale, requiring large production units, and the benefits of a local market in order to limit the costs of transport and storage. In actual fact, the lower cost of inland freight transport, particularly following the

deregulation of the sector, made it possible to take advantage of the productivity gains of large-scale production units and minimise the costs of procurement for production units and services to end markets.

Again, according to Lionel Fontagné, the European automobile industry is a case in point: engines are manufactured in Germany, windows in France, gearboxes in the United Kingdom and assembly is carried out in Spain. In this context, it should be borne in mind that competitive pressure in imports leads to firm selection and, so, will confine a country's production to the areas it handles most efficiently. All of this is a basis for an increase in living standards through the necessary – and, to a greater or lesser extent, painful – social adjustment. The studies available on this tend to show that production abroad increases the employment of skilled labour and reduces non-skilled labour in the country of origin while it has no really significant impact on total employment, as the improved competitiveness of firms increases their sales and consequently the output of the parent company.

To simplify the above developments, one could say that firms respond to imported competition by securing productivity gains, principally through the international fragmentation of production processes and that in so doing they improve living standards by reducing production costs. Indeed, the very close link between the productivity of an economy (hence of firms) and the living standards of its population should not be ignored.

Hence, we have progressed from the International Division of Labour to the International Division of Production Processes (DIPP, Lassudrie-Duchène, 1982) and, in this case, imports become productive insofar as they are fed back into the production process. This type of division can be assimilated to vertical division. For instance, in the United States, intra-firm trade currently accounts for half of the country's exports. Over 90 per cent of the exports of US industrial firms to their subsidiaries are semi-finished goods for processing or assembly abroad.

Yet, one can say that while these developments generate efficiency gains for firms and economies, their costs are entirely localised and clearly identifiable. This is the case, for instance, when firms in a weakened employment market shut down in order to offshore their production to another country. Whether under IDL or IDPP, specialisation creates winners and losers, giving governments responsibility for implementing support policies.

Will the current economic crisis – which was preceded by a dizzying escalation in transport costs (impacts not only of energy costs but also of insufficiencies of transport capacity), saturation of infrastructure, especially port infrastructure, infrastructure congestion costs for inland and air modes, urgent security costs and the all-pervasive sustainability concept – see the internationalisation process peter out faced with the social costs of the adjustments it led to, the crumbling of the global financial system and the limits the transport system seems to be coming up against? Or, on the contrary, are these developments the first fruits of the emergence of a global economy and institutions in which, more than ever before, the notion of distance and nations will no longer be the factors that prevail. What role can transport play in this?

From the outset, one can stress that the transport sector is particularly sensitive to cyclical reversals, independently of any potential question about "alternative governance" that might be the long-term outcome of the crisis that has been affecting the global economy since the end of 2008. Box 2 showed in this respect some indicators that allowed us to determine accurately the scale of the impact that this dramatic economic downturn is having on the transport sector.

The issue here could be, for example, the measures that policy-makers intend to take in response to the worsening situation in the transport sector and how these relate to the role of transport in globalisation: if major infrastructure works are undertaken, will the related finance go first to infrastructure with an

international reach (ports, airports, etc.)?; or, on the contrary, to meeting more local needs, such as dedicated right-of-way public transport? Will the related infrastructure contracts be put out to international tender or will some of them be "reserved" to national players?

The next section will attempt to define some of the basic characteristics of international transport; characteristics which explain the way that the world economy has been evolving and which may provide some ideas on its likely developments.

3. TRANSPORT AND THE GLOBALISED ECONOMY

If one considers the development of the global economy from 1955 to 2004, trade in manufactures increased by a factor of 27 in volume, in other words it is about four times higher than trade of any other kind between countries. One of the current characteristics of the international division of production processes is that growth in trade maintains the ties with vertical specialisation of the economies of different countries. These multiple production stages are particularly sensitive to the vagaries and failures of supply chains, i.e. they are directly sensitive to transport quality. The more the goods and components produced are integrated into supply and processing channels involving different countries, the higher the impact of transport costs will be. The reliability of transport times and real-time tracking of supply processes are key variables in this context. Any transport failure can actually shut down production lines if certain components are missing.

Hummels points out that there are two ways of viewing the expansion of a country's exports: first of all there are well-established on-going export flows of goods and products where there are well-established production chains; secondly, there are also a large number of new entrants in exports who "test out" new export markets. The infrastructure that the new exporters need, and transport infrastructure in particular, may differ radically from the supply chains set up by "major" exporters. This means that newcomers will be reliant on intermediaries to gather information and set up transport and distribution channels in countries they wish to have as export markets. Any shortfall in this respect, or any excessive cost, can "kill off" the export capacity of these firms. Although this may seem anecdotal, it is nonetheless clear that practically all of today's "success stories" had fragile beginnings. Policy-makers must keep in mind the dual requirement for transport and supply processes and not keep their eyes riveted solely on the "major export flows". On this issue, Hummels points out that in order to test new distant markets and ensure a high degree of responsiveness, new exporters often tend to turn to air transport. This illustrates the strategic dimension of air transport.

Indirectly, the foregoing draws attention to the sensitivity of export volume to transport time for the goods exported. This is related to the notion of transport overheads. Hummels makes the point that, as a general rule, costs related to total transport time are higher than customs tariffs on traded goods. These time-related costs may be a result of time delays due to congestion in ports, customs formalities or inland freight hauls, for example. In Asian countries, Hummels found that each additional day of delay for Chinese exports had the same effect as an export tax of 0.77 per cent of the value of the product exported. Hence, a 4-day delay in transit is equivalent to a tariff of 3 per cent on the goods exported.

