Irish Short Sea Shipping: Inter-European Trade Corridors

Final Report

July 2004

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Executive Summary

1. This study by Logistecon Economic and Management Consultants, in conjunction with the Centre for Maritime Economics and Logistics at Erasmus University in Rotterdam and Ecorys Research and Consulting in the Netherlands, on behalf of the Irish Maritime Development Office, is in response to a number of factors likely to impact the short sea shipping market to and from Ireland, most notably:

   • a growing realisation of the critical importance of maritime freight transport linkages to the Irish economy;

   • the accession which took place on 1st May 2004 of new EU member States, particularly those in the Baltic region, and the resulting potential demand for new shipping routes between Ireland and Northern Europe;

   • the trend towards more and increased road user charges in a number of EU countries and the resulting interest in modal shift to short sea shipping.

2. As an island nation, it is clear that the competitiveness of transport linkages with the rest of the world, and in particular the rest of the EU, will have a considerable bearing on the overall competitive performance of the Irish economy. A considerable proportion of Ireland's trade follows routes that involve transport to and from a fairly small number of ports in the EU that have shipping services with Ireland and transport overland to and from a wide range of destinations in Europe. This structure has been determined by a complex range of factors and changes in these determinants may affect the future structure of trade flows. This provides the rationale for this study to examine whether there are opportunities to develop new sea routes with the northern countries of Europe.

3. The analysis is focussed on trade with countries in Northern Europe and on unitised transport. The following countries comprised the study area for this report:

• Belgium	• Netherlands	• Denmark
• Sweden	• Finland	• Estonia
• Latvia	• Lithuania	• Poland
• Czech Republic	• Slovakia	• Germany

4. In addition to compiling a dataset that describes developments in Ireland's trade flows and the routes taken, the work contains three distinct pieces of analysis that address aspects of the topic from distinct perspectives. These are, in turn:

- The potential impact of the structure of trade and new trade partners on freight flows;

- The impact of the existing freight handling infrastructure in Europe on this structure; and

- The impact of the changes in relative costs on the decisions freight forwarders in choosing routes and modes for the transport of Irish inward and outward freight.

5. The data on Ireland's trade with the study area show that both the value and weight of Ireland's trade flows with this area have grown rapidly. However, there has been a considerable lightening of this trade - in the period 1993 to 2002 the number of tonnes per € million of value has fallen by over 73% for exports and by over 60% for imports. In other words the value/volume density of goods being shipped is increasing (higher value, lower volume consignments).

6. Analysis of historical data and economic forecasts for the individual countries in the study area, and allowance for both a slowing in the rate of lightening in Irish trade with the study area and ongoing growth in trade resulting from EU accession suggests that trade volumes will grow, although not substantially. Furthermore, there is likely to be a widening imbalance between import and export volumes. The increasing divergence between the weight of exports and imports is important in determining the structure of freight flows and the routes used since it means that there is an in-built incentive for freight forwarders to structure routes for Irish exports to be compatible with the routes being determined by imports to Ireland.

7. Trade with the accession countries is a very small part of Ireland's overall trade flows with the region. As a result, the eastern expansion of the EU, while providing an impetus to growth and integration will lead to growth from a very low base. Thus, the effect in the short to medium term of overall flows will be limited.

8. The analysis of trade data and projections indicates a number of possibilities but does not lead to unambiguous conclusions regarding the opportunities that will arise for new short sea routes to emerge. It can be concluded, under certain assumptions, that there will be growth in the volume of goods being transported and that these could give rise to new routes. However, despite the importance of trade to the Irish economy and the projected growth of trade with the EU and the new members of the EU in particular, it cannot be concluded that the accession of these new states, while contributing to the gradual move eastwards of the centre of

economic gravity in Europe, will impact on freight flows from Ireland to Europe in a major or predicable manner.

9. A dataset of Irish trade flows and the Irish maritime sector shows that Ireland has a somewhat unusual structure of freight handling with two ports – Rotterdam and Antwerp – dominating in LoLo, and the UK acting as a landbridge for a large proportion of RoRo freight destined for continental Europe. This dataset was compiled from published and unpublished sources, a survey of the ports, and consultations with industry operators. The structure of trade flows is illustrated via a series of maps that illustrate Irish LoLo trade flows with the study area disaggregated by import/export, origin port, intermediate port and final destination. A similar analysis using Irish and UK data was conducted to illustrate RoRo movements between Ireland and Continental Europe using the UK landbridge.

10. It is clear from the structure that exists that analysis on the basis of origin/destination would be inadequate to explain this structure and therefore the likely impact of changes in the determining factors. The importance of logistics and supply chain management, trends in European transport and the factors which dictate the structure of European logistics networks must be considered.

11. The determinants of the structure of maritime freight routes are many and heterogeneous but can be grouped under four headings: trade volumes, transport chain issues, supply chain issues and market considerations – such as the roles of inertia, sunk costs and risk avoidance. These factors impact on operators' decisions regarding the potential for developing new short sea shipping services between Ireland and the Baltic region.

12. Consultations with industry operators indicate that the following issues are particularly important:

   • Transit traffic mixing with point to point traffic: Intercontinental freight traffic increasingly enters and exits Europe only via selected gateway ports and corridors, with feeder services taking such freight on the first / final leg of its journey;

   • Large logistics hubs 'pulling' traffic in certain directions: The large third party logistics service providers (3PLs) are increasing the volume of traffic which they handle in Europe. There is an increasing tendency for these 3PLs to route freight traffic via key logistics hubs as individual shipments are often consolidated with other shipments in order to benefit from scale economies in

transportation and many 3PLs also provide other value-added logistics (VAL) services at their hubs;

• Differences within and between inbound and outbound freight rates as a result of trade imbalances;

• Factors surrounding port and shipping company choice which may mean that routing is not necessarily via the most direct or obvious shipping service.

13. The EU has been cognisant of the fact that the structure of freight flows in Europe is not necessarily that which maximises welfare overall, although it may well be the most efficient from the point of view of freight transport costs. As a result, policy proposals have been developed and relevant EU policies and potential grant-aids for short sea shipping are reviewed. In particular both the Marco Polo programme and the Motorways of the Seas programme (which comes under the Trans European Networks umbrella) are discussed. In the policy area, the role of toll systems in Europe (extant and planned) is important, in particular the proposed German system (LKW-Maut), and these systems are reviewed.

14. A total of 19 destinations for Irish trade in North-western Europe across 28 different LoLo routes are defined. Sea and road costs on these routes are identified. The impact of new tolls on the costs of these routes is then calculated. There is a considerable range in the potential impact of road tolls on total transport costs. For many of the most important destinations the impact would be negligible. Even in the case of some quite easterly destinations such as Vilnius and Warsaw there is a less than 4% increase, provided the route chosen utilises ports in the Baltic region.

15. The greatest total cost increase (>9%) due to the introduction of tolls is on routes to locations such as Munich, Prague and Krakow where road costs comprise more than 60% of total transport costs. In summary, with the possible exception of Warsaw where Gdynia offers a competitive alternative, the costs data back up the current structure of trade routes from Ireland which are concentrated on transhipment through Rotterdam and Antwerp and overland transport to central European destinations.

16. A similar analysis is conducted for RoRo, taking Dortmund as a sample destination and using 5 different routes (3 over the UK landbridge and 2 direct to Continental Europe) from Ireland to this destination. The 3 routes over the UK landbridge had the highest total % cost increase as a result of new tolls (up to a 12% cost increase).

17. The impact of cost increases, as a result of the introduction of new tolls, on modal demand is calculated using appropriate demand elasticities. The analyses suggest that, in the case of LoLo, with increased road tolls greater use could be made of transhipment ports further East than is the case at present where transhipment through Antwerp and Rotterdam dominates. Specifically, this could result in some limited increase in traffic through Hamburg port and there may be some potential for a new route to Gdynia and / or Riga to develop. In the case of RoRo and in the event of new tolls in the UK (which would have a significant impact on Ireland - Continental Europe transport costs for traffic which uses the UK landbridge), the analyses suggest a direct route between Ireland and Zeebrugge may be sustainable as the results indicate a relative and significant cost competitiveness gain for such a route. However, for such a new route to develop there are obstacles to be addressed, perhaps most important of which is the inertia that is in the system due to the costs of changing the extant structures that have evolved.

18. The conclusions of this work indicate that there is an opportunity for new short sea routes but that these might not emerge in the absence of incentives. Three general areas in which policy can operate are identified: promoting change through providing information and research on new opportunities as they emerge, direct promotion of new routes through subsidies, and ensuring that Irish ports are able to handle any new traffic.

19. Two recommendations for further work are detailed: (i) to examine the potential impact on Irish trade of road pricing in the UK, and (ii) a re-examination of the type of statistical data which is currently collected on maritime freight flows.

1. Overview of the Study

1.1 Context of the Study

The importance of international trade to the Irish economy, both in terms of the integration of the economy with the global economy and the primary role of the traded sector in promoting growth, has been widely discussed over the past decade. The openness of the Irish economy is remarkable. It is estimated that in 2003, the value of exports from Ireland reached €112.7 billion[1]. This is equivalent to just under 82% of the value added output of the economy i.e. GDP. On the import side, the estimates indicate a value of €87.8 billion or 63.5% of GDP. Thus, the value of Ireland's international trade in 2003 was 145% the value of GDP for the year[2]. The importance of this trade goes even deeper than these figures suggest since the sectors most heavily engaged in trade have also been identified as providing the main stimulus to Irish economic growth over the past decade. Value added in these sectors is much higher than in non-traded industries, capital intensity and the use of knowledge tends to be higher, and the secondary economic impact of activity on the economy widens the importance of these sectors to many non-traded sectors.

As an island nation, it is clear that the competitiveness of transport linkages with the rest of the world, and in particular the rest of the EU, will have a considerable bearing on the overall competitive performance of the economy. Although the economics of transport mean that there is a greater propensity for higher value products to be transported by air, over 99% of Ireland's trade when measured by weight is transported by sea. The value of this has been growing rapidly over the past decade but there are a number of issues that affect the physical impact of this trade in terms of the handling of freight. Rapid structural change in the economy, and particularly of the sectoral structure of traded goods, means that the growth in the physical properties of trade has been much lower than the growth in value. The growth of internationally traded services is a clear indication of this development. In addition, differences in the rates of change between different markets means that there are changes in the structure of trade flows when analysed in terms of physical movements of the goods that are transported. Furthermore, the increasing emphasis on efficient supply chains affects the modes and timings of freight flows.

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[1] ESRI (2003) *Quarterly Economic Review*, December

[2] When the value of foreign factor flows – principally profit repatriation by multinationals operating in the economy – is excluded from the calculation, the value of exports amounted to 99.6% of GNP while imports amounted to 77.5% of GNP. This gives an aggregate trade total of 177% of GNP and a positive trade balance of just over 22% of GNP.

Changes in the structure of freight flows to and from Ireland are also driven by international policy developments, particularly in relation to the EU. Two developments are particularly important in terms of the focus of this study. These are the accession of 10 countries to the EU on 1st May 2004 and the policy objective of the EU Commission to divert freight transport from roads to other modes. This is being operationalised through a combination of proposals to introduce or increase road charges in a number of EU countries while promoting the viability of alternatives such as new shipping routes.

1.2 Objectives of the Research

It is known that a considerable proportion of Ireland's trade follows routes that involve transport to and from a fairly small number of ports in the EU that have shipping services with Ireland and transport overland to and from a wide range of destinations in Europe. This structure is primarily driven by commercial factors but the issues are complex with the physical imbalance of import and export volumes having an impact. However, there have been changes in many of the determinants of this structure that may affect the future structure of trade flows. This provides the rationale for this study to examine whether there are opportunities to develop new sea routes with the northern countries of Europe.

It is clearly relevant to ask – given the changes that are occurring in the properties of the freight, the boundaries of the EU, the costs associated with transport on existing modes and the overall growth – whether there are opportunities emerging for the development of new short sea shipping routes. Identifying if such opportunities exist is the primary aim of this study. If the answer is positive then there may be implications for the infrastructure of Irish ports and shipping lines.

The main objectives of the study, therefore, are to:

- Provide an overview of Irish trade flows;

- Provide projections of trade growth in the short to medium term;

- Provide a detailed mapping of freight flows to and from Ireland;

- Examine the determinants of this structure of freight flows as distinct from the underlying determinants of trade;

- Identify the cost determinants of these flows and examine how these might change as a result of imminent developments;

- Examine the potential impact of these changes on the future structure of freight flows;

- Identify opportunities for the development of new short sea shipping routes;

- Identify if these changes have resources implications in terms of infrastructure;

- Comment on the funding opportunities that might be available to meet these requirements;

- Compile recommendations in the light of the report's findings.

The main focus of the study is on unitised freight traffic (LoLo and RoRo). In the case of bulk shipping, the road transport leg is usually minimised in favour of both other land modes (rail and inland waterway) and having a greater proportion of the total journey by sea; as a result this trade would not be open to being affected by changes in land-based cost factors and including it in the analysis would possibly distort the picture.

1.3   Report Structure

The study in this report is focussed on 12 economies in the North European and Baltic area. All are now members of the EU. In addition to drawing conclusions and providing recommendations, the work in this report can be divided into three main elements. The first is to provide a mapping of the structure of freight flows to and from Ireland, to provide projections of changes in Ireland's trade with other countries in the study area, and to examine the determinants of this structure. The second is to examine the cost variables in relation to this structure and to estimate the potential for imminent developments to affect this structure. The third is to examine the nature of the logistics sector in Europe and to provide indications of the potential response of this sector to changes in the policy and economic environment.

The first task is addressed in Sections 2 and 3. Section 2 examines the growth of Ireland's international trade with the study area and provides projections of growth in this trade over the next few years based on a combination of economic developments and trends in the industrial structure of Ireland's economy. This provides an estimate of the overall growth of the freight to be transported and the potential impact of the accession of new states in the study area on trade flows. The work in Section 2 is based on data relating to Ireland and its trading partners. In Section 3, the focus is on the routes by which the freight is transported. The main task is to provide as detailed a mapping as is possible of these routes and to examine the impact of these routes in terms of the Irish port sector and the shipping industry. In addition to the published statistics – which are considered to be deficient in terms of providing the necessary data – two main sources are accessed. The first source is provided by a questionnaire

and follow-up discussions with Irish ports and freight forwarders in relation to the routes followed by freight travelling between Irish ports and other countries. The second relates mainly to the use of the UK, principally by RoRo freight, as a landbridge for subsequent transport to the continent and is provided by unpublished data collected for the purposes of processing VAT returns.

Section 4 is concerned with a more detailed examination of the determinants of the structure of freight routes. The determinants of the routes taken are complex, but a key factor is the decision-making process and structure of European logistics providers. The analysis is based on consultations with relevant operators.

Clearly cost factors related to transport are important in determining the outcome of these decisions. Section 5 analyses costs in terms of the existing structure and the impact of policy decisions on future costs. The potential for changes in the cost environment to affect freight flows is assessed.

Section 6 draws the material together to provide an assessment of the potential for new shipping routes to be developed. This is based on an assessment of the outcomes of the three main elements of the analysis in the preceding sections:

- the impact of overall growth, EU expansion and observed trends on freight flows;

- the impact of changed cost conditions on freight flows; and

- the impact of decisions and existing structures in European logistics on freight flows.

Finally, Section 7 provides a summary of the main findings of the study and the recommendations that emerge.

2.   Analysis of Ireland's Trade with the Study Region

2.1   International Trade and the Irish Economy

The sustained rapid growth of the Irish economy during the past decade has been widely discussed. Some indication of this growth and the extent to which Ireland's experience has diverged from the EU average can be seen from the data in Figure 2.1. This compares GDP growth rates for EU countries with GNP growth in Ireland[3]. This chart also contains a growth estimate for 2003[4]. While the cyclical downturn of recent years means that the rates have almost converged, existing projections suggest that the rate of growth in Ireland will rise to about 4.5% per annum over the next number of years, comfortably ahead of the EU trend of 2.5 to 3%[5].

**Figure 2.1: Real Economic Growth in Ireland and the EU
1990-2003 (% change per annum)**
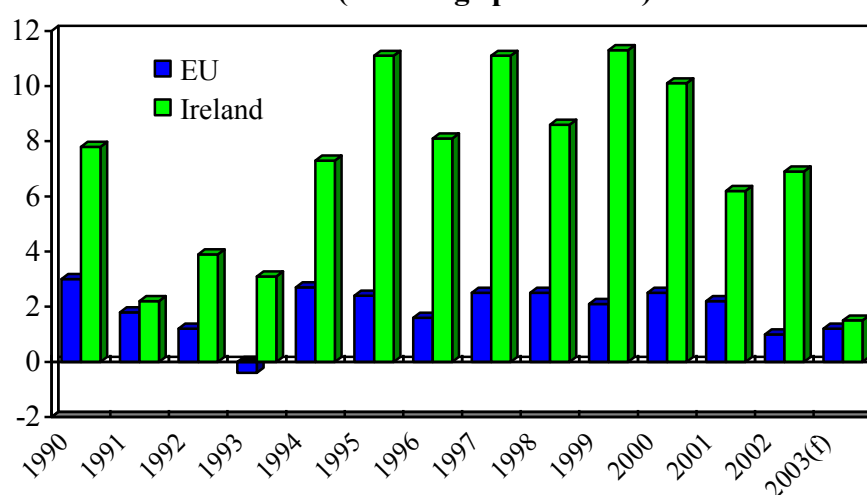
Sources: CSO *National Income and Expenditure* (various years) and OECD *Economic Outlook*

Not all sectors have experienced similar rates of growth. Agricultural output as a percentage of GDP continues to decline while manufacturing output grew strongly during the 1990s. There was a mixed picture among service sectors with the older

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[3] GNP growth in Ireland is a better indication of the increasing wealth of the country and was below the rate of growth of GDP in Ireland in most years in this period.

[4] The 2003 estimate is based on Department of Finance (2003) *Economic Review and Outlook.*

[5] ESRI (2003) *Medium Term Review 2003-2010.* Dublin: ESRI.

sectors growing less slowly than the economy as a whole while some service sectors performed strongly. The most dramatic economic growth in recent years has occurred in the foreign traded sector of the economy. This has been sustained over a considerable period, with the result that it is generally accepted that Irish exports and the sectors that have contributed to export growth have been responsible for stimulating the remarkable performance of recent years. This is shown in Figure 2.2 which shows that throughout the boom period, export growth exceeded output growth in every year.

Figure 2.2: Ireland's Real GDP and Export Growth 1990-2002 (% per annum)
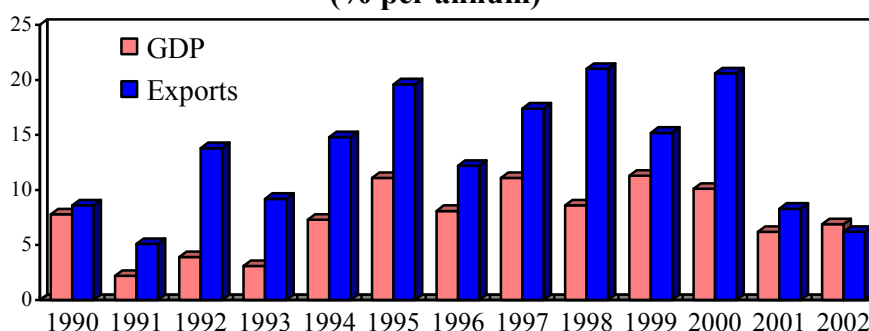
Source: CSO *National Income and Expenditure*

The rate at which Ireland's international trade grew in this period is remarkable. Exports from Ireland almost doubled in the period 1988 to 1994, and then repeated this feat in the 5 years to 1999. In the period 1995 to 2002 exports recorded an annual average growth rate of 14.3%. In this period imports also grew rapidly reflecting the fact that a considerable proportion of Ireland's imports are used for processing and re-exporting. The growth of Irish trade also greatly exceeded the growth of the economies in the main trading partners in almost all cases in this period, often by a considerable margin. This indicates that Ireland was increasingly open and subject to international competitive pressures. However, this growth has not been evenly spread across all trading sectors and there have been changes in both the composition of trade and in the relative importance of trading partners. The UK had accounted for 31.6% of trade in 1993, but declined to 28.4% in 2002 although a long term trend towards the EU region (excluding the UK) has stabilised partly as a result of the relative strength of the UK economy. Agricultural exports and products from traditional industries remain concentrated in the UK market. Exports to North America had grown rapidly in the late 1990s but have slowed in recent years due to the slowdown in the North American economy. These trends are shown in Figure 2.3a for exports and in Figure 2.3b for imports.

Figure 2.3a: Destination of Ireland's Exports (% of total)
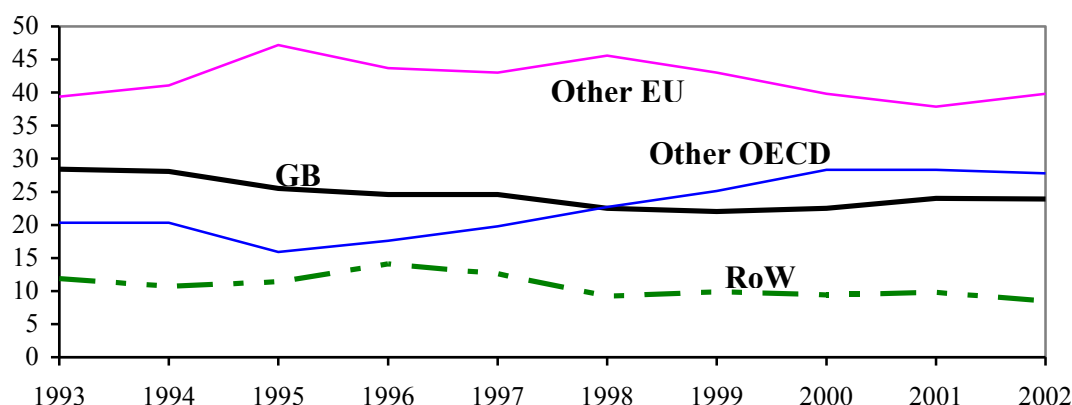
Source: CSO *Trade Statistics.*

Figure 2.3b: Origin of Ireland's Imports (% of total)
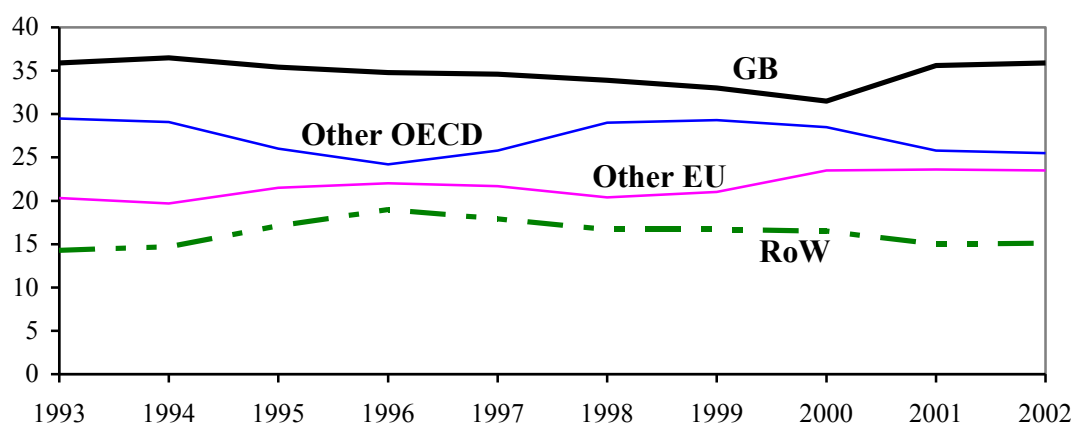
Source: CSO *Trade Statistics*

These charts also suggest that Ireland's trade is not symmetrical. The UK accounts for a much greater proportion of imports – by value – than it does for exports while the reverse is true for the rest of the EU. Furthermore a long term trend away from the UK market for exports is not reflected in the import data.