While time "sensitivity" varies widely with the goods exported and from one supply chain and, hence, one country or economic region to another, it should be noted that time in transit and the time taken to carry out ancillary operations is crucially important for the globalisation process.

Nordas, in her introductory report for the ITF/OECD 17th International Symposium on Transport Economics and Policy, pointed out that several recent studies introduce the length of time taken by export procedures into gravity model estimates and had found that a 10 per cent increase in time reduces the volume of bilateral trade by 5 to 8 per cent. This may seem a small impact compared with the estimated impact of transport costs on trade flows: Limao and Venables, for instance, find that a 10 per cent increase in transport costs reduces trade volume by 20 per cent. In actual fact, studies on the impact of time on exports underestimate it, because they disregard trade flows that are nullified because of they would take too much time (in transport, transit through customs, etc.). If an attempt is made to take these zero flows into account, the estimate obtained indicates that, for every 10 per cent increase in the length of time export goods spend in transit, there is a 5 to 25 per cent reduction in export volume, depending on the sector and destination country.

From the standpoint of gaining insight into the determining factors in the globalisation process, exporters consider two costs, both of which increase with distance: the first is the cost of transport and the second is the cost of time.

3.1. Overview of the impact of transport costs on trade

The less the impact of transport costs on the end price of a product, the greater the incentive for an importer or exporter to use a fast mode. In other words, the higher the commercial value of the goods, the less the impact of transport costs on its end price and the greater the tendency to use high-cost (and, therefore, fast) transport. In the latter case, at any rate, transport will only account for only a small proportion of the end cost of the goods in question. Conversely, if transport costs have an appreciable effect on the end price of a good, the modal choice will be determined by cost considerations.

On this point, Hummels notes that over the period 1975 to 2004, world air tonnage increased at a rate of 7.4 per cent per annum, i.e. at a faster rate than maritime tonnage and world trade. Expressed in tonne-kilometres shipped, the growth in air freight is even faster, increasing at a rate of 12 per cent per annum going back to 1951. Since the heaviest goods are carried by sea, tonnage-based data on international trade significantly understate the economic importance of air freight shipping. Hence, over the past 40 years, air freight shipments from the United States have grown to such an extent that air mode recently accounted for more than 50 per cent of the value of the country's external trade (for trade with non-adjacent countries).

Underlying these trends there has been a change both in the type of goods exported, which makes them less sensitive to transport costs (high value added goods and lighter unit weights), and in the trend in transport costs itself.

As Hummels points out, economists specialising in international trade and globalisation express the costs of transport as a proportion of the value of the goods traded (*ad valorem* transport costs). This accounts for the "drift" in costs of traded goods between origin and destination points. It also facilitates comparison with customs tariffs, which are also expressed as a proportion of the initial value of the goods

Hummels, Lugovskyy and Skiba demonstrate that the *ad valorem* costs of transport are negatively correlated with a country's per capita income and are systematically higher for low-income exporting countries (data for the US and Latin America for 2004). Moreover, as a general rule, transport costs are higher than customs tariffs applied to goods. Hence, for the median good imported into the US in 2004,

transport represented 85 percent of the total costs (transport plus tariffs) faced by an exporter. For historical contrast, transport expenditures on the median good were half as much as tariff duties for US imports in 1958 and equal to tariff duties in 1965. Lastly, despite the fact that sea transport and containerisation are factors in common for goods traded internationally, the costs of transport varies widely from one market to another.

This implies that transport costs play an especially large role in the export process in that they greatly alter the relative price of goods. For example, in 2004, for a typical good, an exporter to the US who pays more than the mean transport costs (for a typical product, one standard deviation above mean transport costs), has to pay transport costs 90 per cent higher than that mean. These variations are indeed higher than customs tariffs. This makes it clear that transport costs play a strategic role in the import/export process. It is tempting to venture to see what determines these variations in transport costs.

3.2. Transport distances and energy costs as explanatory variables in transport costs

Energy costs are obviously an important factor in explaining trends in transport costs. Using data for the period 1974 – 2004, Hummels estimates that a 10 per cent rise in the price of energy increases ad valorem transport costs by 2.6 per cent for air freight.

In contrast, the effect of distance on transport costs has been substantially eroded over time. In 1974, the elasticity of air freight transport costs with respect to distance was 0.43, but had dropped to 0.16 in 2004. To better understand these figures, Hummels proposes to compare the costs of air freight for an exporter 14 000 kilometres from the US and for an exporter 2 000 kilometres away. In 1974, the more distant exporter would have paid air shipping prices that were 2.3 times the price paid by the proximate exporter. In 2004, the more distant of the two would have had to pay only 1.3 times the air freight price paid by the proximate exporter.

In order to assess the impact of distance on transport costs, one can compare the elasticity above, first for maritime transport and secondly for air transport. In 1974, the distance elasticity for air transport costs was almost three times that of maritime transport. This meant that the impact of increasing distance on air transport costs was three times higher than on maritime transport. In 1974, doubling the distance raised air shipping costs by 44 per cent but only raised maritime shipping costs by 15 per cent. By 2004, the two elasticities had become comparable with the result that the relative price of air transport and maritime transport are no longer affected by increasing distance.

Underlying these figures, are the cost and price trends for the individual modes of freight transport. Hummels points out that, for liner shipping, the intensity of competition between maritime carriers influences pricing and, in particular, that the market power of shipping firms is extremely high when demand for this type of transport is very inelastic (captive market) and when the cost of transport accounts for only a small portion of the delivered price of the good (low price elasticity). Summing up his analysis, Hummels demonstrates that maritime transport prices are higher when: (1) goods prices themselves are high; (2) customs tariffs are high; (3) import demand elasticities are low; and (4) the number of rival firms is low. According to Hummels, the majority of variation in transport prices can be explained by the four factors above, not by distance-related factors.

During the period of time when the use of containerisation was spreading, other input costs including energy price, ship prices, and port costs, were soaring. Hummels reports a study by Sletmo and Williams dating from 1981 which argues that rising steel and labour costs resulted in sharply higher shipbuilding prices in the 1970s and that as well as this liner operating costs rose by 14 to 18 per cent per year in the same decade, as a result of energy price shocks alone.

By extrapolation, one might well think that 2004 -- a key year for energy costs marking, as it did, the start of a steady and significant escalation in energy prices,--should also have seen a substantial rise in liner shipping costs. In actual fact, although the price of oil per barrel doubled between the first quarter of 2004 and the second quarter of 2007 (from USD 30 to USD 60), prices for liner shipping on the main routes (US-Asia, Asia-Europe) changed little. The rise only began to make itself felt from the third quarter of 2007 and its impact was most apparent on Asia-Europe links where prices in mid-2008 were up 25 per cent on 2004 prices. The escalation in fossil fuel prices was a process which itself only came to a halt in mid-2008 and has reversed since.

If we look at factors that play a role in cost trends in maritime transport, it can be noted that time spent in port and the cost of port operations are the key costs for short-haul destinations while, for long-haul destinations between Europe and Asia, for instance, port costs are lower. Hence, the key factor is energy costs.

To a great extent, freight transport costs move in response to changes in technology and exogenous "shocks" to production factors: rising energy costs, shipbuilding costs, port congestion costs, etc. The modal split responds to changes in relative prices: relative prices being understood as part of the generalised costs of transport (including time, ancillary services, etc.). The increase in energy prices between 2004 and early 2008 also goes some way to explaining the recent collapse of air cargo, which, as Hummels notes, was observed even before the current credit crunch.

3.3. Weight to value ratios

Hummels, Lugovskyy and Skiba (2007) point out that one factor, the relationship between the weight of a good and its value, largely explains the differences in ad valorem transport costs. This is an important distinction: even if the cost of container transport has remained constant over time, containers are no longer transporting the same goods. Their unit value may have increased and therefore the impact of transport costs on each will be relatively less, with less resistance to export. Conversely, the above authors estimate that a 10 per cent increase in the weight/value ratio of a good leads to a 4 to 6 per cent increase in *ad valorem* transport. This proportionately reduces the comparative advantage of exporting the goods in question.

On balance – after statistical processing and analysis of the data – it would appear that that very large variations in the weight/value ratio of traded goods help to explain cost variations in maritime transport which cannot be explained statistically by other variables, such as distance, technology used, quality of port infrastructure, or intensity of competition between carriers on a given trade route. This finding tends to indicate that as an economy gains in prosperity and concentrates on the production of sophisticated, high value-added goods, (hence low weight/value ratio), it also gains a comparative advantage in terms of transport costs (and hence export costs). Moreover, it would facilitate a switch to air transport, for instance, which is suited to transporting light, high value-added products since the additional costs of transport represent a smaller proportion of the value of the product. Not only is the higher cost of transport less important in this case, transport time and the associated costs are substantially reduced. Seen in this light, it is easy to explain the success of air freight transport reported before the major hike in energy costs changed everything.

If we try to project ourselves into a more distant future, there is no doubt that energy prices and -- should no major deposit or competitive alternative energy be discovered -- the price of fossil fuels in particular, will continue to climb. Actually, world demand for petroleum products should increase faster than supply, which is cartelised. In other words, the steady rise seen in the price per barrel over the period 2000 – 2007 could continue until 2025 or so, which is the time it will take to bring the alternative energies

envisaged today up to speed. Unless the current phase of economic recession sets in to last, the energy price trend should be to the advantage of maritime rather than air transport.

The energy efficiency of maritime transport, which ensures the lion's share of world trade, but consumes only around 5 per cent of the oil used by the transport sector as a whole, means that an increase in energy prices is hardly likely to cause any fundamental change to the world trade balance in this sector. It is more likely the inland transport sector of world trade (deployment of intermodal alternatives in response to the dominance of road transport, port and inland infrastructure congestion, the environmental and security situation, infrastructure finance, technology development costs for equipment, etc.) which will determine the competitiveness of the supply chains in question.

Trade in industrial goods is less dependent on local plants than is, for example, trade in commodities. The factors of production can be off-shored, but raw materials resources are a geographical legacy. This means that logistics capabilities can generate a comparative advantage: industries compete not only on products but also on delivery times and costs. Opening new markets, on the other hand, requires the availability of flexible and, in the initial stages at least, small-scale transport. This is quite another issue, referred to above, but an equally fundamental one: the initial transport requirements for starting up an export process.

There is another approach that can be adopted: the approach that is highlighted in Christian Reynaud's report, which asks: what role can inland intermodal transport alternatives play on certain global trade routes?