Ireland's trade balances with these areas are shown in Table 2.1. In the period 1993 to 2002, Ireland's trade with the UK grew, in value terms, by just under 240%. Growth with the UK was just over 200%, compared to about 270% growth with other developed OECD economies. These are remarkable rates of growth for a period of relatively low inflation.

Table 2.1: Ireland's Trade and Trade Balances by Area (€ million)

	Imports	Exports	Trade	Balance as

				Balance	% of total
UK	1993	6,787	7,150	363	2.6
	1998	13,467	12,921	-546	-2.1
	2002	19,860	22,431	2,571	6.1
Other EU	1993	3,840	9,918	6,078	44.2
	1998	8,111	26,121	18,010	52.6
	2002	12,981	37,287	24,306	48.4
Other OECD	1993	5,570	5,104	-466	-4.4
	1998	11,520	13,003	1,483	6.0
	2002	14,112	26,063	11,951	29.7
R of W	1993	2,703	3,007	304	5.3
	1998	6,617	5,277	-1,340	-11.3
	2002	8,350	7,943	-407	-2.5

Source: Calculated from CSO *Trade Statistics*

However, it would be wrong to translate these data directly into conclusions regarding the flows of freight. The problem is that while these data strongly suggest the pattern of trade and trends in this pattern, there are differences in the structure of this trade according to the types of goods being transported. The growth in the value of trade after allowance for inflation has been much greater than the physical volume and weight of goods carried, leaving aside the increasing orientation of the economy and international trade towards services. This has not necessarily impacted evenly on trade when disaggregated by region.

These developments have had a major impact on the structure of Ireland's economy. Ireland's exports shifted away from traditional sectors based on agriculture and manufacturing towards new manufacturing sectors and chemicals. Exports of Food, Beverages and Tobacco, which accounted for 25.1% of the total in 1985, had declined to 20.8% in 1994 and to 7.1% by 2002. Meanwhile, exports of Chemicals rose from 29.6% in 1985 to 42% of the total in 2002, while a machinery category that includes office machinery and computers rose from 14.4% of the total in 1985 to 35% in 2002. The impact is that the modes and requirements of Ireland's trade have also changed as discussed later in this report.

This change in the composition of trade is reflected also in changes in employment. The period has seen not only rapid growth in employment but also considerable

change in the sectors of employment. This has reflected the change in output towards modern sectors and the strong performance of manufacturing but there has also been a very rapid growth in employment in service sectors.

Not surprisingly, these trends are reflected in changes in the relative importance of various economic sectors as evidenced by divergences in sectoral growth rates. Figure 2.4 shows output growth of the various broad sectors of the economy in each 5-year period since 1971. In effect, the underlying numbers can be interpreted as the contribution of each sector of the economy to Ireland's GDP growth in each period.

Figure 2.4: Annual Growth in GDP by Sector
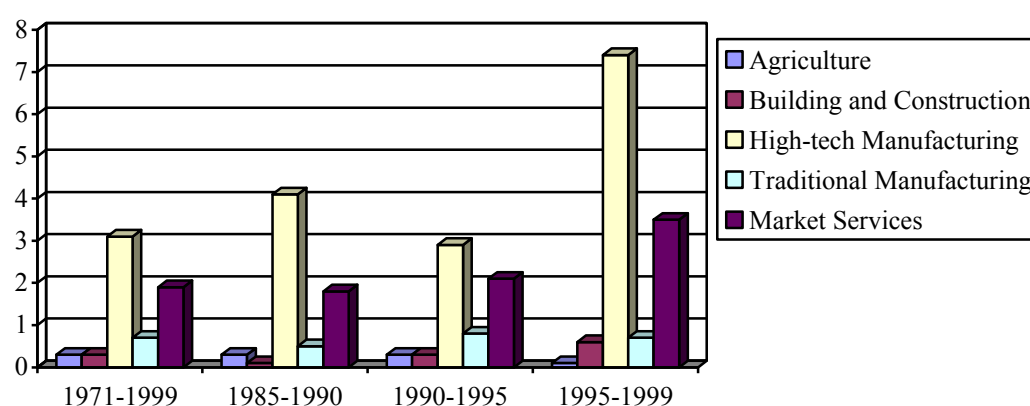
Source: Slevin (2002)[6]

A number of very important findings emerge from this analysis. The most important is that the high-tech manufacturing sector has been the driving force behind Irish economic growth for a prolonged period. This is the case in almost every 5-year period between 1971 and 1999. In addition, this trend became much more pronounced during the 1990s. A second important point is that services became an increasingly important source of economic growth in the 1990s. This coincided with a rapid increase in international trade in services. However, the performance of traditional manufacturing sectors in this period was much weaker.

The dual nature of the Irish economy has been much commented on with a leading sector that is mostly foreign owned, high productivity and highly export oriented, and a more traditional sector that is more dependent on the Irish economy. For example, in 1999, 93% of output from foreign owned manufacturing firms was exported compared to 47% of output from Irish owned firms. Although both sectors grew

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[6] Slevin, G (2002) 'Is there a New Economy in Ireland?' Central Bank of Ireland Technical Paper.

during the 1990s, some important differences remain. The most important are the sectoral concentrations of the two groups of firms and the higher export concentration of the output of foreign firms.

This discussion shows that the industrial structure of the Irish economy has changed considerably in a relatively short period and that internationally trading sectors have been the main drivers of this change. Increased productivity has been the key issue in this regard with foreign-owned, high-tech industries taking a leading role. While a considerable portion of the increased employment in the economy has been in service sectors, these sectors rely to a very great extent on the performance of the export-oriented manufacturing sectors. These firms rely on efficient supply chains for competitiveness and the availability of cost competitive transport to support their supply chains is a determining factor influencing the location of their manufacturing operations. This underlines the importance of ensuring that there are efficient external supply chains servicing the Irish economy.

2.2   Irish Trade Flows by Value

This section of the report provides details of trade by value in the study area. Changes have also occurred in the patterns and content of Irish trade, partly as a result of the changes in the Irish economy, but also because of changes in other economies, in technology and regulations, and in cost conditions. One impact of this has been that the relationship between the value of trade flows and the volume of freight is changing. This is explored in the following sections of the report.

A total of 12 economies are deemed to be relevant to the analysis. While the use of the UK in providing a landbridge to final destinations means that cost conditions and transport infrastructure and policies in the UK are clearly important, the UK does not form part of the core study area. The Terms of Reference identify the Baltic region, with specific reference to the accession states, as the key trade destination and origin economies that could provide opportunities for the diversion of freight to short sea routes. As a result, this section of the report concentrates on existing and prospective trade flows between Ireland and the states in this area.

This list is derived on the basis of economies where there may potentially be opportunities for the diversion of part of the trade from land to sea. Although the UK is an important trading partner it is not included since growth in trade with the UK

will not directly affect the development of new shipping routes to the North European area. The countries included in our study ('the <u>study area</u>') are:

Belgium[7]	Netherlands	Denmark
Sweden	Finland	Estonia
Latvia	Lithuania	Poland
Czech Republic	Slovakia	Germany

Note: In our report the term '<u>accession states</u>' refers to those countries in the above study area who joined the EU on 1st May 2004, while reference to '<u>existing EU member states</u>' refers to those countries in the above study area who were already EU members prior to 1st May 2004.

Although the study area is centred on the Baltic region, Norway is not included for two reasons. First, it is not part of the EU and will not be subject to EU Directives in this area. Second, and perhaps more importantly, while Ireland's trade with Norway is not inconsequential with exports of €516 and imports of €666 million in 2002, this trade is mostly composed of oil and mineral ores. The key point is that these are bulk transport products that are not transported overland except in the origin and destination countries. As a result, this trade would not be open to being affected by changes in land-based cost factors and including it in the analysis would possibly distort the picture.

Irish trade flows with these countries and recent trends are shown in Figures 2.5 and 2.6[8]. The detailed numbers are contained in Appendix 1. At this stage, the precise modes and routes of this trade are not analysed. Figure 2.5 shows the value of trade with this area in recent years. In the period 1993 to 2002, Irish imports from the area almost tripled in value growing by 193%. In this same period Ireland's exports to this region grew by almost a factor of 4 with a total rise of 294%. As a result, the trade balance moved strongly in Ireland's favour from a surplus of €3.8 billion in 1993 to a surplus of €18 billion in 2002, a rise of 368%. The outcome of this growth is that Ireland's exports to this region in 2002 were worth over 3 times as much as its imports. Thus, there is a major imbalance when measured in value with exports much greater than imports.

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[7] Data for Belgium include Luxembourg

[8] Unless stated otherwise, data in this section are taken from the CSO's *Trade Statistics*

Figure 2.5: Trade with the Study Area (1993-2002, € million)
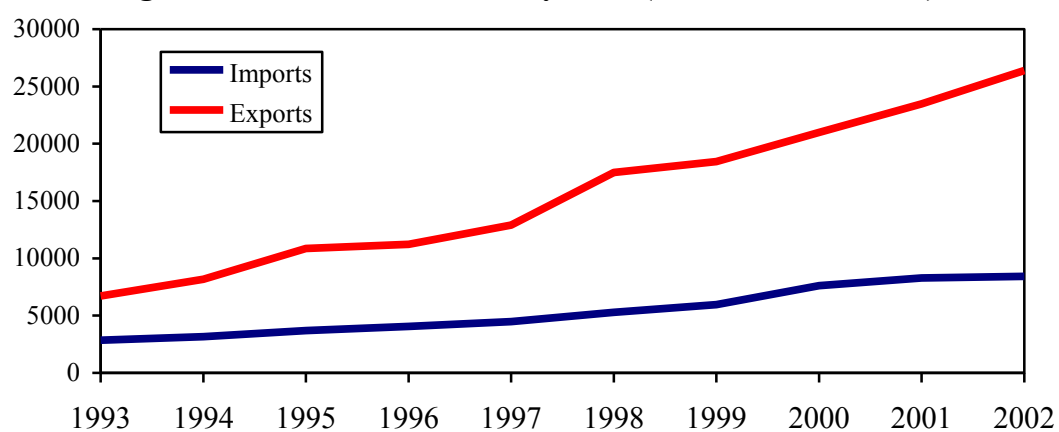
This rate of growth is quite remarkable and, although the rate slowed in later years of this period, rapid growth has been sustained. In the 4 years 1998-2002 exports to these economies grew by 50.8% while the value of imports rose by 59.2%. Even if an inflation rate of 5% per annum is assumed for this period this still implies a very rapid increase in the real value of this trade in this period. However, there is very wide variation in the growth of trade flows. Some of this is likely the result of errors in the source data but there are also some remarkable results.

Figure 2.6 shows the country by country distribution by value of Ireland's trade with this area in 2002. Together, Germany, Belgium and the Netherlands accounted for over 86% of the total with the accession countries in total amounting to less than 3% of total trade with the region.

Figure 2.6: Percentage Distribution of Trade by Value by Country (2002)
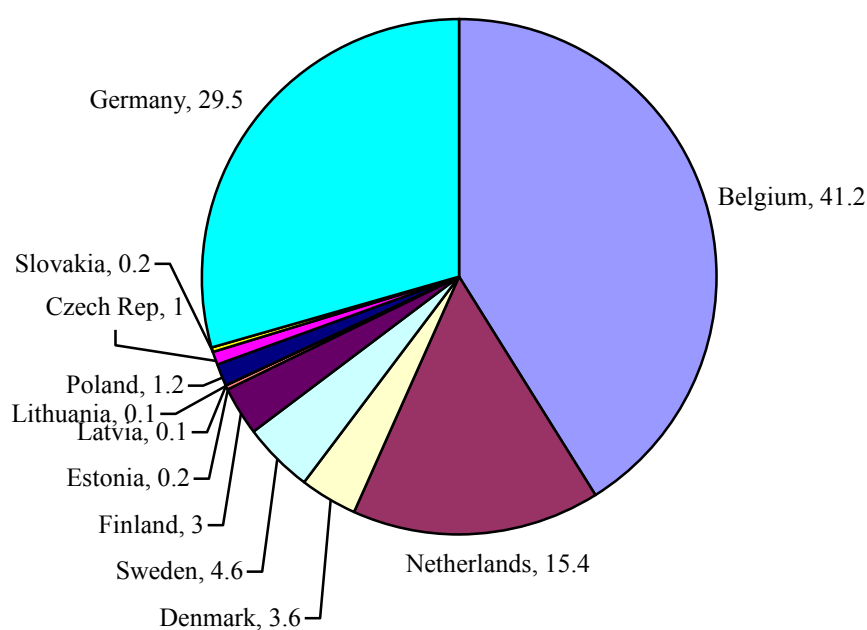
A notable feature of these data is the very rapid growth of imports from the 6 accession countries in the area, albeit from a fairly small start. This is shown in Table 2.3.

Table 2.3: Irish Trade by Value with Accession Countries in the Study Area (€million)

	2002 (€million)		% growth 1998-2002	
	Exports	Imports	Exports	Imports
Estonia	31.6	23.9	102.6	545.9
Latvia	16.0	29.1	61.6	100.7
Lithuania	17.4	29.4	89.1	434.5
Poland	282.1	126.5	15.9	75.5
Czech Rep	197.2	142.8	45.8	177.8
Slovakia	39.8	17.0	111.7	40.5
Totals	584.1	368.7	35.0	152.2

Source: CSO *Trade Statistics*

The value of total trade with the accession countries in 2002 was only 2.7% of the value of trade with the other 6 EU countries in the table. In this period, Ireland's exports to these countries grew by only 35% but imports grew by over 150%.

The very rapid growth of Ireland's exports to Belgium and the very large share of these in the total for this region is also notable. Closer examination shows that this is accounted for almost totally by exports of basic chemicals and pharmaceuticals. It is well known that these industry sectors can be greatly affected by the pricing decisions of individual firms and this is a large part of the explanation although the actual volume of these products being traded also grew very rapidly in this period. This illustrates two important issues.

First, value-based data are insufficient in identifying trends in trade due to the particular nature of the Irish economy. Second, decisions by even a fairly small number of firms with large operations in Ireland in relation to the locations of plants and the routes chosen for transport can have major implications for the structure of Irish trade flows. Thus, while later sections of this report provide indications of the likely development of these flows, the fact is that these can be quite volatile and subject to unforeseeable determinants such as the locational decisions of individual firms.

2.3   Ireland's Trade by Tonnage

This analysis of trade by value provides a background against which projections can be developed but is inadequate in terms of understanding trade flows. This requires that the physical volumes of trade are identified particularly since the changing industrial structure of the Irish economy means that while the value of trade might grow, its physical volume can fall. Figure 2.7 compares trends in the value of Ireland's trade with all countries, adjusted to remove the effects of inflation, with the weight of this trade and shows that there have been very pronounced trends in both. While the value has risen remarkably, the weight of Ireland's imports and exports has remained almost static for most of this period with a small decline in both in recent years. This implies that the value of Ireland's trade per unit of tonnage has risen very considerably.

Figure 2.7: Weight and Real Value of Ireland's International Trade (1993=100)
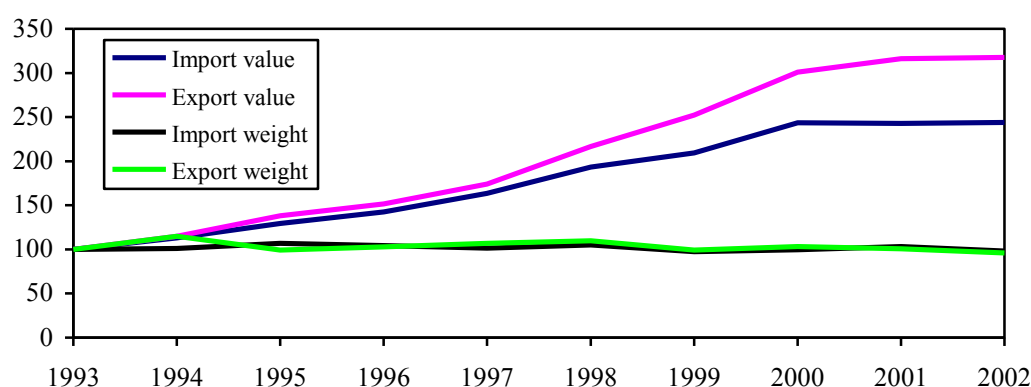
Figure 2.8 shows the distribution of trade across countries in 2002 when measured by weight. As when measured by value, it shows that three countries dominates flows in these years with Germany, Belgium and the Netherlands accounting for 74% of the total. However, the accession countries accounted for 12% of trade with this area when measured by weight compared to only 3% when measured by value. This is a direct result of the lower value content of trade with these countries and reflects the different industrial structure of their economies when compared with existing EU member states.

Figure 2.8: Percentage Distribution of Trade by Weight by Country (2002)
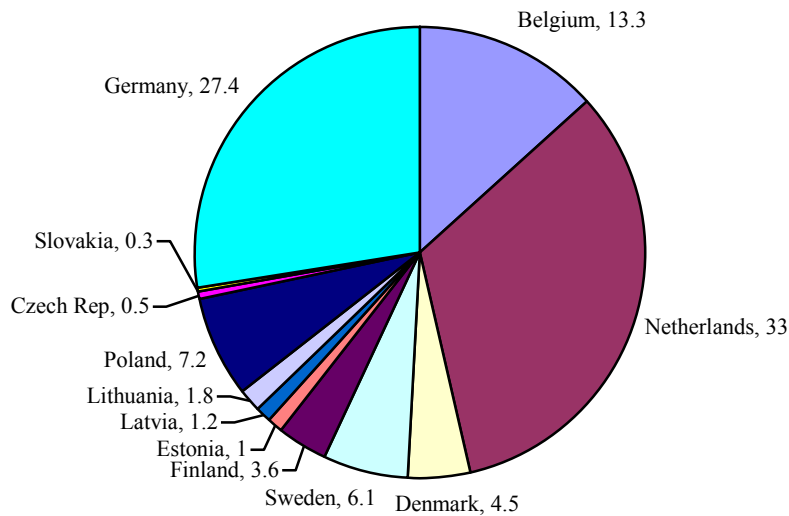
This divergence in the trends in value and weight is also pronounced when only trade with the study area is included. The previous section shows the growth in the value of trade with the study area but Figure 2.9 shows that there is a different trend when trade is analysed by weight. This divergence is particularly pronounced in the case of exports where the weight has fallen in recent years despite ongoing growth in value. This figure also indicates the considerable difference in the weight of imports and exports to and from Ireland and this area.

Figure 2.9: Trade with the Study Area by Weight (1993, 1995, 1998, 2000, 2002)
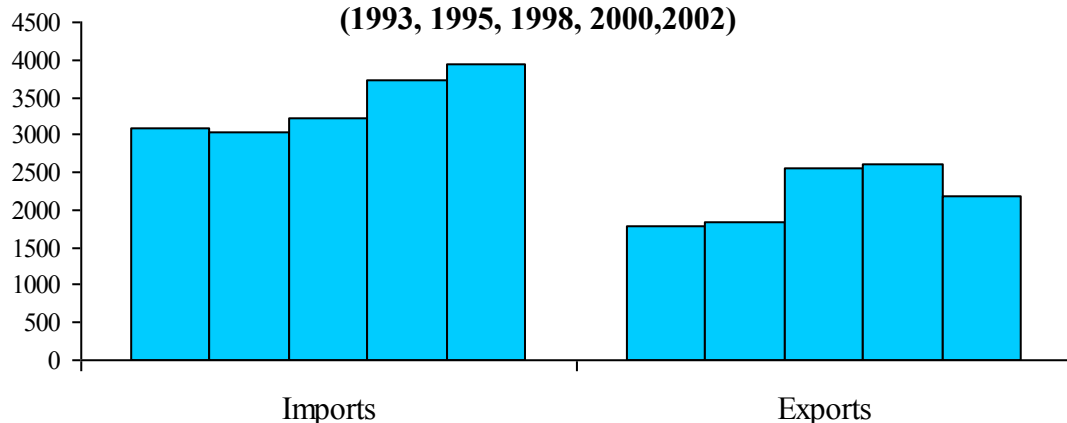
The divergence in these trends is such that the volume of exports overall rose by only 7% and imports by 12% in this period, compared to a rise of 217% and 143% respectively in the value of trade after allowance for inflation. In the period 1998 to 2002, the weight of exports rose by 14.7% while the value rose by over 50%.

The trend in trade when measured by weight has differed between countries. Table 2.4 shows trade with the study area in terms of the weight of imports and exports in 1993 and 2002. Further details are contained in Appendix 1. While experience has varied depending on the country involved, it is most notable that the volume of exports to Poland, by far the largest economy among the accession states, fell by 56% in the period 1998 to 2002. The picture with regards to imports is quite different with most countries increasing the weight of their exports to Ireland. As a result, the excess in the weight of imports over exports, which stood at 658,000 tonnes in 1998 (11.4% of total trade) rose to 1,766,000 tonnes in 2002 (28.9% of total trade).