3.4. Inland routes, or adding to the range of intermodal alternatives

The approach that Reynaud adopts in his report is more descriptive than economic, in the sense that compared with the report by Hummels, which was based on the "economic" measurement of the characteristics of global trade in goods, Reynaud proposes an "exploratory" vision of the kind of inland intermodal transport that might be able to serve the needs of the global economy. He primarily stresses the need for alternatives to the major maritime routes. Specifically, he bases his analysis on the observation that globalisation brought a concentration of traffic along a few major maritime routes with a certain number of unavoidable points of passage, the most well-known of which are the Suez and Panama Canals and the Straits of Malacca, Gibraltar and the Bosporus.

This said, inland transport has historical examples of major intercontinental routes, like the Silk Road, the most famous among them and even older routes across the continents of Asia, Africa and America.

Yet such major transcontinental inland routes have played relatively little part in the growth of world transport in recent years, except in certain countries, such as the United States and Russia. In the United States, this was the land-bridge between ports on the East and West coasts and in Russia the Trans-Siberian route (essentially for bulk transport with relatively little container traffic as yet).

Reynaud points out that at regional level the situation is a little different and gives the European Union as an example of an integrated region in which the principles of "Trans-European Networks" and "priority corridors" have been developed. The corridor approach has proved the most workable for co-co-ordinating the public and private actors concerned. The trans-European network is intermodal and includes all transport modes and their interfaces. The priority corridors extend to the neighbouring countries of the CIS and of the Black Sea and Mediterranean coasts.

Inside the European Union, there is a series of around twenty intermodal corridors, some extending to the neighbouring continents of Africa and Asia, which use a whole range of intermodal approaches and may be in competition with each other and even with the maritime container transport system.

In other regions, Reynaud comments that there are fewer examples of major inland intermodal routes, except in North America where there are major intermodal routes between Canada, the United States and Mexico. One of the reasons for this is probably that regional trade is relatively low compared with the scale of world trade, even though that is not the case in the European Union and the European Free Trade Association (EFTA).

Reynaud stressed the idea that the development of inland intermodal transport, competing with or complementing maritime intermodal transport, would be a step towards the diversification of major intermodal transport routes on a global scale. Diversification would reduce vulnerability and boost the performance of world transport in terms of door-to-door services. In this connection, he gives an outline of the major inland routes that might be planned.

3.4.1Overview of major inland routes complementing maritime routes

By way of introduction, Reynaud states that there are several possible scenarios, for inland routes:

- major inland routes between continental countries that cannot be accessed by sea;
- land bridges;
- inland links which require short-sea shipping as a complement to inland transport.

The main inland routes between continental countries that could be envisaged are, namely, those between Europe and Central Asia or inland routes linking countries within Asia.

On these major routes, inland intermodal transport is not very highly developed and in the medium term road transport seems to be a more likely development prospect, particularly where trade has long remained undeveloped (except in Russia prior to 1990 when rail was given priority).

Among this group, there are some countries that have long been particularly dynamic, such as Turkey where the international road transport sector is very well organised. In other countries, the road sector has grown more recently, as in Iran and Ukraine, in response to restrictions placed on them in international relations (especially relations with the EU).

The growth in raw material exports from the countries of Central Asia has enabled an increase in imports of manufactured and finished products, which are transported in containers either by lorry with pre- and post-shipment carriage over long distances or, less commonly, by rail.

Reynaud notes that we are now seeing a growing number of approaches, as, for example, with intermodal roll-on/roll-off (semi-trailer) transport for crossing the inland seas (the Mediterranean, the Black Sea and the Caspian Sea) with road haulage contractors who have very quickly adjusted to these techniques, bearing in mind that in reality there is sometimes no alternative (especially for many of the links between Europe and Central Asia, including the TRACECA corridors. These solutions also include limited provision of rail container transport, which is developing primarily on the main northern corridors and very little on those in the south (between, for example, Turkey, Iran, Kazakhstan and Turkmenistan, although there is a regular service); here again ISO containers predominate, even for continental transport.

Reynaud concludes that an intermodal link between Europe and Asia taking the northern route, via the Trans-Siberian Railway would be especially interesting. A more southerly route (the Trans-Asian

Railway southern corridor or TARS) would be more problematic because of the much more rugged terrain through Turkey and Iran.

While a northern route, such as the above, would be an alternative to transport via the coast, the mode used to date, it would also serve the purpose of providing transport to inland countries.

There are, indeed, several benefits in developing such routes, as they provide more than just a land bridge. They offer, firstly, an alternative route to a maritime mode and, secondly, a possible continental link between regions or countries where it is difficult and sometimes very costly to access ports. Lastly, they provide new links between continental countries with very poor intermodal network services. In this specific case, intermodal "transit" routes may also provide a route for "services" to landlocked countries.

Similar situations may arise in other continents in the provision of services to inland centres, particularly in Africa where most road and rail infrastructure has been designed to serve coastal areas and ports. Except in North Africa, the advantage of an inland connection is probably all the greater for the fact that there is very little local trade between neighbouring countries and it is likely to grow substantially. The situation in South America is similar although the majority of international trade is via the coast.

The case of North America, on the other hand, is an example of a "land-bridge"' in the strict sense, with trains operating directly between ports on the East and ports on the West or South and West coasts: intermodal container transport complements seaborne transport, the original aim being to avoid the Panama Canal route. This particular case is an example of especially effective intermodal rail transport for high-volume traffic using long (2 000 m) double stack container trains.

For inland long-distance transport, there are also examples of particularly effective intermodal transport in the United States which could be transposed to other continents for use in comparable high-volume traffic and operating conditions.

Reynaud adds that other land-bridges may also be envisaged to provide new international routes, including:

- between the Mediterranean Sea and the Gulf once the link between Syrian and Iraqi networks has been established;
- between the Mediterranean and Black Seas as an alternative to the Bosporus route, as currently proposed by Turkey;
- between the Gulf and the Caspian Sea, which is itself linked to the Black Sea and the Volga network, in which onward transport would be provided by sea-river vessels;
- between the Caribbean Sea and the Pacific, as envisaged through Central America, although the widening of the Panama Canal makes this a less realistic project.

Reynaud adds that the opposite situation, where inland transport is the main mode and sea transport is a possible alternative, also exists over shorter distances, for example within a large region. This echoes all of the debates on the development of short sea transport, which is the only mode possible for much of the trade between the countries of East and South Asia. The suitability of a particular approach thus greatly depends on the geographical context, with either road transport logistics and roll-on/roll-off facilities dominating, or the maritime approach and, in particular, the principles of intermodal ISO container transport dominating, and thereby creating new regional links with the development of "feeder" type services.

3.4.2Main factors in the economic performance inland transport approaches

In introducing this more economic assessment of the prospects he outlines, Reynaud stresses that on the main continental routes the pre-requisites remain higher volume traffic and the industrialisation of transport supply processes, whether one is dealing with sea, port transhipment or inland transport.

In the case of inland intermodal road/rail transport, these higher volumes are provided by multimodal terminals and their rail services. At present, there are several types of terminal, including "European" terminals capable of handling several hundred thousand (200-300) loading units, and American terminals designed differently requiring greater space for up to one million units.

For rail transport, the challenge is to form trains with a minimum load of 100 TEU, but scope for increasing it to 300 or 400 TEU. For inland waterway transport, the range would be 200-400 TEU.

With scenarios such as this, it is reasonable to assume that intermodal combinations could be developed along the main global trade routes, depending on distances, the terrain and connections with regional networks where intermodal transport is growing on a smaller scale.

For trains between Europe and Asia, initial estimates have been obtained which point to the existence of a competitive market for intermodal transport between Europe and Asia, given:

- the differences in distance compared with the maritime shipping option;
- the costs of pre and post-shipment services to inland regions of Europe and China regions;
- the potential for running long trains.

Reynaud adds that, generally speaking, rail costs can be lowered substantially by higher volume flows and intensive use of equipment: to around EUR 0.1 per unit/km, a level at which regional terminal haulage conditions will be the determining factor, as in the case of maritime container shipping. This applies in particular to inland intermodal transport in North America, with the use of 48' or 53' boxes geared to national logistics for average distances of up to 1 300 km.

The NESTEAR (2006) study on inland Europe/Asia alternatives strongly emphasises that the Trans-Siberian Railway is already providing attractive services between Vladivostok and Moscow at around USD 1 500 for a journey that takes ten days or so. Other services are offered from Finland and St Petersburg to China, and tests conducted by DB for container trains between Hamburg and China have proved conclusive.

At present this Trans-Siberian traffic is fairly modest at under 200 000 TEU, but technically there is nothing to prevent it increasing significantly on a line that has always been used by passenger and bulk goods trains, and which has been modernised and occasionally widened.

In economic terms, such services therefore already appear to be competitive for traffic from Europe to Asia, as indeed is borne out by the UNESCAP studies on the landlocked countries of Eurasia for access to the ports of East Asia or the borders of the EU.

Reynaud points out, with regard to direct trade between the EU and China, which already represents over 10 million TEU (with an enormous imbalance in the flows in each direction), that the economic equation may very soon favour rail, with:

- transport that takes 12-15 days for rail, as opposed to four weeks for shipping;

- and, rail costs from China up to the gateway to Europe of probably no greater than EUR 2 000 per TEU (while sea freight and port transport costs alone account for this much).

Of course, container management costs have to be added in either case, with inland alternatives no doubt providing greater scope for balancing the flows in each direction, because of the scale of European exports to Russia and the countries of Central Asia. This brings immediate potential cost and time savings. These advantages also relate to internal distribution costs in the European Union which would be organised from new inland gateways, not just its congested seaboards: as for transhipment costs for the change in rail gauge, they should amount to no more than EUR 50 or EUR 100.

The prospects for this alternative route may look particularly attractive on inland corridors between Europe and Asia, along which expected growth in traffic is unusually strong, probably over 6 per cent or 7 per cent per year for the next 20 years. These prospects would be for potentially higher volume flows on Europe-Asia corridors, which could, in turn, bolster the entire European Union rail system right from its land borders.

Reynaud mentions that several scenarios have been considered, ranging from the operation of 60-100 TEU block trains – which would immediately lower rail transport costs over a distance of 10 000-12 000 km to a level comparable to that of sea freight costs – to the use of trains capable of transporting 200-400 TEU. These scenarios include:

- lengthening trains, as has already been done on these lines for bulk transport;
- "double stack" trains, which would have to be made compatible with electrification of the line;
- or, finally, identification of freight priority routes – an option which is already being examined by China, and which could be considered in Russia given the rail facilities on one entire section of the route

In all of these stages, higher volume flows are possible, in principle, with a view to obtaining a system whose performance would rival that of the system in North America.