Table 2.4: Irish Trade Flows by Weight with the Study Area

	1993 (000's Tonnes)		2002 (000's Tonnes)		% growth 1993-2002	
	Exports	Imports	Exports	Imports	Exports	Imports
Belgium	37.0	18.1	323.8	488.4	775	2,598
Netherlands	697.6	817.5	994.7	1,027.6	43	26
Denmark	55.7	51.9	70.3	205.5	26	296
Sweden	123.8	319.4	146.1	224.7	18	-30
Finland	91.9	172.7	45.6	176.2	-50	2
Estonia	0.4	0.1	1.3	62.2	225	62,100
Latvia	0.8	63.3	1.2	69.7	50	10
Lithuania	5.0	2.6	1.7	108.1	-66	4,058
Poland	70.1	597.7	48.0	395.5	-32	-34
Czech Rep	3.9	11.0	12.0	19.8	208	80
Slovakia	0.0	0.0	3.1	15.1	n.a.	n.a.
Germany	688.5	1,038.6	529.4	1,150.7	-23	11
Totals	1774.7	3,092.9	2,177.2	3,943.5	7	12

Source: CSO Database

The increasing divergence between the weight of exports and imports is important in determining the structure of freight flows and the routes used since it means that there is an in-built incentive for freight-forwarders to structure routes for Irish exports to be compatible with the routes being determined by imports to Ireland. This indicates that there will be the possibility that freight flows will not change in line with trade flows as identified by these data. These issues are dealt with in greater detail in later sections of this report.

These data also indicate the lightening of Ireland's exports that has been occurring in absolute terms and relative to imports. This trend is shown by the data in Table 2.5. The data show that there were 302 tonnes of freight per €1 million of exports in 1993. This fell to just less than 146 in 1998 and had fallen to 82.5 tonnes by 2002. This fall of over 43% is far ahead of what might be accounted for by price changes and reflects the rapid change in the industrial structure of exports. The weight per €million of imports fell only about half as fast as in the case of exports in this period and remains at a much higher level. This table also indicates that there are considerable differences in the structure of trade with existing and accession states but suggests that these differences are reducing.

Table 2.5: Tonnes of Irish Exports and Imports per € million of Value

Exports	1993	1995	1998	2000	2002	Change in period
Existing States	302.2	190.5	149.4	133.0	95.8	-68.3%
Accession States	1,053.9	565.4	289.9	171.8	115.2	-89.1%
Study Area	312.5	196.6	145.9	122.1	82.5	-73.6%
Imports						
Existing States	958.9	793.2	533.3	418.3	406.4	-57.6%
Accession States	7,710.9	4173.8	2,986.8	1,799.5	1,818.3	-76.4%
Study Area	1,186.9	894.4	607.2	470.4	468.2	-60.6%

Price changes will have some effect on these trends so it is necessary to remove this variable. The data do not allow for price indices for trade with the study area to be separately calculated so it is assumed that prices in this trade move in line with overall trade flows. The price indices for imports and exports for these years were used in calculating the data for Figure 2.10 i.e. they show tonnes of trade per €million in 1993 prices. As a result, the trends arise as a result of changes in the composition of trade only.

**Figure 2.10: Tonnes of Irish Trade with the Study Area
per €million (constant 1993 prices)**
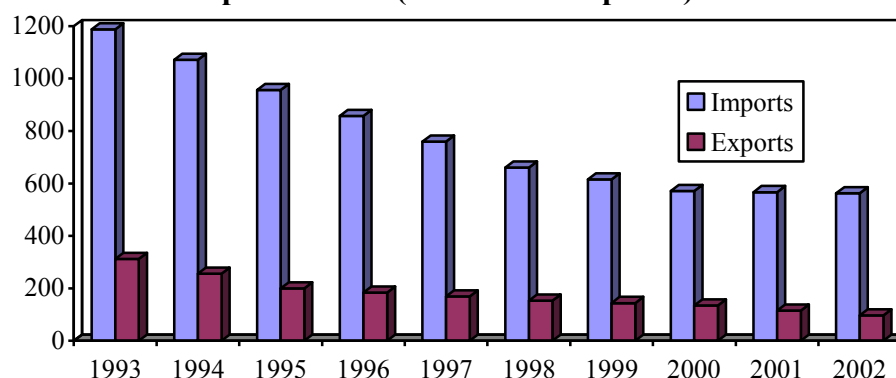
There have been considerable difference in experience between different countries. This is shown in Figures A1.1 to A1.4 in the Appendix. These show that there have been major changes in the structure of exports to the accession countries in particular. This is most obvious in the case of Poland and the Baltic States.

Commodity Composition of Trade

The major changes that have occurred in the industrial structure of the Irish economy is the primary cause of this trend. This compositional structure is reflected in the products that comprise trade flows. This has been quite dramatic over even a short period of time and is seen whether value of volume measures are used. However, value measures tend to be very volatile so a better indication of real development is got by concentrating on the volume measures.

CSO data uses the SITC classification. This is detailed in Appendix 2. The data show that the weight of exports in SITC classifications 0 to 3 has tended to fall. This includes most food items and basic materials. However, there have been increases in SITC section 5 (Chemicals) and 7 (Machinery and equipment). These sections include the pharmaceutical and computer industries. On the import side, most sections have tended to show increases with the largest increases in the manufactured goods category, SITC 6. These trends are seen in trade data for both the existing EU member countries and accession states but are more pronounced for the latter group. Poland, which is by far the largest economy among the accession states, illustrates this trend, as shown in Table 2.6.

Table 2.6: SITC Categorisation of Trade with Poland by Weight (1998 and 2002)

	Weight (tonnes)		% Distribution		Change	
Exports	1998	2002	1998	2002	Tonnes	%
SITC 0 Food & Animals	15,742	8,629	14.4	18.0	-7,113	-45.2
SITC 1 Beverages & Tobacco	128	97	0.1	0.2	-31	-24.2
SITC 2 Crude materials	79,793	25,363	73.1	52.9	-54,430	-68.2
SITC 3 Mineral fuels	165	24	0.2	0.1	-141	-85.5
SITC 4 Animal & vegetable oils	0	4	0.0	0.0	4	~
SITC 5 Chemicals	1,933	5,756	1.8	12.0	3,823	197.8
SITC 6 Manufactured goods	4,755	4,148	4.4	8.6	-607	-12.8
SITC 7 Machinery & equipment	2,485	3,024	2.3	6.3	539	21.7
SITC 8 Other manufactured goods	1,120	851	1.0	1.8	-269	-24.0
SITC 9 Other commodities	2,976	93	2.7	0.2	-2,883	-96.9
Total	109,097	47,989	100.0	100.0	-61,108	-56.0
Imports						
SITC 0 Food & Animals	54,845	94,331	16.4	23.9	39,486	72.0
SITC 1 Beverages & Tobacco	0	28	0.0	0.0	28	~
SITC 2 Crude materials	565	827	0.2	0.2	262	46.4
SITC 3 Mineral fuels	253,496	265,121	75.7	67.0	11,625	4.6
SITC 4 Animal & vegetable oils	0	113	0.0	0.0	113	~
SITC 5 Chemicals	10,172	10,373	3.0	2.6	201	2.0
SITC 6 Manufactured goods	10,763	15,589	3.2	3.9	4,826	44.8
SITC 7 Machinery & equipment	4,471	5,253	1.3	1.3	782	17.5
SITC 8 Other manufactured goods	459	3,810	0.1	1.0	3,351	730.1
SITC 9 Other commodities	0	62	0.0	0.0	62	~
Total	334,771	395,507	100.0	100.0	60,736	18.1

This shows that, in the period 1998-2002, the weight of Ireland's exports to Poland fell by 56% while the weight of imports rose by 18%. Furthermore, the weight of imports was over 8 times as great as exports in 2002. For the accession economies in particular, the greatest increases in trade volumes arise from the most rapidly growing parts of the economy. The importance of this is that these sectors are also those where the lightening effect has been very pronounced. For example, in the case of Ireland's exports to Poland, the value of exports of pharmaceuticals (SITC 54) rose from €24,700 a tonne in 1998 to €48,370 a tonne in 2002. For office and telecommunications equipment (SITC 75 & 76), the value rose from €67,280 to

€78,800. These two industries are driving the export growth to this market and contrast with an over value of €5,880 per tonne in 2002.

This structural change presents a difficulty in attempting to project the volume of goods that will need to be transported to various countries. For example, it is highly unlikely that the major change in the structure of exports to Belgium will be repeated in future years, but similar distortions could arise in respect of other countries. In addition, it is unknown whether the major changes that have occurred in the accession countries as they have moved towards EU membership will be repeated. In this circumstance, the best approach is to apply average trends to individual countries. This is done in the next section in respect of the trend in the weight of freight. Also, to allow for the potential impact of accession, separate values are used for the accessions states and existing EU member states.

2.4   Projections of Ireland's Trade Growth with the Study Area

Although value-based trade data are inadequate for the purposes of describing the flows of freight to and from Ireland, they are useful in providing a basis for projecting the future growth of trade. Rather than basing the projections for Ireland's imports and exports on factors in the Irish economy – which is the usual method used to forecast exports and imports – the projections have been based on economic forecasts for the individual countries in the study area. These are derived from forecasts produced by the European Commission. Table 2.7 shows forecasted real GDP growth in these economies.

Table 2.7: Forecast Economic Growth (Real GDP Annual % Change)

	2003	2004	2005
Belgium	0.8	1.8	2.3
Netherlands	-0.9	0.6	2.0
Denmark	0.8	2.0	2.3
Sweden	1.4	2.2	2.6
Finland	1.5	2.5	2.7
Estonia	4.4	5.6	5.1
Latvia	6.0	5.2	5.7
Lithuania	5.0	5.7	6.0
Poland	3.3	4.2	4.8

Czech Rep	2.2	2.6	3.3
Slovakia	3.8	4.1	4.3
Germany	0.0	1.6	1.8

Source: European Commission[9]

It is quite clear that growth in the accession countries is expected to be considerably higher than in existing EU members over the short term. This is reflected in forecasts for export and import growth for these countries as shown in Table 2.8. Many of these economies are projected to grow trade values by 10% per annum or more in the next few years.

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[9] European Commission (2003) *Autumn Economic Forecasts*; published as *European Economy* No. 5/2003, Luxembourg: Commission of the European Communities

Table 2.8: Forecast Export & Import Growth (Real Annual % Change)

	2003		2004		2005	
	Exports	Imports	Exports	Imports	Exports	Imports
Belgium	-1.0	-0.5	3.0	2.5	4.0	4.1
Netherlands	-0.6	-0.9	4.8	4.3	5.9	5.5
Denmark	2.7	1.6	4.0	5.2	4.8	5.6
Sweden	4.1	4.5	6.5	6.3	7.2	7.4
Finland	2.3	1.7	4.2	3.9	6.0	7.8
Estonia	5.0	9.0	10.0	9.0	12.0	10.0
Latvia	10.0	12.0	10.0	10.0	11.0	9.0
Lithuania	10.0	8.0	8.0	8.7	8.0	7.0
Poland	8.6	4.7	11.2	9.5	12.2	11.5
Czech Rep	6.2	5.6	5.0	4.8	5.8	6.0
Slovakia	19.4	13.6	11.0	9.8	8.5	7.8
Germany	4.7	2.7	4.8	5.4	6.1	3.1

Source: European Commission

The data in Table 2.3 above indicate that Ireland's trade with these countries has grown much faster than this in recent years and, unless there is a big alteration in trends, trade between Ireland and the accession states in particular should continue to grow in terms of its relative importance overall. However, the picture is complex and may be subject to unforeseeable factors. As a result, it is assumed that Ireland has a static market share in terms of the import and export sectors of these countries, i.e. trade with Ireland grows in line with their imports and exports overall.

These official forecasts are short term and it is necessary to project somewhat further for the purposes of this study. The following assumptions are made. After 2005, GDP and trade growth in existing EU member states will slow to 2% and 4% per annum respectively up to 2008. Accession states will grow more quickly and the projection is for average real GDP growth of 4% per annum for this period with the value of trade growing at 8% per annum in real terms. These assumptions allow for a projection of Irish trade with countries in the study area in 2008 as shown in Table 2.9.

As already noted, this cannot be interpreted as a projection of future flows of goods but only of the value of goods. This provides an indication of the economic background against which future flows will develop. However, the volume of trade flows will depend on a combination of this growth due to economic factors and changes in the composition of exports that affect the physical characteristics of these goods. As a result, the projection must combine the growth implied by economic developments with the observed trends in the weight of trade flows identified above.

Table 2.9: Projected Value of Irish Trade with the Study Area in 2008

	Exports		Imports	
	2008 forecast	% growth since 2002	2008 forecast	% growth since 2002
	€ million		€ million	
Belgium	17,276	19.3	1,032	19.4
Netherlands	4,232	24.1	2,282	22.7
Denmark	669	25.9	922	27.0
Sweden	1,584	33.7	561	34.2
Finland	385	27.1	944	28.1
Estonia	52	63.0	40	64.6
Latvia	27	69.2	44	69.2
Lithuania	27	61.6	38	58.2
Poland	485	70.7	195	61.0
Czech Republic	293	48.6	182	47.8
Slovakia	72	81.1	29	69.4
Germany	8,832	31.0	4,420	25.5
Total Area	33,933	24.6	10,687	26.3

The data on the weight of exports and imports, i.e. tonnes per €million, indicate that, after allowance for inflation, the weight per €million of exports to existing member states fell by 68.3% in the period 1993-2002 while the same measure for imports fell by 87.2%. In the case of the accession states, the falls were 49.1% for exports and 71.7% for imports. These trends imply average annual declines of 12% and 7.3% for exports and imports to existing states and 20.5% and 13.1% for exports and imports in the case of accession states. These trends are continuing and some account must be taken of this trend in projecting the volume of future trade flows. This reflects the changing nature of Ireland's international trade. However, it would not be appropriate in this projection to maintain that this trend will continue along recent lines. First, the Irish economy undoubtedly underwent major changes in the period 1998 to 2002 and the rate of this change is likely to slow in the future. Second, the value projection has been made on the basis that the value of Ireland's trade rises in line with total imports and exports to these countries. In recent years this has not been the case as Ireland's trade values, particularly its exports have risen much faster. The underlying reason is the change in the structure of the economy. As a result, an assumption that Ireland's

trade values will rise in line with overall trade is an implicit assumption that this underlying change will be much less.

To reflects these arguments but to maintain that there will be some ongoing lightening of trade even under these assumptions, the projection of the future weight of trade was done assuming that the rate of lightening of trade slows to one-third of its previous rate in the period to 2005 and then to 20% of the previous rate in the years 2005 to 2008. The results of this are shown in Appendix 1, Table A1.10 and are illustrated in Figure 2.11 for states that have been members of the EU for the whole period and in Figure 2.12 for states that joined the EU in 2004.

Figure 2.11: Projected Weight of Trade with Study Area: Existing EU States, 2003-08
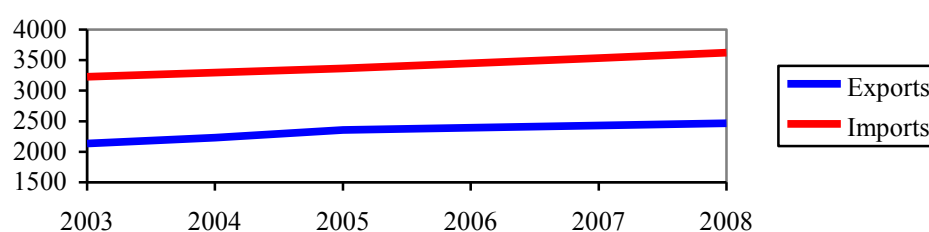
Figure 2.12: Projected Weight of Trade with Study Area: New EU States, 2003-08
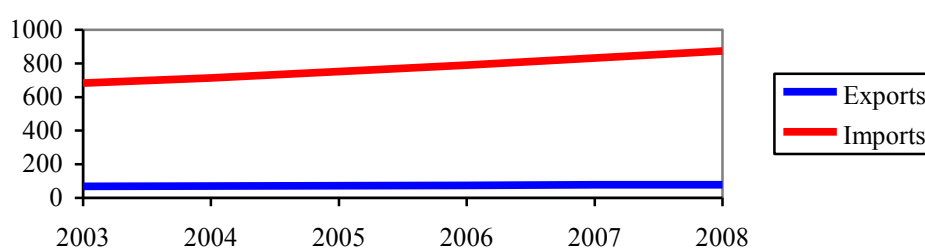
Under these assumptions, the weight of exports rises by 16.8% in the case of existing EU members and by 17.5% for the accession states in the study area in the years 2002 to 2008. The weight of imports rises by 10.7% and 30.5% respectively for these countries. As a result, it is clear that the projected growth of trade with these countries will have an impact on the weight of trade flows provided there is a slowdown in the trend towards ever lighter trade. In total, this growth would lead to an additional 367,000 tonnes of exports to this area and an additional 554,000 tonnes into Ireland. The percentage change in the weight of trade by country is illustrated in

Figure 2.13. All have positive growth although this is negligible in the case of exports to Lithuania and the Czech Republic.

Figure 2.13: Projected Percentage Change in Weight of Trade during period 2002-2008
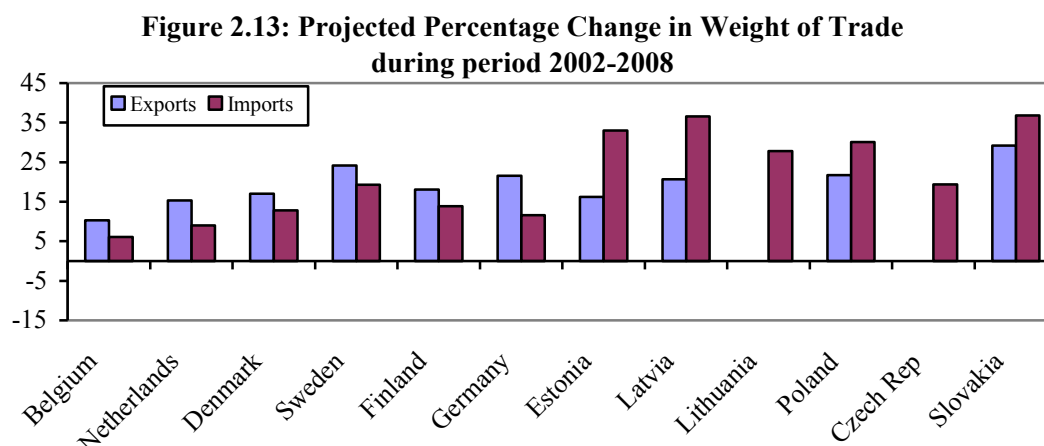
One notable outcome of these projections is that the relative weights of imports and exports continue to diverge. When the lightening of trade is assumed to slow the indication is that the tonnage of imports to Ireland from the study area will be about 1.75 times the tonnage of exports to this region in 2008. In the case of the accession states alone, the weight of imports rises to about 11 times the weight of exports. While the growth possibility suggests that there might be an opportunity for a new route to emerge to service this trade, this imbalance is a major issue to consider in determining the viability of such a route.

2.5   Conclusion

This analysis indicates a number of possibilities but does not lead to unambiguous conclusions regarding the opportunities that will arise for new short sea routes to be viable as a result of economic factors resulting in a growth of trade with this region. There is little doubt that the value of Ireland's trade with these countries will continue to increase, albeit that it likely to be at a somewhat lower rate of growth than has been experienced in the past decade. However, this growth in value hides two important aspects of these trade flows. The first is that the weight of freight per €million of trade has been falling rapidly, particularly on the export side. As a result, there has been very little growth in the weight of either exports or imports during the high growth period.

The explanation is the changing sectoral structure and composition of the goods traded. Ireland's international trade has moved heavily towards lighter knowledge-intensive goods. There is no indication that this trend will not continue although the pace of change might ease in coming years. A further point in this respect is that trade with the accession countries remains 'heavier' particularly with respect to imports. However, this could mean that the rate of fall in the weight of freight might be higher for these countries as they become to resemble existing EU member states more closely. A further issue is the imbalance in the weight of imports and exports. This is substantial at present and is likely to widen further. This imbalance has implications for the structure of freight flows and for the potential viability of new routes. The imbalance is particularly noticeable in the case of the accession countries.

While the projection in this report provides overall estimates of developments, the impact of this on freight transport can be complicated by the fact that the number of LoLo routes and their frequency will depend on the number of TEUs to be transported. The complication arises due to the fact that as the nature of the goods to be transported changes i.e. the value of goods per tonne of freight increases, this may not translate directly into changes in the number of TEUs. Indeed, it is very likely that there will be a fall in the average weight of goods carried in loaded containers either because they are unfilled, because there is a growing number of empty boxes to be transported or because the higher value goods are transported with an increasing amount of low weight/high bulk protective packaging. The problem is that there is no basis on which to predict how this relationship between the overall value per tonne of freight and the weight per container will develop. As a result, any projection of the number of TEUs must be regarded as somewhat speculative. With due recognition of this issue, Table 2.11 contains projections of the number of LoLo TEUs on the major routes. The data for 2002 in this Table are taken from Section 3.2, based on the survey of ports. Greater detail with a destination breakdown is contained in Appendix 3.

Table 2.11: Projected TEUs by Route, 2008, Alternative Scenarios

Exports	2002	2008	2008 (-5%)	2008 (-10%)
Non-Dublin via Belgium	21,322	24,521	25,812	27,246
Non-Dublin via Netherlands	96,242	109,633	115,403	121,814
Dublin through B and Nl	138,468	165,580	174,295	183,978
Total exports	256,032	299,734	315,510	333,038
CEECs only	12,801	15,930	16,769	17,700
Imports				
Non-Dublin via Belgium	16,497	18,005	18,953	20,006

Non-Dublin via Netherlands	84,408	91,873	96,709	102,082
Dublin through B and Nl	144,155	161,741	170,254	179,712
Total imports	245,060	271,620	285,915	301,800
CEECs only[10]	8,822	11,405	12,005	12,672

The initial estimate for 2008 is provided by these data inflated according to the projected growth in the weight of exports and imports as calculated in Section 2.4. This assumes that there is no change in the average weight of containers and that the existing modal distribution is maintained over this period. The alternative estimates – described as 2008(-5%) and 2008 (-10%) – are calculated on the basis that there is a 5% and 10% fall respectively in the average weight of the material per container over this period.

These projections show increases in the number of containers on these routes for both exports and imports. On the export side, the projections indicate that the number of LoLo TEUs would grow by between 17% and 30% on these routes in this period, between about 2.5 and 4.5% per annum. For imports, the growth is in the range of 11% to 23%, between about 1.7 and 3.5% per annum. These trends are illustrated in Figure 2.14.

If trade with the accession countries only is included, then the rates of increase are greater. The number of TEUs in LoLo exports to these economies would increase by between 24% and 38% in this period, equal to annual growth of about 3.7 to 6%. For imports, the number would grow by between 30% and 44% over the period, with annum growth of about 4.5% to 7%. This is quite rapid growth, particularly is the scenario of a 10% fall in the average weight of TEUs is accepted, and with a combined loading of about 30,000 TEUs per annum suggests an opportunity for a new route. However, an important issue is that the number of TEUs to these economies would still account for less than 5% of the total LoLo traffic on the routes examined, up from about 3.6% in 2002. Given the structures and determinants of freight flows as discussed in Section 4 of this report, it cannot be concluded that this will be sufficient to lead to new routes as freight forwarders and logistics providers will have an incentive to keep this freight integrated with existing flows. However, the introduction of new tolls as discussed in Sections 5 and 6 could alter this conclusion.

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[10] Accession countries in Central and Eastern Europe.

Figure 2.14: Projected Growth in LoLo Flows by Route, Exports plus Imports, in 2002-08 (TEUs)
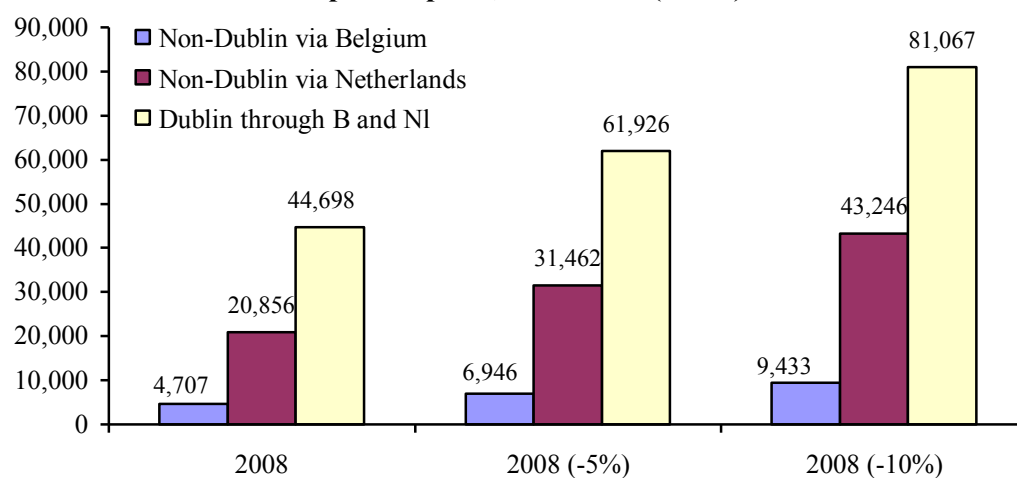
This analysis would appear to suggest that, despite the importance of trade to the Irish economy and the projected growth of trade with the EU and the new members of the EU in particular, it cannot be concluded that the accession of these new states, while contributing to the gradual move eastwards of the centre of economic gravity in Europe, will impact on freight flows from Ireland to Europe in a major or predicable manner. Under certain assumptions there are reasons to conclude that there will be growth in the volume of goods being transported and that these could give rise to new routes. However, this conclusion is tentative given the small proportion of trade accounted for by the new member states and requires recognition of the determinants of trade flows. This analysis is undertaken in the next two sections of this report.

3.   Structure of the Irish Maritime Transport Sector

3.1   Freight Flows and the Port Sector

3.1.1   Structure of Flows

The port sector has changed radically in recent decades. In the past, competition between ports was minimal and port-related costs were relatively insignificant in comparison to the high cost of both ocean and inland transport. Indeed as a result there was in the past little incentive to improve port efficiency. Today, however, most ports are competing with one another on a global scale and, with the tremendous gains in productivity in maritime transport achieved over past decades, ports are now perceived to be the remaining controllable component in improving the efficiency of ocean transport logistics. According to the United Nations Conference on Trade and Development (UNCTAD)[11] world seaborne trade totalled 5.83 billion tonnes in 2001 after 15 consecutive years of growth up to 2000. Total freight movements vary according to region, commodity and freight origin/destination. In the EU, for example, 70% of the Union's trade with the rest of the world is carried by sea, 41% of intra-Community goods transport is by short-sea shipping, and inland waterways carry 9% of goods traffic in the six European countries of the Rhine-Main-Danube network[12]. In terms of commodities, world port traffic is made up of 45% liquid bulks (mainly oil, petroleum products and chemicals), 23% dry bulks (coal, iron ore, grain and phosphate) and 32% general cargo.

The freight handled by weight by Irish ports and the category of traffic is shown in Table 3.1.

Table 3.1: Freight Handled by Port and Category of Traffic 2002 (000 tonnes)

	RoRo	LoLo	Liquid Bulk	Dry Bulk	Other	Total
Cork	134	956	5,970	1,765	217	9,042
Drogheda		484	189	249	448	1,369
Dublin	7,232	3,392	3,438	1,351	143	15,557

[11] United Nations Conference on Trade and Development (UNCTAD), *Review of Maritime Transport in 2002*.

[12] *White Paper on European Transport Policy for 2010,* Directorate-General for Energy and Transport, European Commission.

Dun Laoghaire	146					146
Rosslare	1,926					1,926
Shannon-Foynes			1,792	8,453	173	10,418
Waterford	11	1,087	137	539	136	1,910
Other Ports			1,628	2,418	505	4,551
Total	9,449	5,919	13,154	14,775	1,622	44,919

Source: CSO *Statistics of Port Traffic 2002*

CSO data record trade through 21 ports for 2002, but it is clear that most ports are relatively small with just 3 ports – Cork, Dublin and Shannon-Foynes – accounting for 80% of the total. The table also shows that out of a total of 44.9 million tonnes, almost 15.4 million (34.2%) was unitised with the remainder in bulk or break bulk form. Some specialisation is evident in some ports with only Dublin, Cork and Waterford handling all categories of freight. Given that the focus of this study is primarily on unitised freight flows, the ports of Cork, Drogheda, Dublin, Dun Laoghaire, Rosslare and Waterford are of relevance.

An important categorisation of trade through ports is by the mode of transport used. In terms of this study two modes are important: RoRo and LoLo unitised freight. The chosen mode will depend on a number of factors including the nature of the goods and the relative costs of transport. The transit time each takes is also a relevant consideration. This issue was examined in a background report during the preparation of the National Spatial Strategy[13]. The respective times taken to transport LoLo and RoRo to different areas of Europe are indicated by Figure 3.1. This shows that when rapid delivery is the key requirement, RoRo freight will be the chosen mode.

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[13] *Transport Corridors in Europe*. Report prepared by Atkins McCarthy, November 2000

Figure 3.1: Length of Travel Time for Freight to Europe

Source: Dept of Heritage, Environment and Local Government (2000)
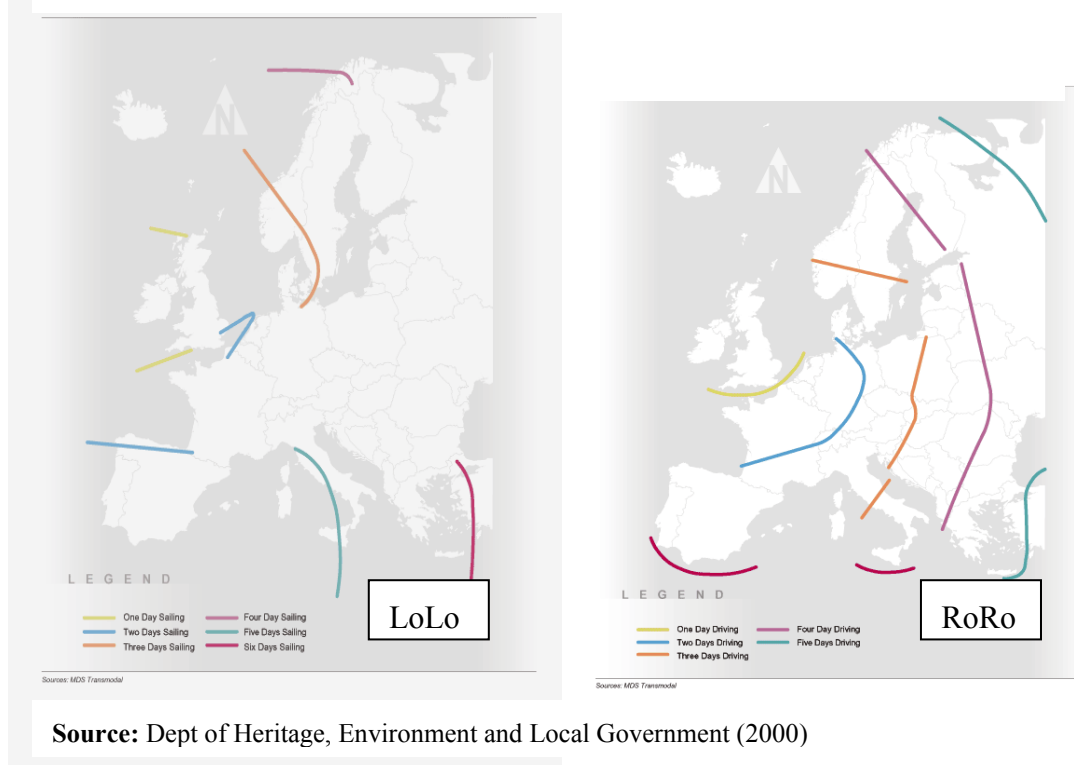
Trade through Ireland's ports by region of origin/destination is shown in Table 3.2. This shows that almost 42% of freight passing though Irish ports either arrives from or is destined for ports in the UK. If only the 7 ports that handled unitised trade are included then this proportion rises to 52%.   This is greater than the percentage of total Irish trade accounted for by the UK due to the use of the UK as a landbridge and the relatively lower value per unit of weight of trade with the UK, partly as a result of the importance of this market for traditional Irish industry which tends to concentrate on the UK market.

Table 3.2: Freight Handled by Port and Region of Trade (000 tonnes)

	UK	Other EU	Non-EU	Other Ports
Cork	2,611	2,246	2,650	1,535
Drogheda	178	1,009	85	97
Dublin	10,512	3,725	507	813
Rosslare	1,583	343		
Dun Laoghaire	146			

Waterford	526	1,186	46	153
Other Ports	3,393	3,183	1,014	7,524
Total	18,657	11,692	4,302	10,122

Source: CSO *Statistics of Port Traffic 2002*

The pattern of trade through the ports has reflected the changes that have occurred in the economy with rapid economic growth resulting in considerable growth in the traffic through the ports. Table 3.3 shows that in the period 1995 to 2002 the total tonnage passing through the ports grew by 38.7%. However, there has also been a considerable change in the nature of the traffic as evidenced by the fact that containerised traffic overall grew by over 90%, with RoRo growing much faster in the period by over 142% in total. The result is that the percentage of total freight handled in the form of RoRo grew from 12% in 1995 to 21% in 2002.

Table 3.3: Growth of Freight Handled in Irish Ports 1995 – 2002 (000 tonnes)

	1995	2002	% growth
RoRo	3,894	9,449	142.7
LoLo	4,175	5,919	41.8
Liquid Bulk	9,384	13,154	40.2
Dry Bulk	13,538	14,775	9.1
Other	1,389	1,622	16.8
Total	32,380	44,919	38.7

Source: CSO *Statistics of Port Traffic 2002*

These data reflect the fact that, when measured in tonnage, freight through the ports appears to be growing much more slowly than output in the economy. GDP growth in this period was 66.8% when measured in constant prices and 125.9% when measured in value. The growth in the value of exports and imports in this period exceeded GDP growth. This is a result of the considerable change in the economy with a rapid lightening of trade. A further implication of this change is that the freight passing through Irish ports requires more careful management in terms of the physical handling of the goods and also their efficient transit through the port. Furthermore, Irish economic growth has implications for the modes adopted in the transport of output with high growth in the RoRo mode. Thus, ports with this facility are particularly important for the competitive operation of the leading sectors of the economy. Important as the growth in trade has been to wealth creation in recent decades, the gains are magnified by the ability of firms to utilise the efficiency gains that have accompanied this growth. The efficiencies do not just result in lower costs

as would be concluded by a static model of world trade but have led to the growth in the importance of supply chains in determining competitiveness and to the development of new business models and patterns of trade as firms move to exploit the opportunities that are created.

The ports have handled the increase in trade but there are indications that some constraints are being approached. Research undertaken in the late 1990s examined capacity, capacity utilisation and future trends in port activities.[14] The study provided estimates of future trade growth based on statistical models that were fitted to each type of cargo for inwards and outwards traffic, giving a relation between growth rates for Irish GNP and each cargo category, after adjusting for the specific factors. These multipliers are shown in Table 3.4.

Table 3.4: Growth Rate by Type of Cargo, as Multiple of GNP Growth Rate.

	Inwards	Outwards
RoRo	1.44	1.52
LoLo	1.30	1.28
Bulk liquid	0.90	0.91
Bulk solid	0.77	0.72
General cargo	1.29	1.09
Trade vehicles	1.63	0.77
Accompanied cars and coaches	1.07	1.09

These multipliers were applied to the projections for future economic growth contained in the ESRI *Medium Term Review 1999-2005*. The resulting projected development of each type of traffic for each port between 1999 and 2007 were compared with estimated capacity in 2007. This comparison showed that some ports will simultaneously experience shortfalls and surplus in different operations in 2007. In general, the report concluded that there would be surplus capacity in a number of ports in bulk handling – with shortfalls in Dublin and Cork – and smaller surpluses in general goods capacity. However, it forecast a major shortfall in unit load capacity in Dublin of 5.6 million tonnes per annum, with smaller shortfalls of 800 tonnes and 500 tonnes in Cork and Waterford respectively. Given the key role of supply chains in the competitiveness of modern firms, any such deficit in capacity is likely be

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[14] *Assessment of Irish Commercial Seaport Capacity (2000 Update)*. Report prepared by Baxter Eadie Ltd. in association with ORM Consulting. Department of the Marine and Natural Resources, 5th October 2000.

interpreted as a reduction in the overall competitiveness of the Irish economy as a location for production.

3.1.2   Government Policy and Irish Ports

Failure to satisfy the demands of consignors and consignees can only result in non-optimisation and increased costs throughout the supply chain, ultimately rendering international supply chains with nodes in Ireland less competitive. This can seriously harm national competitiveness. As a result, policymakers and operators in the wider economy also have an interest in the structure of freight flows and Ireland's ports underwent considerable change in the 1990s as a result of policy developments. In 1991 the Government established a review group to examine the policy and legislation governing commercial ports in Ireland. The report in 1992 of the review group had considerable implications for Irish ports and led ultimately to the 1996 Harbours Act which corporatised the main commercial ports[15]. While not recommending immediate privatisation ('the privatisation of ports is not realistic at this time, but is an option that should not be ruled out for the future')[16], the shift towards corporatisation recommended by the report had the effect of 'freeing Ireland's key ports from direct departmental control and giving them the commercial freedom they need to be able to operate as modern, customer-oriented service industries'[17].

In 2002 the Government commissioned a High Level Review (HLR) of the State Commercial Ports to *inter alia* conduct a detailed evaluation of the current model for the governance of Irish ports. The report of the HLR was published in April 2003 and broadly supported the extant model of port governance in Ireland. While not ruling out privatisation, the HLR recommended that privatisation is not pursued at present and that more emphasis is placed on public private partnerships (PPP) for various aspects of port operations.   In 2002 the Government published the report of the Task Force on Transport Logistics in Connection with Ports. That report highlighted the key role played by ports in the context of logistics competitiveness and the Irish economy and added that freight transport should be identified as a sector of primary national interest. The report called for more attention to be given to the provision and

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[15] *Report of the Review Group on Commercial harbours and Pilotage Policy and Legislation*, Government of Ireland (1992).

[16] *ibid*

[17] Quoted in: Mangan, J. and F. Furlong (1998) Strategies for developing commercial port administration in Ireland, *Maritime Policy and Management*, Vol. 25, No. 4, 349-360.

integration of access and egress landside transport infrastructure to ports and urged that attention should be given to innovations such as dedicated freight corridors to and from ports. The importance of ports and maritime transport to the national economy has also been recognised by Government through the establishment of the Irish Maritime Development Office, which along with other developments will lead to a stronger shipping and maritime sector in Ireland.

Appendix 4 details by frequency and operator both LoLo and RoRo services to and from Irish ports. Analysis of data for 2002 by the consultants suggests a load factor[18] of 46% for RoRo and 81% for LoLo. While LoLo services enjoy a higher load factor, the relatively lower load factor for RoRo services can be compensated for by the fact that such services can also carry car passenger traffic. The following sections will now consider both LoLo and RoRo freight flows by route in detail.

Table 3.5 details key features of Ireland's main ports. All of the ports listed (with the exception of Rosslare) have a commercial mandate and operate as corporatised ports under the 1996 Harbours Act with their Boards appointed by the Minister for Communications, Marine and Natural Resources. Rosslare is also run as a commercial entity and is currently under the aegis of CIE and the Department of Transport.

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[18] The 'load factor' is a measure of capacity utilisation and is calculated by freight carried divided by space available.

Table 3.5: Key Features of Ireland's Main Ports

Port	Passengers and Freight?	Traffic types handled	Total Freight Volume Handled ('000 tonnes)	Weekly unitised shipping services*
Cork	Yes	RoRo, LoLo and Bulk	9,042	15
Drogheda	No	LoLo and Bulk	1,369	3
Dublin	Yes	RoRo, LoLo and Bulk	15,557	110
Dun Laoghaire	Yes	RoRo only	146	21
Rosslare	Yes	RoRo only	1,926	39
Shannon-Foynes	No	Bulk only	10,418	-
Waterford	No	LoLo and Bulk	1,910	13

Source: CSO *Statistics of Port Traffic 2002*

* Data on weekly services are minima and are approximate as some services are seasonal, some can operate to irregular schedules, etc.

Trends Impacting on Port Traffic

As illustrated in Table 3.3 above, traffic through Ireland's ports has grown significantly in recent years with RoRo freight enjoying the largest growth at over 147% in the period 1995-2002. The 'diversion' to Northern Ireland ports of (mainly unitised) freight so evident in the 1990s has receded somewhat in recent years as increased capacity and efficiency gains have emerged among ports in the Republic of Ireland. Competition in the Irish ports and shipping sectors is now quite extensive. As is the case internationally, high fixed costs commit operators to react strongly to new entrants and lead to an emphasis on volume and on marginal income. Notwithstanding, new routes do emerge and operators also sometimes shift existing services to alternative ports. A recent proposal by one of the largest unitised operators on the Irish Sea to sell to another such operator some of its services was blocked by the UK Competition Authority. However, with continued tightening of margins going forward it is likely that other such proposals and structural changes will occur in the Irish shipping market.

Although outside the remit of this report, it is worth noting that the last decade has also seen some significant developments in the maritime passenger sector in Ireland. The cruise sector has grown substantially while both fast ferries and new large conventional ferries have entered service. Passenger numbers have grown by 96% since 1994. In 2003, 127 cruise ships visited the island of Ireland with 76,931 passengers and 39,264 crew. It is estimated that this business was worth almost €66 million to five Irish ports last years and generated 484 full-time jobs[19]. Indeed the Irish Sea is unique in that it has some of the world's largest conventional and fast ferries. On combined (passenger and freight) services it can be difficult to determine which trade makes the largest contribution to profitability. Notwithstanding, it is apparent that maritime passenger traffic to and from Ireland is very seasonal and consequently the year-round nature of maritime freight is critical to many combined shipping services.

Two developments in vessel technology may impact the structure of the Irish maritime freight sector in the future. First, LoLo vessels are becoming faster and more efficient and thus may take some traffic which previously was exclusive to the RoRo mode. Second, new vessel builds in the deepsea container trade are getting progressively larger to the extent that increasingly only some ports will be able to handle these large mother vessels. 'Hub and spoke' networks are thus emerging with many non-hub ports providing feeder services to these hubs rather than point-to-point direct services.

Various factors are likely to impact the cost and operational structures of maritime freight in the future. Environmental concerns and the shift towards internalisation of transport externalities are placing a greater emphasis on the use of both intermodal and multimodal transport. Many ports are also developing transport links to their hinterlands with many inland and dry ports now emerging, with rail or inland waterway connections to the principal sea-facing port. Because of the (increasingly) globalised nature of trade, rate imbalances (in terms of trade direction and/or commodity) are likely to remain a feature of many shipping markets in the future. Finally, security considerations – traditionally with regard to narcotics and other controlled materials, now increasingly with regard to both trafficking in people and in the counter-terrorism area – are likely to continue to impact the maritime transport chain. The factors that impact on port performance through route choice are considered in Section 4 below.

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[19] Report prepared by Centre for Policy Studies, UCC for Cruise Ireland, April 2004

3.2 Analysis of LoLo Freight Flows by Route

3.2.1 LoLo Shipping Routes from Ireland

Appendix 4 includes details of the shipping routes for LoLo freight from Irish ports to ports in the study area.[20] Dublin has the largest number of routes while across all ports the most prevalent destinations are UK ports and the ports of Rotterdam and Antwerp.

Official statistics do not identify trade flows according to the actual origin-destination route taken but merely in terms of the destination country, in the case of CSO Trade Statistics, or the origin and destination port, in the case of CSO Port Statistics. Thus, it is not possible to construct a map of trade routes from these sources. To get around this problem, a questionnaire was sent to Irish ports and followed up by interviews with port representatives and with others in the shipping and freight forwarding sectors. A copy of the questionnaire is contained in Appendix 5. The analysis in this section is based on the replies to this questionnaire and the follow-up consultations. This section refers to unitised freight only.

3.2.2 LoLo Freight by Route

Four Irish ports have LoLo services with the UK and Continental Europe. Table 3.6 shows the total volume of LoLo freight handled by Irish ports in 2002. Dublin handles almost 70% of all of Ireland's containerised freight and 80% of all RoRo traffic. In 2002, this amounted to 554,500 RoRo units and 456,150 TEUs of LoLo freight.