According to the particular scenario, a significant share of the traffic between Europe and China, or indeed between Europe and the countries of East Asia, could use this alternative route, freeing up extra capacity via continental gateways in Europe and Asia that do not experience the same saturation problems as sea ports.

Of course, Reynaud draws attention to another maritime alternative that is also mentioned at times, namely, a new sea route via the north that ought to become navigable year round with the melting of the icecap.

For a whole series of trade links between Europe and Asia, and between America and Asia, this route is much shorter, cutting current maritime shipping distances by half.

However, according to Reynaud, this solution would not overcome the problem of port congestion unless it also promoted the development of new ports in the north of Europe and northern Russia, which would then have to be linked by rail for longer inland terminal hauls. On this point, Finland's input to the work of the 2009 Forum is worth mentioning as it points out (cf. Box 6) that new shipping routes are emerging.

Box 6. **Maritime container transport in Finland**

The current situation and development prospects for container transport were analysed in a report by Finland submitted as input for the 2009 Forum. According to the report, container transport is the fastest growing maritime transport sector. It is expected to quadruple in the Baltic by 2020: the majority of the growth will be from an increase in Russian container traffic. The reasons for containerisation are well established and relate to the increasing value of the goods transported, demand for speed and reliability, flexibility and efficiency in handling containers and the competitive price of this form of transport due, principally, to keen competition on the market. The market is itself driven by growth prospects in the sector, leading to an abundant supply of container transport. In Finland, container transport is concentrated in a few ports (Kotka, Helsinki, Hamina and Rauma, which account for some 90 per cent of container movements). As container vessels increase in size, traffic may become even more concentrated in future, but in actual fact, the trend towards increasing containerisation in transport may also give small ports a role to play. Port congestion in the heart of Europe and increasing competition in the Baltic Sea have led to the start-up of new transhipment terminals, strengthening the development of ports in Russia and Poland and the entry of new ocean shipping companies into the "feeder" market. The development of freight train services in Russia and traffic on the Black Sea route will also increase competition on the transport market, according to the report.

In any event, the gains derived from a new maritime route in terms of transport time and/or costs would not be enough to compromise all possibility of developing a high-volume continental rail service, bearing in mind that inland regions in the continents of both Asia and Europe are becoming increasingly integrated into global trade. The main intercontinental trade routes should thus be regarded as forming part of a vast intermodal global transport network, not just as a few specially selected corridors to which there is no alternative.

3.4.3Some points on vulnerability and sustainability

One last point that Reynaud makes is that while consolidating long-distance flows is obviously a more effective approach from the transport standpoint and often -- with the use of rail, river and sea -- from the standpoint of environmental impact, too, it nonetheless increases the vulnerability of transport where there is no alternative route.

Transport is vulnerable to breaks in any link on a route that has become a vital artery for the global economy. This risk exists in sea transport wherever traffic converges in order to pass through straits and canals, or in ports and airports, which are major global transport hubs, regardless of the external cause of the risk: accident, natural catastrophe or terrorism.

One of the papers contributed by Canada to the 2009 Forum, "Is just in case replacing just in time?", illustrates the importance of these points on security. The highlights of the paper are given in Box 7. They illustrate the extent of disruption that can result from a change in customs systems aimed at preventing certain security risks.

The approach developed by Reynaud is quite different: it aims to show that measures can be developed to improve risk prevention, but that one of the best responses is in fact to diversify world trade routes so that the impact of a sudden break in one link does not spread to the entire worldwide transport system.

Box 7. **"Is just-in-case replacing just-in-time?"**

The June 2007 briefing by the Conference Board of Canada examines the consequences of the terrorist

attack of 11 September 2001, particularly the consequences of joint or unilateral border security policies implemented by the Canadian and US governments. More specifically, the briefing is intended to highlight the impact of these policies on Canadian exports to the US. For these purposes, interviews of over 60 firms and associations whose members regularly cross the border between Canada and the US were conducted.

Findings from data collected following the measures implemented at the border are outlined below.

- Whereas the aim of a just-in-time inventory management is to keep firms' inventories as low as possible, some companies are now stockpiling inventory on both sides of the border, just in case there are problems crossing the border. This practice of doubling warehouse storage is generating extremely high additional organisational costs.

- The added costs resulting from these precautionary policies can have major consequences in terms of firms' decisions to locate in Canada. A case in point is that some production crosses the border more than once with value-added increasing at each production stage. The additional costs at each crossing can tilt the balance and put US firms off locating on the Canadian side of the border.

- Moreover, US and Canadian firms produce and trade comparable, therefore highly substitutable, goods across the border. Any added cost for border crossings or any uncertainty in this respect can make Canadian products less competitive while US products are perfectly substitutable.

- Uncertainty about the time it will take to cross the border with tighter security measures in place has meant that some companies now send goods in advance "just in case" rather than "just in time". Hence, they lose the benefits of just-in-time production because they wish to hedge against uncertainty.

- Carriers themselves are increasingly reluctant to cross the border and even apply surcharges if they do have to. US carriers are only rarely willing to cross the border because of the loss of time and efficiency. Only a few Canadian carriers now continue to carry goods across but charge a "premium" for doing so. In most cases, there is a vehicle change at the border, with all of the organisational complexity and added costs that that entails.