Table 3.6: LoLo Freight Handled by Port 2002 (000 tonnes)

	LoLo
Cork	956

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[20] Of course, there are other routes operating from these ports to areas outside the study area mostly in southern Europe and bulk routes some of which are to ports in the study area.

Drogheda	484
Dublin	3,392
Waterford	1,087
Total	5,919

Source: CSO *Statistics of Port Traffic 2002*

Maps 1A and 1B shows the total flows of LoLo TEUs to/from the first port of call[21]. In total, these data suggest a certain imbalance in flows but when trade with Britain is excluded there is almost balance in terms of inflows and outflows of TEUs with the continental ports.

Map 1A: LoLo Trade by Partner Port (Export TEUs)

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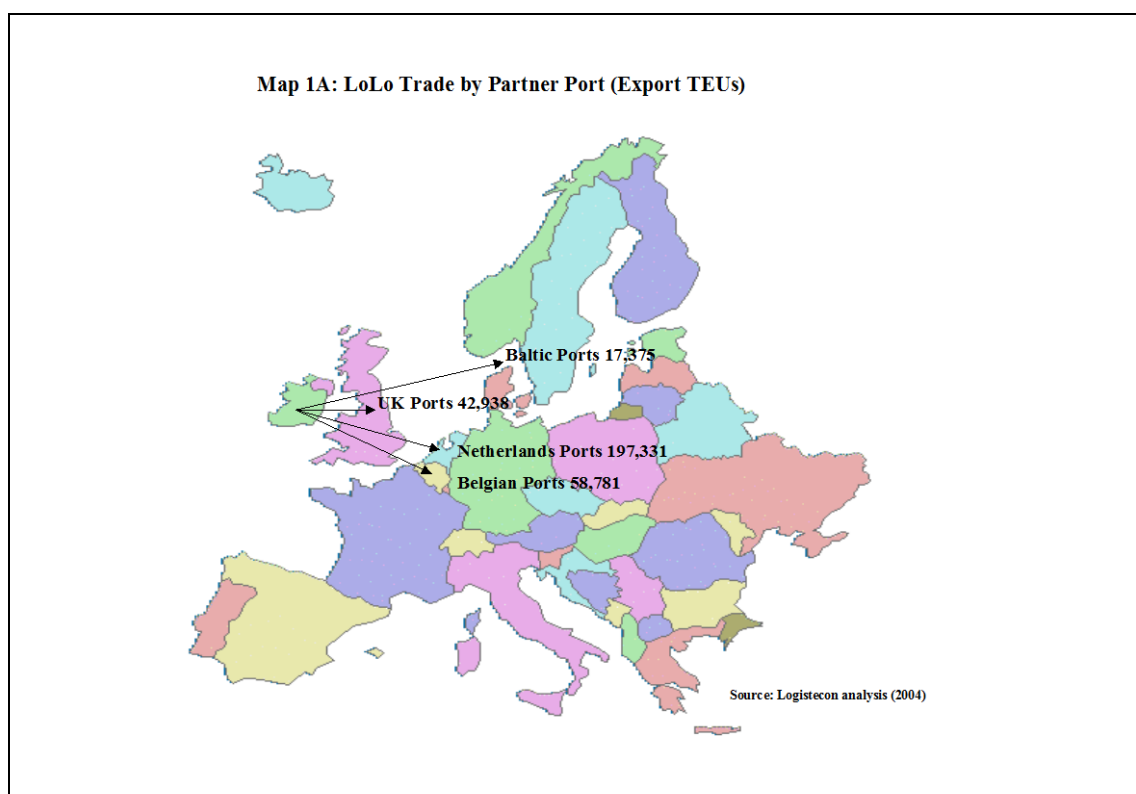
[21] The data for all maps are in Appendix 6.

Map 1B: LoLo Trade by Partner Port (Import TEUs)

Baltic Ports 16,153

UK Ports 79,229

Netherlands Ports 196,341

Belgian Ports 49,157

Source: Logistecon analysis (2004)
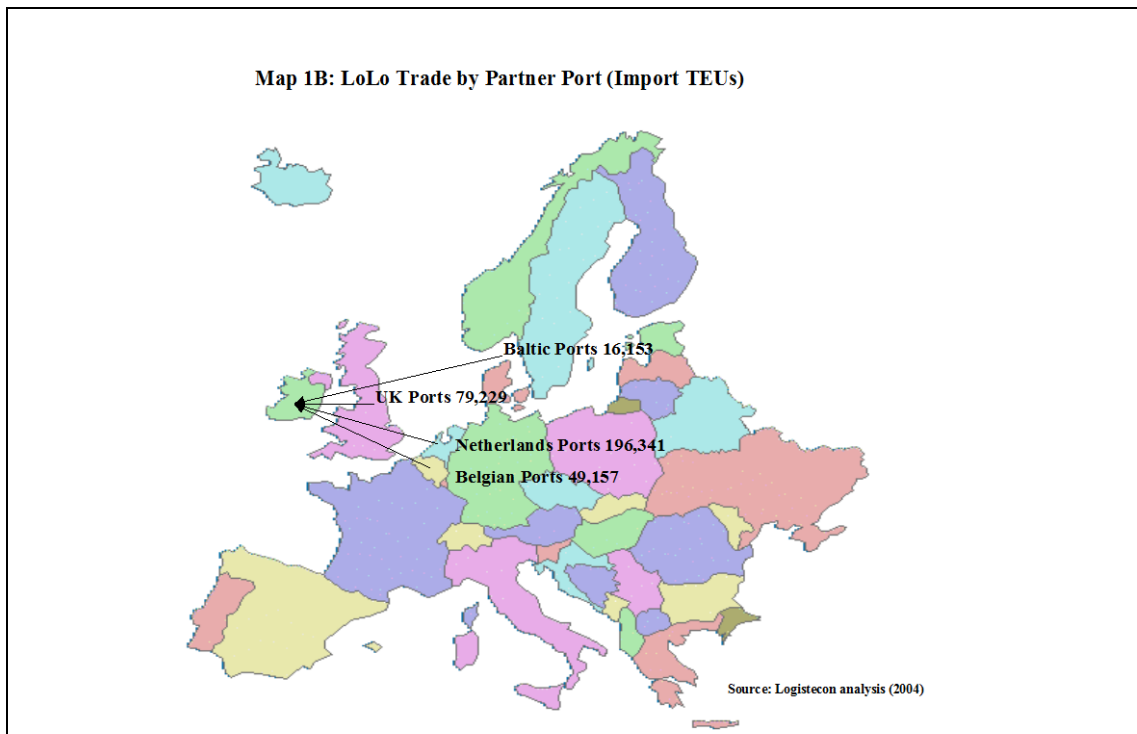
When UK flows are excluded, it is clear that the vast majority of this traffic passes through Belgian ports (19.5% of imports and 17.9% of exports, mostly Antwerp), and Netherlands ports, (Rotterdam 74.5% of imports and 72.6% of exports). Clearly then the work needs to concentrate on these two flows.

The quality of the data that are available on the routes taken by freight through and from Ireland varies depending on the port through which it passes. Ideally, data would be available for all Irish ports to/from final destinations and origins. However, only Drogheda and Cork ports could supply this detail. In the case of Dublin and Waterford it has been necessary to disaggregate the data to get the routes beyond the first/last port outside Ireland. In the case of Waterford it has been deemed appropriate to assume that the routes for containers to/from Rotterdam and Antwerp are the same as in the case of Cork.

This distribution is shown in Maps 2A and 2B for Belgian ports. Maps 3A and 3B shows the distribution of freight through Netherlands ports. Routes from Cork and Waterford have been aggregated and distributed by region according to the Cork flows. Drogheda is then added to these flows. This is undertaken because some ports are concerned about confidentiality if the analysis was done on the basis of identifiable flows.

Map 2A: Non-Dublin LoLo Freight through Belgian Ports by Final Destination (Export TEUs)

Norway, Sweden & Finland 3,328

Latvia, Lithuania & Estonia 46

Denmark & Germany 2,795

Poland, Czech & Slovakia 244

Belg, Neth & Lux 14,909

Source: Logistecon analysis (2004)
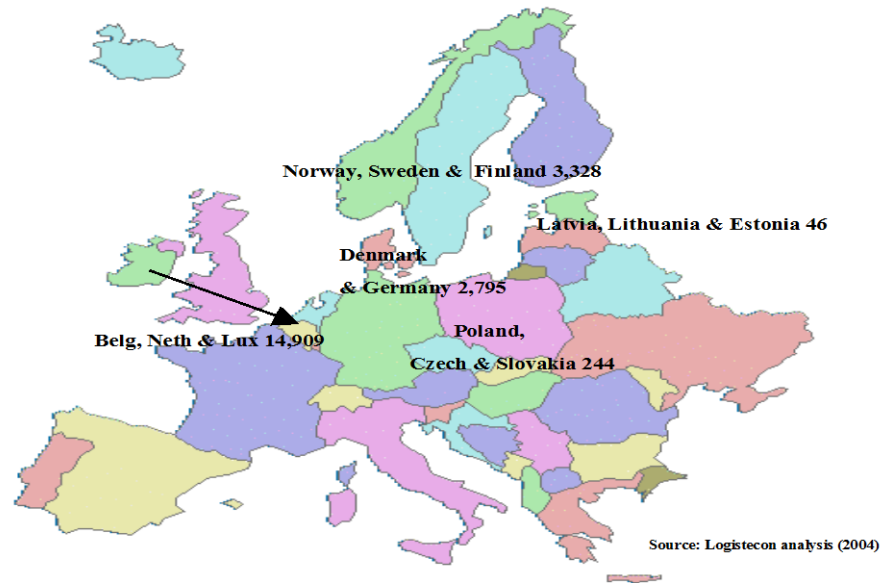
Map 2B: Non-Dublin LoLo Freight through Belgian Ports by Freight Origin (Import TEUs)
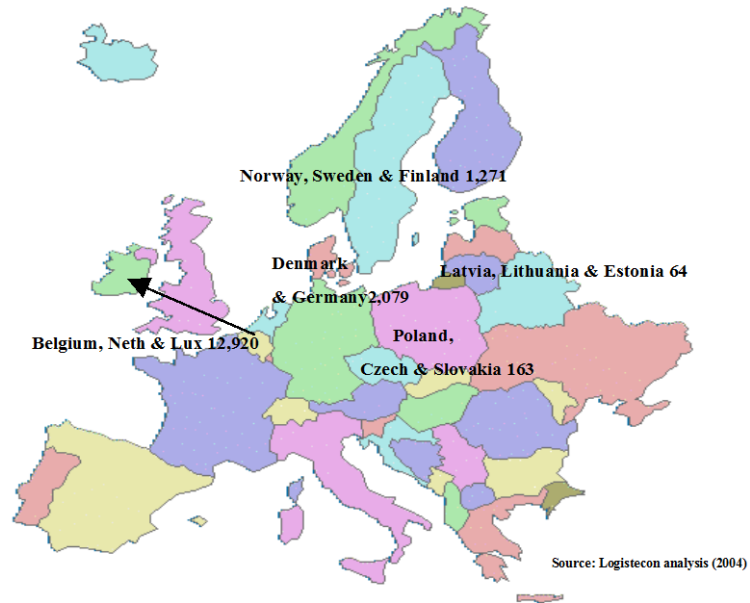
Norway, Sweden & Finland 1,271

Denmark & Germany 2,079

Latvia, Lithuania & Estonia 64

Belgium, Neth & Lux 12,920

Poland, Czech & Slovakia 163

Source: Logistecon analysis (2004)

Map 3A: Non-Dublin LoLo Freight through Netherlands Ports by Final Destination (Export TEUs)

Norway, Sweden & Finland 1,983

Denmark & Germany 10,000

Latvia, Lithuania & Estonia 360

Belgium, Neth & Lux 82,108

Poland, Czech & Slovakia 1,791

Source: Logistecon analysis (2004)

Map 3B: Non-Dublin LoLo Freight through Netherlands Ports by Freight Origin (Import TEUs)

Norway, Sweden & Finland 1,871

Denmark & Germany 11,018

Latvia, Lithuania & Estonia 819

Belgium, Neth & Lux 69,778

Poland, Czech & Slovakia 922

Source: Logistecon analysis (2004)
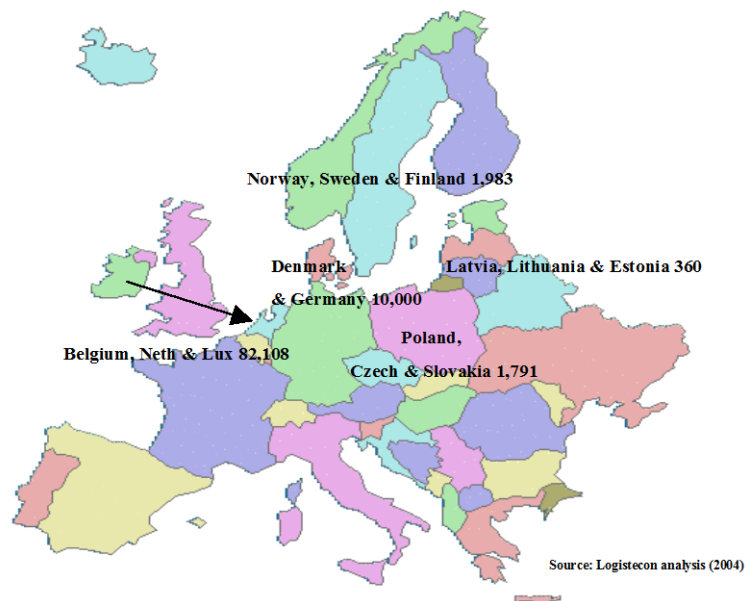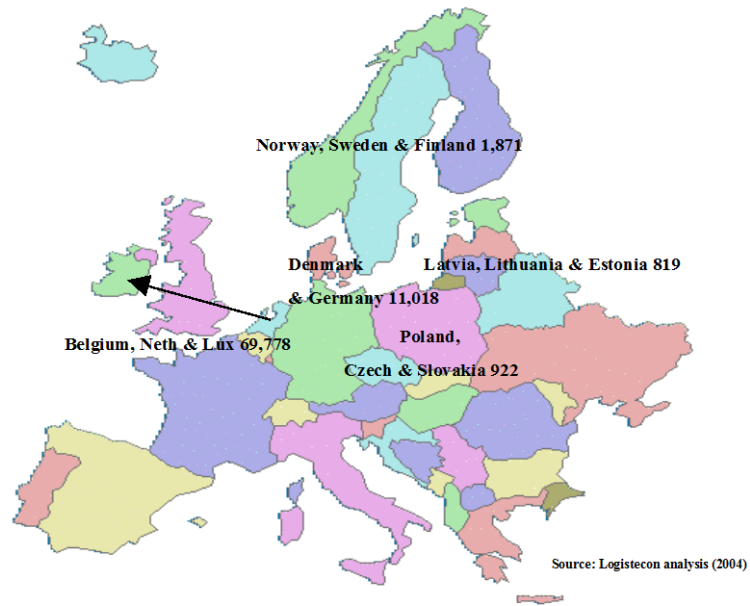
Identifying freight flows in the case of Dublin poses a greater challenge because of its size in terms of the overall transport flows and the greater number of countries which it appears reasonable to assume will be involved. While it is possible to identify the first/last port for the Dublin traffic, it is necessary to aggregate the freight through Rotterdam and Antwerp if the remainder of the routes are to be estimated. Other flows through Swedish and German ports are small and it is assumed below that this freight remains in these countries. The methodology to disaggregate the Dublin flows is based on a separate dataset from the Central Statistics Office. This dataset shows the weight of imports and exports by final country but not the routes taken. The approach taken was as follows. First, the total weight was broken down by SITC sector. On the basis of discussions with transport and port operators, each 2 digit sector was assigned a percentage according to the estimated proportion of LoLo freight in the total freight in that SITC division. In some cases this was either 0% or 100% but intermediate values were also used where mixed modes are likely to be used. This then gives the total weight of freight by trading partner that is carried by LoLo. It was then assumed, again on the basis of contacts, that LoLo exports and imports to Ireland have an average weight of 10 tonnes per TEU. This allowed for the calculation of total TEUs to each trading partner[22]. This then allowed for the distribution of total LoLo freight among the regions to be calculated as shown in Table 3.7.

Table 3.7: Percentage Route Distribution of LoLo Freight between Dublin and Northern Europe

	Imports	Exports
Belgium, Netherlands, Luxembourg	46.3	43.6
Germany, Denmark	46.2	39.8
Norway, Sweden, Finland	3.9	11.6
Latvia, Lithuania, Estonia	0.6	0.6
Poland, Czech Rep, Slovakia	3.0	4.4
	100.0	100.0

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[22] Clearly there are a number of assumptions here that are difficult to prove. However, it was possible to provide a check on the validity of the estimates that would be produced by this methodology by estimating flows to Britain. All the ports were able to provide data for the number of LoLo TEUs to British ports. If it is assumed that all LoLo between Britain and Ireland has an origin/destination in Britain, then doing the calculation as described using the CSO data should provide estimates that are comparable with the data provided by the ports. When this calculation was done it was found that in the case of both imports and exports the estimates produced by the two methods for the number of TEUs involved in LoLo trade with Britain were within 5% of each other.

This distribution was than applied to the number of TEUs from Irish ports to Europe via ports in Belgium and the Netherlands to give the freight flows shown in Maps 4A and 4B. The flows already identified in Maps 2 and 3 were subtracted from the resulting estimates thus giving the flows of LoLo to and from Dublin via Rotterdam and Antwerp.

Map 4A: Dublin LoLo Freight through Belgium & Netherlands Ports by Final Destination (Export TEUs)
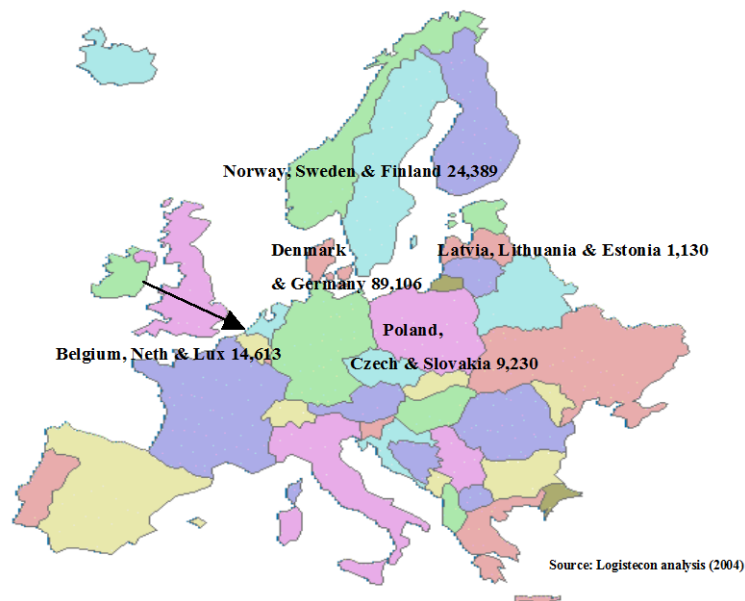
Norway, Sweden & Finland 24,389

Denmark & Germany 89,106

Latvia, Lithuania & Estonia 1,130

Poland, Czech & Slovakia 9,230

Belgium, Neth & Lux 14,613

Source: Logistecon analysis (2004)

Map 4B: Dublin LoLo Freight through Belgium & Netherlands Ports by Freight Origin (Import TEUs)

Norway, Sweden & Finland 6,415

Latvia, Lithuania and Estonia 587

Denmark & Germany 100,121

Poland, Czech & Slovakia 6,267

Belgium, Neth & Lux 30,765

Source: Logistecon analysis (2004)
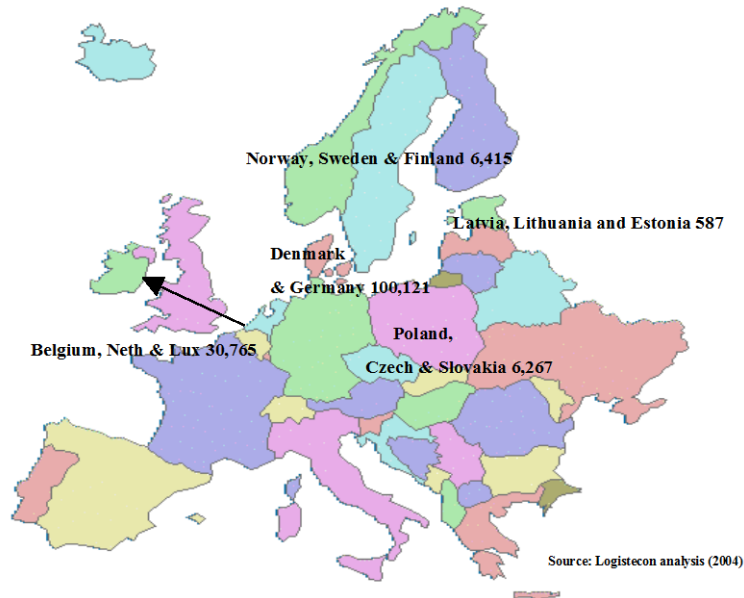
This provides an indication of routes between Dublin and Northern Europe for LoLo freight. However, these estimates should be read as indicative since there are potential sources of error. The first problem arises from the methodology adopted. It is not possible to comment further on this and it is possible that any errors are distributed so that the final estimates are reasonably acceptable. The second potential problem is that it is quite possible that not all LoLo freight into Germany travels through Antwerp and Rotterdam with the possibility that a proportion enters through French ports. This is relevant in the case of Dublin Port which has services to a number of French Ports. However, the data indicate that total TEUs to these ports in 2002 amounted to only about 10% of traffic through Rotterdam and Antwerp. This suggests that the effect of these flows on the estimates would be small. However, if present the impact would be to bias the estimates above somewhat towards Germany with a slight underestimation of flows into the Baltic region. As a result, it would appear appropriate to interpret these estimates as having an error interval in the region of 10%.

3.3   Analysis of RoRo Movement via UK Landbridge

Four Irish ports have RoRo services. Appendix 4 includes details of the RoRo services operating between Ireland and the UK and the limited number of (mostly seasonal) RoRo services between Ireland and France.

Data supplied by Dublin Port show that most of their RoRo activity involved travel to the UK. Out of the total, all but 1,124 units that were forwarded to Cherbourg and 946 units that were received, mostly from Cherbourg with a small number from Spezia and Kiel, involved transport to the UK in 2002. Combining imports and exports, Rosslare handled 1,583,000 tonnes of UK freight and 343,000 tonnes of freight to and from France. CSO *Port Statistics* 2002 indicates the export tonnage through Rosslare to the UK in 2002 was 825,000 tonnes. In the case of Dun Laoghaire, all freight is RoRo with the UK as the first port of call. The average freight tonnage per RoRo vehicle through Dublin was 15.5 tonnes. Total tonnage through Dub Laoghaire in 2002 was 55,000 tonnes forwarded and 91,000 tonnes received.

Table 3.8 shows the total number of RoRo units handled at the ports in 2002.

Table 3.8: RoRo Units through Irish Ports

	Forwarded	Received	Total Units	Tonnage (000's tonnes)
Dublin	257,382	197,114	454,496	7,070
Cork	1,555	2,157	3,712	43
Rosslare	56,950	47,768	104,518	1,797
Dun Laoghaire	15,621	14,714	30,335	146
Total	331,508	261,753	593,061	9,056

Source: CSO *Port Statistics* 2002

The published CSO data for RoRo freight flows to the UK relate to the first port of call only and it is known that a proportion of this traffic will proceed through the UK to other destination countries. Further analysis of these flows is possible by accessing data produced by surveys in the UK and VAT returns in Ireland. The Department for Transport in the UK carried out a survey of foreign vehicles over a six-week period during June and July 2003. The survey comprised around 2,100 interviews with drivers at ports, including Holyhead, and truck stops around Britain[23]. Respondents

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[23] The ports included were Hull, Harwich, Portsmouth and Holyhead. The truck stops were Ashford, Clackett's Lane and Thurrock.

were interviewed on their way out of the UK and provided information on the vehicle and its activity whilst in the UK, the journeys made, goods carried, length of time in the UK and the number of visits to the UK.

The results of the survey show that foreign HGVs moved 10 billion tonne kilometres of freight in the UK over the previous year[24]. Of this, 61% were goods entering the UK, 25% were exports from the UK and 6% represented cabotage in the UK[25]. This means that freight in transit through Britain accounted for 8% (800 million tonne kilometres) of the total.

Irish registered vehicles accounted for 165,625 or 11.5% of all the vehicles leaving ports in Britain in 2002. On average, Irish respondents to the survey indicated that they spend 1.6 days per trip in Britain, compared to an average for all vehicles of 1.7 days. On average, each Irish vehicle visits Britain 47 times per year, well ahead of the average of 26 for all countries and 28 for all EU countries.

Irish registered vehicles accounted for 1.26 billion tonne kilometres (12.4%) of goods moved by foreign vehicles in Britain in the year. However, there is a distinct difference between the activity of Irish vehicles in Britain and vehicles from other countries. For most vehicles, the main purpose in moving freight through Britain is to deliver it within Britain or to collect freight for export. On average, transit through Britain accounts for only 7.4% of freight activity. Of the total carried in transit, Irish registered vehicles accounted for 71.9%, or 535 million tonne kilometres. Consequently, out of the total tonne kilometres for Irish vehicles operating in Britain, 42.5% represented freight in transit. Most of the remainder was accounted for by vehicles registered in the Netherlands and Austria suggesting that this too was freight being transported to Ireland. When activity is measured in terms of distances travelled, 36.4% of the distance travelled by Irish trucks was for freight in transit through Britain and accounted for 67.2% of the total (39 million Km.).

It is clear from this survey that the amount of freight transported to and from Ireland via the landbridge through the UK is considerable. The data from the ports above indicate that the amount of LoLo that is routed through the UK with a 3rd country

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[24] Department for Transport UK (2003) *Transport Statistics Bulletin: Survey of Foreign Vehicle Activity in GB – 2003*.

[25] While some foreign trucks were engaged in cabotage in the UK, the cabotage penetration rate is only 0.4% of the total activity, measured in tonne-kilometres, of UK hauliers activity in the UK, with only a small minority of foreign registered vehicles engaged. Irish registered vehicles accounted for 72 million tonne kilometres or 11.4% of cabotage by foreign registered vehicles in Britain.

origin or destination is very small; a similar conclusion is likely in relation to bulk goods so that most of this freight transport will be composed of RoRo freight. The fact that virtually all RoRo through Dublin, Dun Laoghaire and Rosslare travels to the UK supports this conclusion since it is known that RoRo is increasingly competitive for transport to many European locations.

Data collected in the CSO Road Freight Survey 2002 provide an indication of the routes taken by RoRo freight leaving Ireland. The survey sample is rather small but the data are considered to be reliable enough so that they provide reasonably accurate indicative estimates.

CSO port statistics for 2002 indicate that 3.93 million tonnes of cargo was transported from Ireland by RoRo. Of this, RoRo to Britain accounted for 3.72 million tonnes or just under 95%. The weights provided by the survey can be applied to these aggregate estimates to provide estimates for the routes taken by this freight.

The survey indicates that 59.5% of this freight, about 2.21 million tonnes, had a final destination in the UK. Onward transit to France accounted for 39.6% (1.47 million tonnes), while 0.9% (35,400 tonnes) travelled on by sea to ports in the Netherlands. This last flow had final destinations evenly split between the Netherlands, Denmark and Germany. RoRo that travelled onwards from the UK to France had destinations in a wide range of countries. The survey data show that 23.5% of this freight remained in France while 20.9% travelled North to Belgium and the Netherlands. This amounts to 8.25% of all RoRo freight from Ireland to Britain. A further 26.9% (10.6% of the total) went to Germany and Denmark while 3.6% travelled on the Sweden. Destinations in Southern Europe accounted for the remaining 370,000 tonnes. Map 5 shows the routes taken by the 3.72 million tonnes of RoRo that travelled from Ireland to Britain in 2002.

Map 5: RoRo Freight through Britain by Mainland Europe port of entry (export tonnes)

3,721,000 tonnes of Irish freight travel to UK ports

Onwards to Netherlands Ports 33,500

- 22,500 travels on to Germany & Denmark

Onwards to French Ports 1,473,500

- 308,000 travels on to Belgium & Netherlands

- 396,500 travels on to Germany & Denmark

- 53,000 travels on to Sweden

Source: Logistecon analysis (2004)
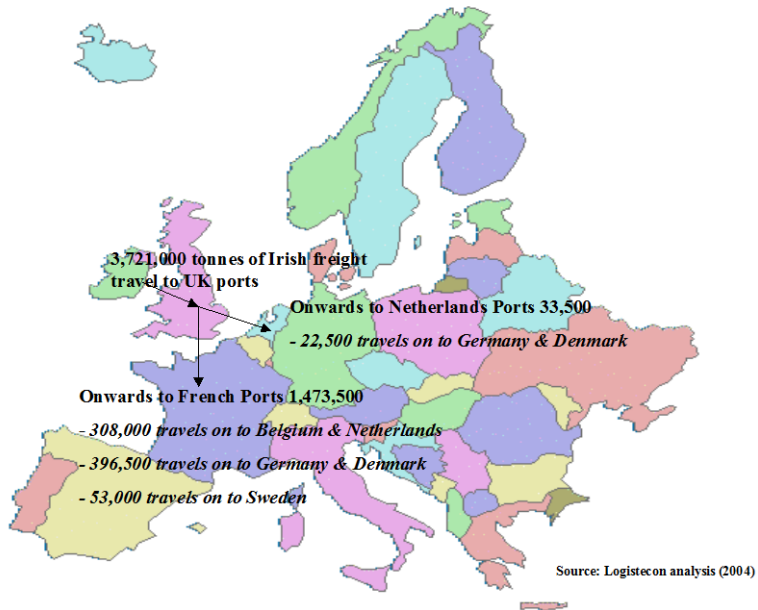
4.   Determinants of the Structure of Freight Routes

4.1   The Growing Importance of Logistics and Supply Chain Management

The previous chapters have considered the nature of Ireland's maritime trade with the study region and the structure of the maritime transport sector supporting the movement of this freight. These freight flows to and from Ireland cannot however be viewed in isolation. Their generation and routing is dictated by the structure of the particular supply chains of which they are essential components. Furthermore, these flows are impacted by various transport and logistics practices. This chapter examines the impact of transport, logistics and supply chain management practices and priorities on maritime trade flows to and from Ireland. In particular the specific drivers and other contextual issues behind the preferred and heterogeneous routings for these freight flows will be considered. This examination is important for three reasons. First, it provides information in relation to the forces that have and will continue to determine freight transport flows and routes from Ireland. Second, it indicates the forces that will determine the future structure of flows, not all of which relate to the issue of costs as identified in this report. In particular it indicates the importance of including the costs of introducing change into any judgements regarding the opportunities that might exist for new routes. Finally, it provides a different approach to the analysis from what was undertaken above in relation to the economic drivers and the more formal analysis in the final parts of this report in relation to the potential impact of developments on non operating costs on route structures.

Supply chain management (SCM) is a relatively recent (i.e. over the last two decades) phenomenon. In the competitive business environment of today it is now generally accepted that supply chains, and not individual firms or products, are the basis of much marketplace competition. This new era of network competition has led leading thinkers on supply chain management to conclude that success will now go to:

> '*those organisations who can better structure, coordinate and manage the relationships with their supply chain partners in a network committed to better, faster and closer relationships with their final customers.*'[26]

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[26] Christopher, M. (2000), 'Relationships and alliances: embracing the era of network competition', in: John Gattorna (ed.) *Strategic Supply Chain Management: Best Practice in Supply Chain Management*, Aldershot, England: Gower Publishing, pp. 272-284.

The supply chain (Figure 4.1) can be described as the end-to-end flow of materials, information and finance upstream from suppliers, via manufacturers and other value-adding entities, downstream to ultimate consumers via distribution channels[27]. In this sense the supply chain of necessity involves various, cooperating firms. For success in today's marketplace attributes such as branding and technological leadership are necessary but not enough: what is key is an efficient supply chain.

Figure 4.1 The Evolution of Logistics & SCM
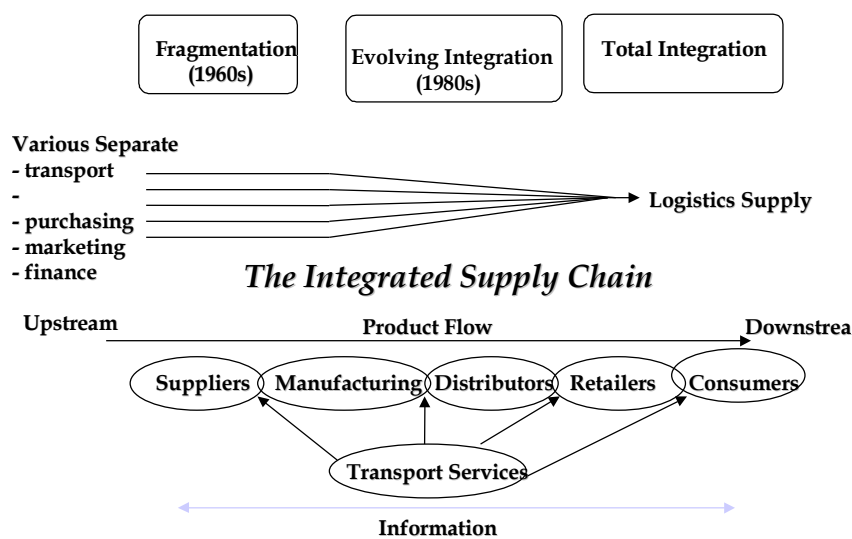
Starting with a situation of fragmentation where the various transport and transport-related functions – such as warehousing, purchasing, marketing, etc. – were viewed as vertically independent operations to be planned and carried out separately with maximum efficiency achieved through limited integration at key nodal points, the supply chain concept has developed as efficiencies were increasingly achieved through greater integration of these functions into an almost seamless operation. Increasingly, this is achieved through specialist service providers who may not own the products or who may not be involved in what was previously considered to be the key central operation of manufacturing. As a result, the manufacturing function increasing came to be seen as locationally footloose and driven by cost considerations further intensifying the importance of achieving efficient supply chains.

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[27] There is a distinction between the terms 'supply chain' and 'logistics' although in practice both are often used interchangeably: logistics is a part of the supply chain but it is not the whole of it, whereas logistics generally concerns freight movement and handling, SCM is a much wider, inter-company boundary spanning concept involving a whole network of organisations..

Total logistics costs (packaging, storage, transport, inventories, administration and management) are variously estimated to reach up to 20% of total production costs and transport usually accounts for a quarter of these logistics costs. Therefore, for these networks of supply chains to function effectively it is necessary for efficient transport systems to be in place. Transport services (links in supply chains) and transport infrastructure (nodes in supply chains) are key elements in such efficient logistics systems and, accordingly, both ports and shipping services play a key role in supply chain competitiveness. In essence then ports and shipping services are the essential lubricants of the supply chain allowing such supply chains to function smoothly and efficiently. According to Cullinane and Song (2002), ports constitute a critical link in the supply chain and their level of efficiency and performance can influence, to a large extent, a country's competitiveness[28].

Moving beyond ports into other parts of the supply chain, it is apparent that competencies and capabilities in both logistics and SCM can not only facilitate a country's competitiveness, but can also be sources of wealth creation. A recent report for both Intertrade Ireland and IBEC-CBI for instance noted that the development of logistics and SCM is crucial to Ireland's success (both North and South) in meeting the challenges of global competitiveness[29].

It is worthwhile to consider briefly some of the key trends shaping supply chain management today, as these in turn will ultimately impact both on the nature of the trade flows that transit ports and how the ports respond to changes in the business environment. Lee (2002) noted that managing supply chains effectively is a complex and challenging task due to the current business trends of expanding product variety, shortening product life cycles, increased outsourcing, globalisation of businesses, and continuous advances in information technology[30]. Concomitant with the trend towards globalisation, many firms today have steadily expanded the geographical scale, or 'logistics reach', of their sourcing and distribution operations. Increased sourcing alternatives are now available with sourcing decisions ultimately determined by total delivered cost, which in turn can be greatly dependent on logistics costs throughout the supply chain. Similarly, many manufacturing firms have been engaging in both vertical specialisation (where firms increasingly focus on their core competencies and subcontract other activities) and focused manufacturing (where production capacity is concentrated in fewer locations). Both of these strategies have added links to global

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[28] Cullinane, Kevin and Dong-Wook Song, 'Port Privatisation Policy and Practice', *Transport Reviews,* Vol. 22, No. 1 (2002), pp 55-75.

[29] *Supply Chain Logistics and Transportation on the Island of Ireland: an Integrated Study*, IBEC-CBI and Intertrade Ireland, 2002.

[30] Hau Lee, "Aligning Supply Chain Strategies with Product Uncertainties," *California Management Review,* Vol. 44, No. 3 (2002), pp. 105-119.

supply chains and increased the transport intensity of production processes. The transport elements of supply chains have become more efficient with service improvements resulting from both market deregulation and increased utilisation of supporting technologies such as track-and-trace systems. Furthermore, the transport cost sensitivity of goods has decreased (increasingly, the nature of goods being transported internationally is higher value / lower volume) thus facilitating further growth in international trade.

All of these trends then are having considerable impacts upon the nature of maritime trade and the role played by ports in the supply chain. Paik and Bagchi (2000) showed that seaports facilitate the exchange of goods and services among the various industry supply chains and thus help enhance the economic well being of a nation[31]. They add that in the global marketplace, materials, subassemblies and finished goods can be sourced worldwide, produced offshore and marketed in many different countries and, as this trend is expected to continue into the future, ports are increasingly regarded as the most critical gateway through which materials and finished goods are transferred. Increasingly, ports are acting as logistics platforms, rather than merely acting as simple transhipment centres. While ports have always been important nodes in logistics systems, globalisation of production has sharpened the need for ports to be value adders, not value subtractors in the supply chain[32]. As value adders, ports are adopting strategies where they identify themselves as part of a wider transport and logistics system and are increasingly providing logistics-related facilities with both shippers and ship-owners demanding new types of services. Thus, for some ports, income is generated through the development of new specialised systems where they may offer capital-intensive transfer systems serving a limited number of customers, or they may provide specialised warehousing or value-added logistics services. In many cases it may be no longer sufficient for measures of port productivity to be related merely to maritime transport, but instead should measure the entire logistics process. An outcome of this development has been the expansion of the port zone to include freight corridors associated with the inland part of the transport chain. In this context, port activities may be categorised into two broad areas:

- Port-specific activities essential to the operation of the port and located within the 'internal' port zone, and

- Port-related activities that are essential in the logistics chain but do not need to take place within the port zone itself.

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[31] Paik, Seung-Kuk and Bagchi, Prabir, "Process reengineering in port operations: a case study," *The International Journal of Logistics Management,* Vol. 11, No. 2 (2000), pp. 59-72.

[32] *The Evolution of Ports in a Competitive World*, p.20, World Bank, October 2001.

Thus in several European ports (e.g. Rotterdam, Hamburg, Marseilles) various 'port' services are provided by companies situated in the port hinterland.

4.2   Trends in European Transport and their Impact on Freight Flows

While the macro-logistical trends outlined in the preceding section are most certainly applicable in the European context, certain other trends can also be identified which are specific to the European context. Furthermore, the policy response at the European level has a considerable impact upon how the transport and logistics sectors function.

Table 4.1 outlines the modal shares for intra-EU goods transport in 2000, the % change in these shares over the preceding decade, and the forecasted growth (with and without policy interventions) for the subsequent decade.

Table 4.1: Intra-EU Freight Transport Shares

Mode	Modal Share - 2000	1990-2000 Change	Forecast Modal Growth 2001-2010: Without policy	Forecast Modal Growth 2001-2010: With policy
Road	44	+34%	50%	38%
Rail	8	+6%	13%	40%
Inland Waterways	4	+18%	25%	40%
Pipelines	3	+8%	13%	13%
Sea	41	+33%	34%	40%

Source: European Commission / Allan (2003)[33]

A number of key trends are apparent from the table. First, road transport has a dominant share for intra-EU freight transportation, and is set to continue to grow going forward, although this growth may be dampened as the mode becomes a target for further policy interventions. The attractiveness of road transportation is easy to understand because of the quick, flexible, and reliable door-to-door services it can offer. The various externalities associated with road transportation, allied with increased congestion in Europe, renders it a prime target for a policy response to

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[33] Allan, J. (December 2003), The Kinnock lecture 2003, *Logistics and Transport Focus*, Institute of Logistics and Transport: Corby, UK.

dampen growth. Ruijgrok[34] details the growing road congestion in Europe and in particular that surrounding the growing concentration of population along the London - Milan axis. For example he estimates the annual economic damage of lost travel time in Germany, the main road freight transit country in Europe, to be approximately US$275m. Similarly, in the UK the Freight Transport Association estimate that without action by 2010 the cost of congestion to the UK supply chain will have grown by £3.6 billion a year on top of what it already is. It is not surprising then that the 2001 EU White Paper on Transport seeks to reduce growth in road haulage with supporting measures aimed at stimulating quite dramatic growth in other modes.

The second significant observation to be drawn from Table 4.1 is the past and projected growth in the share of intra-EU shipping and the targeting of this mode by policy makers for further growth. Inland waterways and rail are also targeted for significant policy stimulated growth, although whether this can be achieved, especially for rail given its current low share, remains to be seen. The growth of intra-EU freight traffic is easy to understand with the addition of 10 more member states, a population increase of 75 million, an increase in land area by one third and an increase in economic output by one-third. This growth will be augmented by both increased globalisation of trade and productivity increases in transportation.

4.3   Logistics Network Configuration in Europe

Since the creation of the Single European Market (SEM) in 1992, there has been a shift by companies serving the region to view it as a single market. From a logistics standpoint, the challenge for such companies seeking to supply customers uniformly throughout Europe is to accept the differing requirements of customers in different countries and aim to exploit common processes where possible for fulfilling demand from these customers. One of the most prevalent logistical strategies for serving the European market has been the trend towards centralisation of inventory (Ruijgrok)[35]. Such centralisation of inventory often leads to increased freight movements across Europe. Meanwhile, economies of scale in terminal and vehicle operation have led to the concentration of international trade through a smaller number of hub ports and airports. Such network reconfiguration has considerable implications for short sea shipping in Europe as, increasingly, intercontinental vessels only ply to the larger European ports which in turn are served by feeder services from regional ports. In

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[34] Ruijgrok, C. (2001), European transport: insights and challenges, in *Handbook of Logistics and Supply Chain Management*, edited by Brewer *et al*, Pergamon/Elsevier: Oxford.

[35] *Ibid.*

terms of logistics service provision, the concept of a single provider of logistics services throughout Europe is, for many European manufacturers and distributors, an attractive, but possibly elusive, proposition. In this regard Lewis[36] reports the frustration of many companies with the slow rate of progress being made by the larger logistics service providers in providing a truly pan-European service.

In transport economics, one of the simplest ways to estimate traffic growth between two regions is to apply the *Gravity Model*[37]. Put simply, the model suggests that traffic will *grow* between two points in proportion to the size and economic output of these points, but will *decay* the further apart the two points are. While this model can be applied at the macro level to estimate total freight trips between Ireland and the study region, it would be very unwise to migrate from this position to an estimation of particular flows for maritime routes between Ireland and European ports. The reason for this lies in the complex allocation of maritime freight to various route combinations and the heterogeneous and complex factors which dictate this allocation. The purpose of this section of our report is to highlight these heterogeneous and complex factors which mitigate against such a simple origin - destination route analysis. As part of our analysis we conducted a series of discussions with various industry experts who indicated that the following factors can dictate the actual nature of maritime freight flows:

- Transit traffic mixing with point to point traffic: Intercontinental freight traffic increasingly enters and exits Europe only via selected gateway ports and corridors, with feeder services taking such freight on the first / final leg of its journey. The considerable container flows then between Ireland and Benelux, for example, are not only a function of trade between both regions, but more critically also include significant intercontinental freight volumes. In contrast other gateways are less obvious and so the mixing of intercontinental and point to point traffic may be less evident. An example in this regard is East Asian and Russian traffic entering Europe over Scandinavia and the Baltic Region and mixing with 'domestic' European traffic for the first / last leg of its journey from / to Ireland as appropriate. Shipping services to and from Ireland to these feeder gateways will thus develop not in response to 'domestic' European traffic but rather to feed the intercontinental traffic. Indeed it could be argued that the intercontinental traffic on the feeder routes 'subsidises' the

[36] Lewis, C. (December 2003), What is happening in European supply chains?, *Logistics and Transport Focus*, Institute of Logistics and Transport: Corby, UK.