- Moreover, carriers are changing their choice of border crossings and avoiding what would usually be the most sensible route. This is because there have been some problems with the operation of the "Fast and Secure Trade program" which provides for advance notice of goods and faster crossing at certain crossing points.

- In order to avoid congestion at the border, some carriers have changed their schedules so as to arrive at crossing points at off-peak times, this switch from their preferred times implies a loss of efficiency. Other firms send their vehicles out well in advance in order to be prepared for any eventuality. The vehicles sometimes have to wait while the manifests needed are processed, which also leads to environmental inefficiencies as frequently engines are left idling while the vehicles are at a stand. Conversely, manifests can be sent out well in advance, even before the vehicle is loaded, but the risk is that the cargo details will not be exactly as on the document. The driver may be stopped and runs the risk of a fine for papers not in conformance with the load carried.

In conclusion, even if carriers can adapt to this different environment and companies can rationalise their production to allow for these new constraints, the behaviours illustrated in the points above signal a return to the situation prior to the free trade agreement between Canada and the United States. This potentially nullifies the benefits of specialisation that occurred in the Canadian economy with the elimination of customs tariffs between Canada and the United States under their free trade agreement.

As a measure of the negative implications, it could become much less attractive to buy Canadian products and to locate companies serving the North American market in Canada, according to the study by the Conference Board of Canada.

In seeking to diversify transport in this way, Reynaud points out that extending intermodality to inland and seaborne modes clearly increases the number of alternative approaches and routes: the risk being primarily at unavoidable points of passage. Extending intermodality would require a minimum number of agreements on standards for both material and information. It would also require the development of transhipment points. In this sense, a global transport network can only be an intermodal network in which all modes are on an equal footing, with no real hierarchy in its organisation.

According to Reynaud, the credibility of this vision is stronger for the fact that the terminal haul itself can no longer be overlooked in the integration of the transport chain and is becoming increasingly important as long-distance transport improves. On this point, it should be noted that the congestion of inland transport infrastructure takes on significant importance. Flow consolidation, container repositioning, customs transit, sensitive areas and other aspects relating to the need to ensure the smooth flow of trade are all points that can be mentioned in this regard. This overall problem was addressed in studies for the Ministerial Forum session in Sofia in May 2007. Port congestion in particular was discussed and in its input for the 2009 Forum, Australia has submitted a report entitled "Review of Port Planning" which, among other issues, addresses rail services to ports in the Victoria region. The Australian paper (cf. Box 8) shows that setting meaningful modal share targets for rail from ports is a difficult exercise as soon as it comes to implementing practical measures.

Box 8. **Planning port rail services in the Victoria Region of Australia**

In July 2007, the Australian Ministry of Finance requested the Essential Services Commission to undertake a review of the impact of port planning on competition between port operators in the Victoria region. The Commission was asked to assess whether the market structure for port services had an impact on competition and the efficiency of services, particularly as concerns the Government target for rail transport: i.e. a 30 per cent share of port freight by 2010.

Focusing on this aspect of the report, it can be noted that port operators say that the target is not necessarily compatible with the supply chain efficiency objective, but they agreed to it in principle. Currently, rail's share of the freight market is 15-19 per cent.

One of the preliminary conclusions of the report is that achieving the target of 30 per cent will require a very large share of containerised freight to and from Melbourne's industrial areas to be carried by rail. This is because the share of rail mode for destinations or origins in non-metropolitan areas is already substantial (from 40 to 90 per cent, depending on distance). It follows that increasing the market share of rail freight in port traffic overall would require this mode of transport to play a very major role in the Greater Melbourne area. Rail shuttles would therefore be indispensable, even though some rail operators are of the view that problems including costly port transhipment and track congestion will have to be overcome in order to make shuttles competitive. Having a combination of two different rail gauges on the network in the Victoria region is an added constraint.

Furthermore, because of the limited availability of train paths on rail passenger lines and the need for all trains operating on the same track to have similar operating characteristics, it would be practically impossible to free the required rail capacity without further investment in rail infrastructure. All of the above could be envisaged only if there were a comprehensive plan for the development of rail transport,

both passenger and freight, in the region.
More outer urban intermodal freight terminals operating as distribution hubs are also a precondition for increasing rail freight's share of the market. Vertical integration of terminal ownership and terminal and rail shuttle operation may also help their development. However, competition and market power issues mean that there should be "light handed" access regimes for intermodal terminals.

At present, it costs much more to unload containers off a ship and onto a rail wagon than onto a road vehicle. This is a direct result of current terminal configuration and adequate investment and planning will be needed to resolve this issue. The Commission recommended neither the introduction of subsidies to cover the cost differential between rail and road modes, nor cross-subsidisation of one mode by the other. Nevertheless, this shows that achieving the target of a 30 per cent modal share for rail transport could require economically inefficient arrangements to be put in place.

The Commission concluded that it would be more advisable to wait and assess the outcome of current investment plans to see what modal shift could reasonably be achieved rather than prescribe targets that were not really economically meaningful.