[37] See, for example, Ortuzar, J. de dios and Willumsen, L. (1994) *Modelling Transport* (2nd ed.), Wiley, Chichester.

'domestic' traffic in that the latter traffic would have to pay higher rates if there was less dense traffic volumes on its preferred routes.

- Large logistics hubs 'pulling' traffic in certain directions: The large third party logistics service providers (3PLs) are increasing the volume of traffic which they handle in Europe. There is an increasing tendency for these 3PLs to route freight traffic via key logistics hubs for a variety of reasons, for example:

    - Individual shipments are often consolidated with other shipments in order to benefit from scale economies in transportation, resulting in such individual shipments often taking routings not on the natural shortest path between shipment origin and destination. Increasingly then shipments will be first routed to the 3PLs hub before on-forwarding to final destination.

    - As well as providing basic transportation, many 3PLs also provide other value-added logistics (VAL) services at their hubs. Examples of such services include pick-and-pack, vendor hubbing, light manufacturing, merge-in-transit, cross-docking etc, thus necessitating shipment flows to and from these hubs. As an example, one large multinational with considerable exports from Ireland routes most of its European traffic (generally regardless of actual destination) first by surface to Benelux and onto a 3PL hub in Northern Germany before on-forwarding to final destination. Similarly, certain traffic flows handled by one 3PL and destined for intercontinental air freighting are first shipped by surface to Benelux in order to access that 3PL's preferred intercontinental air freight carrier.

- Differences within and between inbound and outbound freight rates: In 2002 some 32 million tonnes of freight were imported by sea into Ireland while under 13 million tonnes were exported. Clearly then more freight capacity is available for exports, resulting in lower freight rates, while considerably higher rates apply for import traffic. Individual shipments may thus take certain routings in order to leverage differences in freight rates. A further issue which arises from such trade imbalances are various equipment issues (such as variations in box sizes, availability of empty boxes, imbalances in required volumes of reefer units, etc.) which can also dictate particular traffic flows.

- Factors surrounding port and shipping company choice: The decision regarding which port and shipping service to use is a key issue in determining the route that freight flows will follow. The preferences of the customers of any port, both direct customers (shipping lines and third party service

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              ┌─────────────────────────────┐
              │   Potential for SSS services │
              │        dictated by          │
              └─────────────────────────────┘
              ↙                               ↘
┌─────────────────────────────┐       ┌─────────────────────────────┐
│   Supply Chain Issues       │       │   Transport Chain Issues    │
│                             │       │                             │
│ -  Fit with logistics service│      │ -  Diversionary impact of landside │
│    providers' requirements  │       │    tolls, congestion charges, etc │
│                             │       │                             │
│ -  Ability to pass cost     │       └─────────────────────────────┘
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Two important conclusions emerge from this analysis. First, while these structures will evolve over time, there is also considerable inertia to change. This inertia arises from three sources. The first is the complexity and the difficulty of identifying specific changes and the optimal way to address these. The second issue is risk and the specific risks that are attached to first-mover investments. Thus, while the economic centre of gravity may indeed be moving east, it would be expected that support firms would move at a relatively slower pace making only minimal incremental changes until a major movement becomes inevitable. At this stage, the risk of not altering activities exceeds the risk of change. Finally, there are large costs associated with moving major logistics centres and investment will be delayed until trade flows are large so as to shorten the pay-back period. Thus, the impact of Eastern expansion on trade flows would be expected to be less than the economic analysis might suggest.

The second conclusion, with respect to identifying the impact of a single issue such as non-operating costs for road transport firms, is that one factor alone is unlikely to achieve a major change in activities. This explains why efforts to change modal usage in Europe through economic measures have had limited results to date. Obviously cost factors are important. However, the key issue is in relation to who ultimately pays the costs. Faced with a situation where all transporters are faced with known, measurable and similar increases in road costs, and risks and uncertain costs if they undertake initiatives to avoid these expenses, there is a clear incentive to allow economic and market forces to allocate these costs towards consumers. In other words, the logistics providers in the absence of a major structural change to this sector can avoid most of the costs through a risk free strategy that might – at least in the

short term – have a higher payback that a riskier strategy to avoid the costs altogether through changing the established structure of the sector.

5.   Policy and Cost Drivers

5.1   Review of Relevant EU Policy and Potential Grant-aid

There are currently a number of relevant EU grant schemes along with schemes in individual member states for promoting short sea shipping and / or intermodal transport. In addition, in some cases general grant schemes are sometimes also applicable, although they are not specifically focused on short sea shipping or intermodal transport. Two European Commission supported schemes are 'Marco Polo' and the 'Motorways of the Sea'.

The Marco Polo programme supports actions in the freight transport, logistics and other relevant markets. The purpose of the programme is to help shift the expected aggregate increase in international road freight traffic to short sea shipping, rail and inland waterways or to a combination of modes of transport in which road journeys are as short as possible. The timeframe of Marco Polo is from 2003-2010 with a budget of €115 million.

The Marco Polo programme features three types of action:

- *Modal shift actions*, which focus on shifting as much freight as possible under current market conditions from road to short sea shipping, rail and inland waterways. Under this type of action, aid is given to start-up new services, and also to significantly enhance existing services. Up to 30% of the costs of setting-up a new service may be co-funded, with a minimum of €1 million.

- *Catalyst actions*, which seek to change the way non-road freight transport is conducted in the community. This is essentially done in three steps by applicants: first the barrier must be clearly defined, then a highly innovative solution should be presented, and finally a modal shift service of great growth potential for freight transport is to be proposed for timely implementation. Results will need to be foreseen within the duration of the subsidy. The maximum aid level is 35%, with a minimum of €3 million.

- *Common learning actions*, to enhance knowledge in the freight logistics sector and foster advanced methods and procedures of co-operation in the freight

market. Under this type of action improvement of co-operation and sharing of know-how is subsidised: '*coping with an increasingly complex transport and logistics market*'. The maximum level of funding is 50%, with a minimum €500,000.

The Motorways of the Seas initiative focuses on stimulating short sea transport on specific corridors. The EU decided to include this project in the list of Trans-European transport (Ten-T) projects. The motorways of the sea established four primary maritime transport networks within EU waters:

- Motorway of the Baltic Sea (linking the Baltic sea member states with member states in central and western Europe)

- Motorway of the sea of western Europe (leading from the Iberian peninsula via the Atlantic Arc to the North Sea and Irish Sea)

- Motorway of the sea of south-east Europe (connecting the Adriatic sea to the Ionian sea and the Eastern Mediterranean to include Cyprus)

- Motorway of the sea of south-west Europe (western Mediterranean), connecting Spain, France, Italy and including Malta, and linking with the motorway of the sea of south-east Europe.

A grant scheme is planned under this program, but it is not yet clear in what way and under which conditions grants will be paid.

Two additional grant schemes, in France and the UK, are of interest in the context of this report. A scheme is also at the planning stage in Spain although no information can be confirmed, while a grant scheme on intermodal transport was in existence in Belgium (Flanders) until it expired at end 2003.

The French aid scheme aims at promoting combined transport. The aid is paid to the operators of combined transport services who assemble the various links in the logistical chain. The aid scheme is intended to offset the handicap imposed by the transhipment operation inherent in intermodal chains but absent from door-to-door road transport. The scheme operates from 2003 to 2007, with an annual budget of some €30-40 million. The new scheme replaces the operating subsidy per tonne-kilometre that the French State currently pays to French railways and French waterways, to operators who set up scheduled services for the transport of containers by river. The scheme covers all categories of intermodal transport: rail, river and short sea shipping. The aim is to enable combined transport operators to provide competitively priced services in order to promote the development of this transport system. It provides for a flat rate payment per intermodal transport unit transhipped at a land terminal or port situated on metropolitan French territory and per intermodal transport unit transiting through a transport hub during national and international transport for import/export

In the UK the Freight Facilities Grant (FFG), which started in 2003, operates as a 10-year aid scheme. The total aid in the first three years is about €80 million. The maximum grants will be 50% of the total project costs for facilities. The FFG has a dual purpose. It is designed to encourage a shift of freight currently travelling by road to water and also to ensure that freight currently on water does not transfer to road. The FFG does this by assisting companies with the capital costs of new freight handling facilities, improvement of existing facilities or investment which would re-open dormant facilities. Most facilities needed to handle or carry freight on water are eligible for grant but capital expenditure must be involved. Design and construction costs associated exclusively with the water freight facility are also likely to be eligible.

The FFG can be paid towards leased capital assets, such as barges, provided the assets are specifically purchased or refurbished by the lessor to meet the requirements of the lessee in reduced leasing charges. The FFG will *not* normally be paid where:

- The freight facility can be commercially justified or would proceed anyway without FFG

- Contracts for construction work or for water haulage have already been put in place or construction work has started in respect of the facility that is the subject of the grant application before the grant has been approved

- The environmental benefits to be gained are insufficient to justify a grant

- Road transport is not possible

- Increase in costs above the estimate on which the grant application was assessed

- Establishment charges and overhead during design and / or construction costs incurred in obtaining statutory planning approval for any part of the project

- Costs incurred in preparing or processing the grant application, auditing claims for payment of grant or arising from capitalisation of interest.

Up until December 31, 2003, the Flanders government offered a grant for combined transport. This grant subsidised between 7.5 % and 15 % of the costs for investing in the following items:

- Containers, swapbodies, and trailers, which have been specifically built for combined transport and which are used for 80% of the time for combined transport

- Investment in transhipment equipment in intermodal loading and unloading systems that have been specifically built for combined transport

- Investments in electronic information systems that increase the reliability of combined transport.

5.2   Planned New Toll Systems in Europe

Appendix 7 contains details on tolls, permits and licence costs for HGVs in various European countries. The proposed introduction of the LKW-Maut in Germany is discussed below, as are plans in the UK for HGV road charging to take effect from 2006, although the exact start date is still not definite. Planned for introduction before now, but delayed for various reasons, the latest estimate for introduction in Germany of the LKW-Maut is early 2005. The successful introduction of the Austrian Maut earlier in 2004 is also detailed in Appendix 7.

5.2.1   LKW-Maut in Germany

The German Federal Government has decided to redistribute the costs of maintaining, expanding, and renovating German motorways among domestic and foreign users by introducing a toll on commercial trucking based on the distance travelled by all trucks weighing 12 tonnes or over. The time-based motorway toll (Eurovignette) will no longer be collected after introduction of the distance-based toll (LKW-Maut). All vehicles or vehicle combinations with a permissible gross weight of 12 tonnes and above, which are exclusively intended for use in transporting freight, will be required to pay this toll, regardless of their country of origin. Whether the truck is loaded or empty has no bearing on the duty to pay the toll which will apply to all German motorways, including service stations and rest areas. It also applies to urban expressways and begins with the ramp to the motorway. The introduction date of the distance-based toll was initially planned to become for August 31 in 2003, but has been postponed several times. Latest plans are to introduce the Maut in early 2005. Vehicle classification categories in preparation for this introduction are shown in Table 5.1.

Table 5.1: Vehicles Classification Based on the Current Toll Rate Regulations

	Category A	Category B	Category C
Until 30 Sept. 2006	S4, S5 and EEV Class 1	S3 and S2	S1 and vehicles that do not belong to any

			pollution class
1 Oct. 2006 to 30 Sept. 2009	S5 and EEV Class 1	S4 and S3	S2, S1 and vehicles that do not belong to any pollution class
Commencing 1 Oct. 2009	EEV Class 1	S5 and S4	S3, S2, S1 and vehicles that do not belong to any pollution class

The amount of tolls payable per kilometre based on these classifications is shown in Table 5.2

Table 5.2: Current Toll Rates

	Category A	Category B	Category C
Up to three axles	€ 0.09	€ 0.11	€ 0.13
Four or more axles	€ 0.10	€ 0.12	€ 0.14

5.2.2   HGV road charging plans in the UK

In April 2002, Ministers from both the UK Treasury and the Department for Transport announced that they would introduce a UK-wide road-user charge for all HGVs - including foreign HGVs - using UK roads. They promised that, at the same time, there would be offsetting tax cuts for the industry. Since that announcement, the Government has decided that the tax cuts will take the form of reduced duty on fuel for HGVs liable to the charge. Ministers hope that implementation of the charge will begin around 2006, but cannot be sure of an exact start date until it has been agreed with the market what can be delivered and thoroughly tested. Ministers will need to ensure that the right balance is struck between early introduction and quality and reliability. The proposed charge will apply to the use of UK roads by all HGVs over 3.5 tonnes. Unlike other EU countries, the UK has a comprehensive non-motorway network that is used for long-distance travel. Rates are likely to be structured so that heavier and more polluting HGVs pay a higher rate. It has also been decided to simplify the proposed charge so that it has no more than two basic rates (one for motorways and one for other roads) at least initially, although there may be additional variants on these rates according to time of day. No exact rates have been communicated so far.

5.3   Road Haulage Cost Drivers and Components

Appendix 8 contains rate comparisons for mainland Europe haulage, while estimates of typical haulage cost components are contained in Appendix 9. These data have been used, along with the data above on freight flows, to enable a statistical analysis of the potential impact of changes in underlying cost factors on the structure of flows. The methodology is based on the calculation of the percentage change in underlying costs that would occur as a result of the introduction of proposed road charges. Appropriate demand elasticities from the literature are then applied to these results to indicate the potential for this change to alter trade flows.

The most important cost drivers to be included in estimating the costs of road haulage are the vehicle type, the distance travelled in a year and the incidence of country-specific tolls and taxes. The costs have been calculated for a 44-tonne, 5-axle truck with trailer, which is commonly used in international transport on the Continent. It is assumed that the truck has a performance of 150,000 km's per annum.

The cost components associated with this truck can be split into four categories:

- Fixed cost
- Variable cost
- Staff
- Overhead

The rates, assumptions and calculations are based on road haulage cost analysis as used in TLN and the EU's COST-334 study that have been updated to reflect recent changes in some key figures such as fuel prices and other operating costs[39]. The fixed costs entered into the calculation include depreciation of the main components, interest, taxes, insurances and other fixed costs.

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[39] Note that the cost items included are not necessarily Irish costs but average costs for north European country. These most closely correspond to costs in the Netherlands. To use Irish costs throughout would be to assume that the trucks using these routes are Irish. Not only is there no basis for this but it is also open for Irish operators to base their operations in the most economically advantageous location and pay local costs.

Depreciation is based on a new tractor unit costing €81,600 and a new trailer worth €13,500. These costs include items such as registration, transaction costs and other costs associated with property transfer. The calculation assumes a standard linear depreciation over 6 years with 150,000 km travelled per year. This gives a yearly cost of depreciation of €15,850. Interest is calculated at a rate of 8% per annum on the non-depreciated amount of capital invested. This amounts to an average of €3,804 per annum. Motor Vehicle Tax on this unit is estimated at €900 per year while the Eurovignette levy amounts to €1,250 per annum. This gives a total cost of €2,150 per annum. Insurance is assumed to include cover for 3rd party (i.e. civil responsibility), fire and theft, and includes a cost for relevant taxes on this item. This amounts to €4,800 per year.

Variable costs include fuel, tyres, oil, maintenance and repairs and motorway tolls. The cost of fuel is calculated on the basis of a trade price of €0.35 per litre, excise duties of €0.35 per litre, and consumption of 1 litre per 3.2 km over the assumed distance travelled of 150,000 kilometres per year. This gives a total cost of fuel (ex VAT) of €32,813 per annum. The cost of oil is also included at a rate of €0.042 per km. Based on the typical wear pattern of a tyre on a truck such as this, the cost per tyre is estimated at €0.002 per tyre per kilometre. Assuming 4 tyres for the tractor unit and 6 tyres for the trailer, this gives an annual cost of €3,000 for tyres. Maintenance and repairs includes an estimate for spare parts of €0.05 Euro per km and labour costs incurred in maintenance of €4,800 per annum. Clearly, the cost of motorway tolls and trip permits is important for this analysis but it is not possible to place a value on this at this stage as it depends on the route that is taken. This is analysed below.

The final category of costs refers to staff operating costs and an estimate for overheads and the required margin. Driver costs are based on an estimate for wages and social charges in the Netherlands and amount to €47,960 per year. Overheads are estimated to amount to 15% of total costs while the required margin is estimated at 5% of costs.

Together these items amount to an average cost of €1.06 Euro per kilometre.   These costs are summarised in Table 5.3.

Table 5.3: Haulage Cost Categories and Cost per Vehicle Km. (40 ft container)

Category	Type	Annual Costs
Fixed costs	Depreciation	€ 15,850
	Interest	€ 3,804
	Taxes	€ 2,150
	Insurance	€ 4,800

Variable costs	Fuel	€ 32,813
	Oil	€ 6,300
	Tyres	€ 3,000
	Maintenance and repairs	€ 4,800
	Motorway tolls and trip permits	€ 0
Staff	Salary costs	€ 47,960
Overhead and margin	Overhead	€ 22,761
	Margin	€ 7,587
Total		€ 159,324
Total price per kilometre (40 ft. container)		€ 1.06

These costs are used in the analysis in Section 6 below.

6.   Statistical Analysis of Freight Transport Costs

6.1   LoLo Transport Costs on Irish SSS-routes

6.1.1   *Short-sea Shipping Routes in the Corridor*

The scope of this analysis is defined by a framework of 19 destinations in the North-western part of Europe using Dublin as the origin point. This origin-destination model provides 19 different origin-destination (OD) relations that form the basis for defining intermodal door-to-door routes. Most of these routes involve the use of a transhipment port – either Rotterdam or Antwerp – but some involve the use of only 1 port. This analysis is not strictly based on the existing structure of flows – which, as discussed above, are in part the result of established routes and locations – but on the routes that would most likely be chosen if starting from scratch to minimise distance travelled.

In the case of 16 destinations, logic demands that only one preferable intermodal route is defined, but for the destinations of Warsaw, Krakow, Prague and Bratislava, it is necessary to define several alternative routes. As a result, the analysis is based on a total of 28 different routes that comprise the totality of OD relations. Two routes are distinguished in the case of Warsaw, one via the port of Gdynia and one via using the port of Hamburg. In the case of Krakow, it is necessary to distinguish three different routes, via the destination ports of Gdynia, Hamburg, and Rotterdam. For Prague and Bratislava, the model distinguishes four different routes in each case i.e. travel via Hamburg, Bremerhaven, Rotterdam or Antwerp as destination ports. The full range of routes including transhipment and destination ports is summarised in Table 6.1.

Table 6.1: Dublin–Destination Short Sea Shipping Routes in NW Europe

Origin	Destination	Transhipment port	Destination port
Dublin	Brussels		Antwerp
Dublin	Amsterdam		Rotterdam
Dublin	Hamburg	Rotterdam/Antwerp	Hamburg
Dublin	Bremen	Rotterdam/Antwerp	Bremen
Dublin	Dortmund		Antwerp
Dublin	Munich		Antwerp

Dublin	Copenhagen	Rotterdam/Antwerp	Copenhagen
Dublin	Arhus	Rotterdam/Antwerp	Arhus
Dublin	Oslo	Rotterdam/Antwerp	Oslo
Dublin	Goteborg	Rotterdam/Antwerp	Goteborg
Dublin	Stockholm	Rotterdam/Antwerp	Stockholm
Dublin	Helsinki	Rotterdam/Antwerp	Helsinki
Dublin	Tallinn	Antwerp	Tallinn
Dublin	Riga	Rotterdam/Antwerp	Riga
Dublin	Vilnius	Rotterdam/Antwerp	Klaipeda
Dublin	Warsaw	Rotterdam/Antwerp	Gdynia
Dublin	Warsaw	Rotterdam/Antwerp	Hamburg
Dublin	Krakow	Rotterdam/Antwerp	Gdynia
Dublin	Krakow	Rotterdam/Antwerp	Hamburg
Dublin	Krakow		Rotterdam
Dublin	Prague	Rotterdam/Antwerp	Hamburg
Dublin	Prague	Rotterdam/Antwerp	Bremerhaven
Dublin	Prague		Rotterdam
Dublin	Prague		Antwerp
Dublin	Bratislava	Rotterdam/Antwerp	Hamburg
Dublin	Bratislava	Rotterdam/Antwerp	Bremerhaven
Dublin	Bratislava		Rotterdam
Dublin	Bratislava		Antwerp

6.1.2   Transport Costs by Route

All routes include pre and post haulage by road. Pre haulage to the port of Dublin is
assumed to be 30 km. The cost of this is based on the estimated price to transport a
40 feet container by road, without tolls and charges, of €1.06 per kilometre. Estimates
of feeder prices for a 40 feet container between ports are based on a series of
telephone interviews with liner operators. This work produced the prices shown in
Table 6.2, including terminal handling costs (THC), for use in the analysis.

Table 6.2: Feeder Costs for Containers between Ports

Route	Cost	Operator
Rotterdam – Dublin	€525	BG Freight Line
Antwerp – Dublin	€525	BG Freight Line
Zeebrugge – Waterford	€613	C2C Lines
Rotterdam – Waterford	€900	Norfolk Line
Rotterdam – Bremen/Hamburg	€430	Unifeeder
Rotterdam – Felixstowe	€375	BG Freight
R'dam/Antwerp – Denmark	€550	Various
R'dam/Antwerp – Norway	€750	La Line
R'dam/Antwerp – Sweden	€585	Unifeeder
R'dam/Antwerp – Finland	€996	Containerships Ltd
Rotterdam – Tallinn/St Petersburg	€1,000	Unifeeder / Nord Container
Rotterdam – Poland	€675	Estimate
Hamburg/Bremen – Poland	€540	BCT

Using these data, the costs of door-to-door transport on the different routes can be calculated for the various routes in the analysis. These are shown in Table 6.3.