To Reynaud's analysis, one might add that the consideration of measures capable of making freight transport "sustainable" is implicit in the course of developing inland alternatives. Some of the conclusions of the 2008 Forum, which focused specifically on climate change, warrant mention in this regard. A potential improvement in the energy efficiency of freight transport can be achieved by rationalising firms' activities, innovations in technology, training drivers in eco-driving techniques, electronic per-kilometre charges, coherent infrastructure usage charges for all modes, greater intermodality, etc., all of which will require an innovative policy approach rather than a radical shake-up in the options implemented. Even then, it is by no means certain that we will be able to curb greenhouse gas emissions from the transport sector. Opinion is virtually unanimous on this issue. In fact in its contribution to the 2009 Forum, the Netherlands points out that if the liberalisation of world trade intensifies it will put a heavy strain on the environment in terms of energy demand and pollution. While that would still not necessarily lead to environmental disaster, it would necessitate the adoption, of very strict environmental legislation, among other things (cf. Box 9 on the conclusions of the WorldScan general equilibrium model).

Box 9. **Insights from the Netherlands' WorldScan general equilibrium model**

Using the WorldScan general equilibrium model, the Netherlands Central Planning Bureau simulated the impact of globalisation on transport and the environment by constructing four scenarios. These scenarios make different assumptions on the extent of economic globalisation, technical progress and labour migration as well as energy policies. WorldScan looks at long-term economic growth and trade trends and at the degree of specialisation in given economies. It quantifies growth in energy demand and global emissions from 1995 to 2050. In the "Schumpeterien" scenario, as it is known, the faster pace of technical progress, intensive internationalisation of the world economy and its strengthened competitiveness lead to high economic growth for all regions of the world. Without accompanying environmental legislation designed to promote energy-efficient technologies, global emissions may even quadruple. In contrast, in what is referred to as the "Ecological" scenario -- where the non-material aspects of life are seen as more important and environmental protection is a social value -- a mix of local production and efficient technology, restrictive environmental legislation and moderate economic growth result in only a slight increase in global emissions.

One can consider, in concluding, that climate change policy will be an important part of globalisation but the impact of climate policies is likely to be relatively small for maritime shipping and aviation (in comparison to the impact on road transport) because of the relatively small part fuel consumption

represents in overall maritime logisitics costs and the likely small cost of emissions permit costs for aviation relative to the cost of landing rights at congested gateway airports.

On the sustainable development issue, the fact remains that there is also great potential for reducing greenhouse gas emissions in other sectors of the economy than transport, and sometimes at less cost. Logically, this should prompt policy-makers to consider how the priorities should be ranked, not just in the transport sector but also across all sectors.

4. CONCLUSIONS

Globalisation is related to the salary disparities between economic regions. These disparities are here to stay for another decade and more, although the process of globalisation will inherently level them out. What will continue to make the difference between regions and economic areas will be their capacity to innovate.

Globalisation is furthered by efficiency gains in transport, in the movement of people and in the circulation of information flows. These efficiency gains can be attributed primarily to a decline in the generalised costs of freight transport. This decline in costs owes more to time savings and reliability gains in freight haulage than to any fall in the relative price of transport. Actually, the studies brought together for the 2009 Forum show that, over a long period, it is difficult to establish with any certainty whether the price of freight transport actually has declined. In contrast, efficiency gains (in transport time and reliability and in the quality and range of services, information flows, ancillary services, etc.) are undeniable.

Globalisation relies essentially on maritime transport and, at the end of the day, the Hummels report stresses that with the unit value of the goods transported increasing, in most cases, the cost of maritime transport has very little impact on the price of the end good delivered to consumers.

In addition, maritime transport is not the transport mode most sensitive to energy costs: it uses only 5 per cent of the oil consumed by the transport sector as a whole but carries the majority of world trade (measured in tonnes). In contrast, air transport -- which is much more sensitive to variations in energy price, which is the main cost factor for this mode -- reported declines in activity very shortly after prices for petroleum products began to rise in 2004.

This means that for a long time to come – the one thing that all experts are agreed on is that demand for petroleum products will in all likelihood exceed supply capacity -- maritime transport and, therefore, globalisation will not be jeopardised in any fundamental way by the rise in the price of petroleum products.

Given the foregoing, the "maritime transport / energy price" equation will not, in all likelihood, radically change the globalisation situation in the foreseeable future. Moreover, some experts think that globalisation "Is actually only just beginning".

It is nonetheless true that some regions, such as North America or the European Union, which are closely integrated in economic terms, are areas of the world where internal trade is highly developed and where the inland transport problem is as acute as ever before.

This may prompt the comment that the "battle" of globalisation is to some extent being fought on land. With challenges such as the threat of terrorism on the rise, this simply underscores the importance of having viable alternatives. Does that mean that we should subscribe to the approach described in the Reynaud report, which outlines plans for inland alternatives to the main ocean trade flows: e.g. the Trans-Siberian route? Such alternatives could firmly root the economic efficiency of transport in time savings for certain market areas. This could lead, say, to the redefinition of the gateways to Europe.

The consideration of measures capable of making freight transport "sustainable" is implicit in all of the research papers that have been assembled. On this point, some of the conclusions of the 2008 Forum, devoted specifically to the challenge of climate change come to mind, among them that the consolidation of the energy-efficiency of freight transport is to be achieved through a range of policy levers, which will require an innovative policy approach more than a fundamental shake-up of the options implemented. Even then, it is not certain that we will manage to curb greenhouse gas emissions from transport. Market opening, keener competition and trade development are vectors of stronger economic growth, hence, of potentially higher levels of greenhouse gas emissions.

On the issue of sustainable development, there is considerable potential for reducing greenhouse gas emissions. It is important, therefore, to put these policy levers into action alongside any and all measures aimed at making international transport more efficient.

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