Table 6.3: Cost Associated with Defined Short Sea Shipping Routes

Destination	Destination port	Road cost	Sea cost	Total d2d cost	% road costs
Brussels	Antwerp	85	525	610	14%
Amsterdam	Rotterdam	117	525	642	18%
Hamburg	Hamburg	64	955	1,019	6%
Bremen	Bremen	100	955	1,055	9%
Dortmund	Antwerp	288	525	813	35%
Munich	Antwerp	843	525	1,368	62%
Copenhagen	Copenhagen	64	1076	1,139	6%
Arhus	Arhus	64	1076	1,139	6%
Oslo	Oslo	64	1275	1,339	5%
Goteborg	Goteborg	53	1110	1,163	5%
Stockholm	Stockholm	64	1110	1,174	5%
Helsinki	Helsinki	64	1521	1,585	4%
Tallinn	Tallinn	64	1525	1,589	4%
Riga	Riga	64	1525	1,589	4%
Vilnius	Klaipeda	361	1525	1,886	19%
Warsaw	Gdynia	420	1200	1,620	26%
Warsaw	Hamburg	956	955	1,911	50%
Krakow	Gdynia	685	1200	1,885	36%
Krakow	Hamburg	998	955	1,953	51%
Krakow	Rotterdam	1,367	525	1,892	72%
Prague	Hamburg	712	955	1,667	43%
Prague	Bremerhaven	737	955	1,692	44%
Prague	Rotterdam	1,001	525	1,526	66%
Prague	Antwerp	1,002	525	1,527	66%
Bratislava	Hamburg	1,062	955	2,017	53%
Bratislava	Bremerhaven	1,088	955	2,043	53%
Bratislava	Rotterdam	1,335	525	1,860	72%
Bratislava	Antwerp	1,269	525	1,794	71%

The various destinations can be categorised according to the percentage of road transport costs in the total costs. Obviously, destinations situated close to a port will have a small share of road transport costs in the total door-to-door costs, while destinations more towards central Europe will have a much higher share of road transport in the total costs. Doing this categorisation allows for the cheapest way to ship containers between Dublin and the various destinations to be estimated. This is shown in Table 6.4. It is meaningful to look at the balance of routes to the central destinations since it is expected that there is the greatest opportunity in these cases for substitution of existing routes which utilise considerable overland travel with new routes that travel a greater proportion of the journey via sea. Four destinations appear particularly relevant: Warsaw, Gdynia, Prague and Bratislava.

The cheapest way to ship a container to Warsaw is via Gdynia. Though the sea transport is longer than to Hamburg, it takes a truck almost 7 hours shorter travel time to the destination as it travels only 420 km instead of 956 km if it uses Hamburg. In the case of Krakow, transit via Gdynia is also the cheapest way to ship a container although the difference with Rotterdam is small. Travel via Gdynia takes a truck more than 5 hours shorter travel time to the destination compared to road transport from Rotterdam (956 km as against 1367 km), but sea transport will take much longer. This makes Rotterdam more attractive as the port of destination on this route. For Prague, the cheapest way to ship a container is via Antwerp or Rotterdam. Transhipment via Hamburg is slightly more expensive although it takes 3 to 3.5 hours shorter road transport time. This is insufficient to compensate for the difference in sea transport costs to Hamburg. The cheapest way to Bratislava is also via Antwerp. Transhipment via Hamburg reduces road transport time by less than 2 hours which is insufficient to compensate for the longer sea transport to Hamburg. In this case the difference is substantial with transhipment via Antwerp about € 225 cheaper to use. In summary, therefore, with the possible exception of Warsaw where Gdynia offers a competitive alternative, the costs data back up the current structure of trade routes from Ireland which are concentrated on transhipment through Rotterdam and Antwerp and overland transport to central European destinations.

Table 6.4: Categorisation of Routes According to Importance of Road Costs

Category	Destinations and Routes
4-10% road costs	Hamburg, Bremen, Copenhagen, Arhus, Oslo, Goteborg, Stockholm, Helsinki, Tallinn, Riga (own destination port)
11-20% road costs	Brussels (via Antwerp), Amsterdam (via R'dam), Vilnius (via Klaipeda)
21-30% road costs	Warsaw (via Gdynia)
31-40% road costs	Dortmund (via R'dam), Krakow (via Gdynia)
41-50% road costs	Warsaw (via Hamburg), Prague (via Hamburg or Bremerhaven)

51-60% road costs	Krakow (via Hamburg), Bratislava (via Hamburg or Bremerhaven)
61-70% road costs	Munich (via Antwerp), Prague (via R'dam or Antwerp)
71% or more	Krakow (via R'dam), Bratislava (via R'dam or Antwerp)

Given this situation, the next stage of the analysis is to identify if the introduction of the proposed road charges would have a meaningful impact on this trade-off of road against sea routes and would thereby open up the possibility that new routes in the Baltic region would become competitive with the existing structure.

6.1.3   The Effect of Implementing Road Tolling in Europe on Costs

This analysis assumes that new road tolls will be implemented in Europe in the future. It is recognised that there is uncertainty regarding the timing and the precise nature of the regulations that have been proposed but there does appear to be a strong lobby at high levels in favour of the proposal.   The analysis is based on an assumed average charge of €0.15 per vehicle kilometre for truck-trailer combinations. Given this charge, and assuming that there are no consequences for other taxes – for example it is assumed that there is no attempt to introduce a revenue neutral charge that would alter transport decisions but would not raise government revenue or that the revenue would be recycled directly back to those paying the new tolls – road transport costs on which the incidence of the toll falls would increase by 14%. This would have consequences for intermodal door-to-door costs between Ireland and the North European destinations. These are shown in Table 6.5, assuming that there is no response in terms of altering the route choice.

Table 6.5: Cost Impact of New Tolls on Specified LoLo Routes from Ireland

Destination	**Destination port**	**% Price increase due to tolls**
Brussels	Antwerp	2.1%
Amsterdam	Rotterdam	2.7%
Hamburg	Hamburg	0.9%
Bremen	Bremen	1.4%
Dortmund	Antwerp	5.3%
Munich	Antwerp	9.2%
Copenhagen	Copenhagen	0.8%

Arhus	Arhus	0.8%
Oslo	Oslo	0.7%
Goteborg	Goteborg	0.7%
Stockholm	Stockholm	0.8%
Helsinki	Helsinki	0.6%
Tallinn	Tallinn	0.6%
Riga	Riga	0.6%
Vilnius	Klaipeda	2.9%
Warsaw	Gdynia	3.9%
Warsaw	Hamburg	7.5%
Krakow	Gdynia	5.5%
Krakow	Hamburg	7.7%
Krakow	Rotterdam	10.8%
Prague	Hamburg	6.4%
Prague	Bremerhaven	6.5%
Prague	Rotterdam	9.8%
Prague	Antwerp	9.8%
Bratislava	Hamburg	7.9%
Bratislava	Bremerhaven	8.0%
Bratislava	Rotterdam	10.8%
Bratislava	Antwerp	10.6%

This table shows that there is a considerable range in the potential impact of road tolls on total transport costs. For many of the most important destinations the impact would be negligible. Even in the case of some quite easterly destinations such as Vilnius and Warsaw there is a less than 4% increase, provided the route chosen utilises ports in the Baltic region. This leads to the conclusion that the introduction of these tolls would have a small cost effect for Irish exporters and importers, provided shipping routes are adjusted to minimise costs. However, as discussed below, this conclusion does not mean that routes will be quickly adjusted and other cost considerations would be important.

It is clear from this analysis that there is a strong relationship between the share of road transport costs in total door-to-door costs and the impact of the proposed new

charges on total costs. Table 6.6 shows this relationship according to the categorisation used above.

Table 6.6: Categorised Effects of Introducing Tolls

Category	Destinations and Routes	% Cost increase due to tolls
4-10% road costs	Hamburg, Bremen, Copenhagen, Arhus, Oslo, Goteborg, Stockholm, Helsinki, Tallinn, Riga (own destination port)	0.6% - 1.4%
11-20% road costs	Brussels (via Antwerp), Amsterdam (via R'dam), Vilnius (via Klaipeda)	2.1% - 2.9%
21-30% road costs	Warsaw (via Gdynia)	3.9%
31-40% road costs	Dortmund (via R'dam), Krakow (via Gdynia)	5.3% - 5.5%
41-50% road costs	Warsaw (via Hamburg), Prague (via Hamburg or Bremerhaven)	6.4% - 7.5%
51-60% road costs	Krakow (via Hamburg), Bratislava (via Hamburg or Bremerhaven)	7.7% - 8.0%
61-70% road costs	Munich (via Antwerp), Prague (via R'dam or Antwerp)	9.2% - 9.8%
71% or more	Krakow (via R'dam), Bratislava (via R'dam or Antwerp)	10.6% - 10.8%

The conclusion is that the effect on the door-to-door price of container transport between Ireland and the North-European region is almost negligible for final destinations situated in the direct neighbourhood of feeder ports. However, on routes where road transport costs exceed 30% of total transport costs, total costs rise by more than 5%. Where road transport costs exceed 70% of the total – as is the case on some routes to central Europe that travel via Rotterdam – the impact on total costs exceed 10%. With the exception of Munich via Antwerp, all destinations where the impact exceeds 7.5% of total costs are in the accession countries where, as seen earlier, trade volumes are quite small. Furthermore, it cannot be concluded in the case of Munich that there is an alternative port available to reduce the percentage of road costs in the total and thereby reduce the impact of the tolls as it is relatively remote from North German ports.

For final destinations in central Europe (the southern part of Poland, the Czech Republic and Slovakia), the effect of the tolls on costs can add up to a price increase in door-to-door transport of 10% for transit through Rotterdam and Antwerp. It appears reasonable to suggest, that in some cases at least, this could be sufficient to

lead to a different route becoming optimal, particularly one using a different transhipment port further east. Put another way, for freight forwarders in Ireland, the optimal hinterland region of the ports of Antwerp and Rotterdam for LoLo freight will have become smaller and would lead in some cases to an incentive to enlarge the proportion of sea-transport in the door-to-door route. However, this effect on the total trade is likely to be limited by a number of factors including switching costs, the longer travel time of sea transport which might be important in respect of certain types of cargo and the fact that the destinations where this is most apparent are relatively small in the overall structure of Irish trade.

6.2   RoRo Transport Costs on Irish SSS Routes

6.2.1   Routes and Costs

The market potential for door-to-door transport with RoRo containers differs from LoLo transport. In general, RoRo transport focuses on shorter door-to-door distances. The analysis that has been undertaken for LoLo is clearly heavily reliant on the availability of quite detailed data on trade flows and costs. As shown above, the data that are available for RoRo freight are somewhat more limited than for LoLo and the analysis has to take this into account. In particular, the routes taken by RoRo freight flows from Ireland relied to a greater extent on estimates based on surveys and there may be considerable statistical errors with such estimates. As a result, the RoRo analysis focuses on the European mainland to a greater extent and compares the landbridge alternative with direct RoRo connections between Ireland and the European mainland. In fact, this is not a weakness of the analysis since the limited competitive range of RoRo means that this trade-off between the use of the UK landbridge and direct sea transit to the continent captures the true decision making variables.

At the moment, Ireland's only regular RoRo connections are mostly to the UK and some services to France. The analysis proceeds by identifying a main freight route from Dublin to Dortmund. It is possible to identify five different routes from Dublin to Dortmund:

1. The UK landbridge route (Dublin-Holyhead) through the Channel Tunnel (Folkestone-Calais),

2. UK landbridge route (Dublin-Holyhead) via Southern England (Portsmouth-Le Havre),

3. The Northern UK landbridge route (Dublin-Holyhead) via Eastern England (Hull-Rotterdam),

4. Sea route via Cork-Roscoff to Dortmund, and

5. A potential new route utilising a new RoRo line from Dublin to Zeebrugge.

The road distances of these five routes are:

1. Dublin-Dortmund via Dublin-Holyhead and Channel Tunnel travelling Folkestone-Calais: 1,062 km (585 km in UK);

2. Dublin-Dortmund via Dublin-Holyhead and Portsmouth-Le Havre: 1,226 km (531 km in UK);

3. Dublin-Dortmund via Dublin-Holyhead and Hull-Rotterdam: 492 km (202 km in UK);

4. Dublin-Dortmund via Cork-Roscoff: 1,345 km (270 km in Ireland);

5. Dublin-Dortmund via Dublin-Zeebrugge: 362 km.

The two main items of cost are road transport and ferry costs. As in the previous section, a price of €1.06 per vehicle kilometre is assumed for a 40-ft truck/trailer combination and the cost of land transport is calculated. The estimated costs of ferry transport are based on the UK Marine Motorway Study, in which the costs of high speed ferry transport are calculated. This gave a cost of ₤0.495, or € 0.728 per trailer per kilometre. This excludes port handling costs of ₤40 or €58.80[40]. The resulting estimated costs of RoRo transport are shown in Table 6.7.

Table 6.7: Cost of RoRo Transport Dublin to Dortmund (alternative routes)

Ferry 1	Ferry 2	Road costs	Ferry costs	Total costs
Dublin-Holyhead	Folkestone-Calais (Channel Tunnel)	€1,128	€249	€1,377
Dublin-Holyhead	Portsmouth-Le Havre	€1,302	€321	€1,624
Dublin-Holyhead	Hull-Rotterdam	€523	€762	€1,284
Cork-Roscoff	None	€1,429	€386	€1,815
Dublin-Zeebrugge	None	€385	€808	€1,193

The important issue in relation to this table is not the overall accuracy of the absolute figures but the differences that are identified between the costs of the different routes

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[40] Marchant, C. 'The effect of supply chain structure on the potential for modal shift: Evidence from the Marine Motorway Study'. Heriot Watt University

and the share of road transport in these costs. Due to the longer sea-transport and shorter land transport in the total route, the routes via Hull/Rotterdam and Dublin-Zeebrugge have the lowest total costs. This would not seem to comply with the structure of transport identified above that showed a heavy reliance on the south of England routes. However, a key issue is that the landbridge route through the Channel Tunnel is by far the fastest way, with other south of England routes second fastest. Time is an important issue for much of the cargo that is carried RoRo – this is one of the main reasons for the choice of this mode over LoLo and the effective area where RoRo is competitive is determined by the area in which time savings are possible. That routes have not altered to reflect these cost differences is a strong indication that this is an important issue. This suggests that an effective trade-off to a new route would only be possible if it reduced time taken for certain routes *vis-à-vis* LoLo, thereby extending the competitive range of RoRo. It is unclear that the introduction of new tolls would be an important variable in this decision. This recognised, it is relevant to identify the potential for any change in road charges to alter RoRo routes towards new lines. The potential impact on cost is shown in Table 6.8.

Table 6.8: Impact of New Tolls on RoRo Transport Costs (Dublin –Dortmund)

Ferry 1	Ferry 2	Charge 15 ct/km	% cost increase	Total costs
Dublin-Holyhead	Folkestone-Calais (Channel Tunnel)	€169	12.3%	€1,546
Dublin-Holyhead	Portsmouth-Le Havre	€195	12.0%	€1,819
Dublin-Holyhead	Hull-Rotterdam	€214	11.8%	€1,498
Cork-Roscoff		€78	6.1%	€1,893
Dublin-Zeebrugge		€58	4.8%	€1,251

The effect of an increase in costs due to introduction of road charges on these routes results in a total price increase in the range of 4.8% to 12.3%. The Channel Tunnel route will be confronted with the highest increase, while the short sea routes via Hull-Rotterdam and Dublin-Zeebrugge will have a lower impact on the cost level. This is potentially important. It means that the greatest increase is felt on the currently most popular routes. These increases are also greater than was generally observed in the case of LoLo and also apply to a much greater proportion of total Irish trade. This suggests either that the currently competitive area of the RoRo mode will be reduced on existing routes or that new routes will emerge to retain or expand the area. However, as discussed already, this conclusion is based on costs alone and the time element will be important in determining the actual response of freight forwarders to this change in relative and absolute costs.

6.3   The Effects of Cost Increases on Modal Demand

6.3.1   Applying Demand Elasticities

The final step in this analysis is to estimate the impact of these alterations in costs and relative costs on freight flows. There are two potential sources of impact. The first is that the new tolls through increasing the cost of transport act to reduce the overall freight flows. The consultants are of the opinion that this impact is negligible given the strong growth path of international trade, the fact that transport costs are a relatively small portion of the overall costs of production and the fact as discussed above that the cost changes on Ireland's main freight flows will be small. As a result, this impact is excluded from the analysis.

The second way in which new tolls will impact on freight flows is through altering the relative costs of different modes and routes. The analysis above shows that an increase in the cost of road transport results in a competitive gain for intermodal trips which have a higher share of sea transport in the total route. This opens the possibility of opportunities for new short sea shipping lines or expansion of existing lines. The extent to which there will be a response by the market depends on the price elasticity of existing routes and on the availability of an alternative[41]. If an alternative does not currently exist then the analysis points to the possibility of a new route to meet what is in effect a new source of demand. Thus, having identified the percentage changes in costs, elasticities can be applied to indicate the likely change in demand. It should be possible to translate this into an estimate for freight for a new service.

This raises a problem for the analysis since no elasticities for demand are available and there is insufficient data available to allow them to be estimated. Indeed, given the relatively small number of alternative routes that are currently available and the issues discussed later in this section, it is arguable that it would be impossible to identify reliable data allowing elasticities specific to Ireland to be identified. For this reason it is necessary to use estimates from the literature.

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[41] Here, price elasticity of demand is defined as the proportionate (percentage) change in demand for a transport service divided by the proportionate change in the cost of that service.

In the door-to-door corridors defined for both RoRo and LoLo, a choice exists between landbridge routes or intermodal routes with direct SSS connections to the European mainland. The parameters of this choice show similarities to the choice between road transport or intermodal road-inland shipping transport on the European mainland. Price elasticities for this choice have been calculated in research sponsored by the European Commission.[42]. The main similarity is that in both the current case and in the EC funded study, the change in costs arose as a result of a policy decision with the effect of increased internalisation of external costs in road transport. In effect, the results of the 1998 study are being applied here to give an indication of the expected impact of a further move in this direction, although it is recognised that the modal shifts under discussion – from road to inland waterway in the earlier study but from road to sea in the current study – are different.

The cross-price elasticity of road transport costs on demand for inland navigation for NSTR-category 9 (general cargo and containers) was estimated in the study at 1.05 in absolute values. This means that a price increase of 10% in road transport would be expected, everything else held constant, to result in an increase in the volume demand for the alternative of 10.5%. In the view of the consultants, this estimate of elasticity is sufficiently close to mean that an elasticity of 1 can be assumed. This is acceptable from a theoretical point of view since in an industry with a limited number of alternatives, the potential for strong long term relationships to emerge and, particularly, where there are large capital costs, there is an incentive for service suppliers to adjust prices to a level where elasticity will approach 1. A different way of saying this is that there is an incentive for shipping services suppliers to maximise capacity and revenues given the high fixed costs with which they are faced. This is a reasonable statement in relation to this industry.

One final point also needs to be recognised. While there is a relative gain for some routes over others due to lower cost increases, there is an actual cost increase for all routes. Thus, while an elasticity of 1 implies that there will be a similar change in percentage demand to the percentage change in price, there is also a counteracting effect as a result of the increase in the price of the route where there has been a competitive gain. Thus, the modal or route shift will not be given simply by the percentage changes in costs but by the differences in the changes between alternatives.

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[42] Meersman and van der Voorde (1998), *Sort-It D4 Final Report on Modelling: Appendix D Modelling Inland Navigation*. Report to European Commission. This methodology has been applied in the Seine-Scheldt corridor study in order to asses the effect of the European policy to internalise external costs of road transport on the volume of inland navigation on the River Leie in Belgium.

6.3.2 Impact on Trade Flows

Estimating the impact of these cost changes on trade flows involves the application of elasticity estimates to the relative changes in costs to provide the estimate for the change in demand. In the case of LoLo, the consultants are of the opinion that relative cost increases of less than 3% will have a negligible effect on route decisions for a number of reasons. First, the data cannot be considered to be sufficiently precise to allow for conclusions to be drawn at this level of detail, particularly since there is uncertainty regarding the precise regulations that might be introduced. Second, operators may be in a position to defray some of these costs without changing current operations. Finally, as discussed below, inbuilt resistance to change and risk will mean that firms will not react in the form of introducing major changes in operations in response to relatively minor changes in the cost environment.

As a result, routes where road costs are less than 30% of the total cost will not be affected. This covers all trade with Belgium, the Netherlands and Scandinavian countries[43]. The situation for Germany and Eastern Europe is different. Routes to Germany via Rotterdam and Antwerp will have cost increases in excess of 5%. Since the tolls will apply in Germany, there will be opportunity to offset some of this cost for parts of Northern Germany near the ports. However, beyond a quite limited radius – of probably no more than 50 to 100 km. – of these ports, this opportunity will disappear. Thus, it would appear that there is just a limited opportunity for some diversion of trade to a short sea route carrying German trade to Hamburg port. The available data do not allow for the destination of Irish trade with Germany to be identified on a regional basis but the trade from Rotterdam to Hamburg that would be affected by cost increases would be unlikely to exceed 10% of total German trade. At an average increase of 5% in costs and an elasticity of 1, this suggests that only 0.5% of German trade will be affected. In 2002, this would have amounted to about 2,500 tonnes of Irish exports and 5,000 tonnes of imports to Ireland. A portion of this is already carried on the existing Dublin Hamburg route.

In terms of LoLo TEUs to Germany, the data indicate that in 2002 exports to Germany and Denmark though Belgian and Dutch ports amounted to 101,901 TEUs and imports to 113,281 TEUs. About 88% of the total – 189,227 TEUs – passed through Dublin Port. Allocating this according to the distribution of overall trade

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[43] It is important to note that this is not a conclusion that new routes to the Scandinavian countries will not exist. Rather, the conclusion is that the introduction of the tolls does not create the impetus for these routes to emerge.

between Denmark and Germany – CSO data indicate that 88% of the total is with Germany – indicates that about 90,000 TEUs exports and 100,000 TEUs imports may be affected by the introduction of the tolls. With a 5% increase in costs and an elasticity of 1, this means that about 9,500 TEUs per annum could be diverted. On the basis of the growth projections in this report and if the average weight of a TEU were to fall by 10% then this would rise to about 12,200 in 2008. This would suggest that there will be an impact and an opportunity to divert trade to avoid the tolls. However, the question is, to what port would this LoLo trade divert? If it goes to Hamburg then the gain will be limited to only certain areas of Northern Germany while diversion to ports further east would add to the journey time and would not eliminate the cost of the tolls completely. Given the switching costs that would be involved in such a change, the likelihood of actual savings accruing would be limited.   Thus, there would appear to be only a very limited opportunity for a new route to service German trade with perhaps 1,500 TEUs currently gong to/from Germany through Amsterdam and Antwerp diverting to this route.

The results with regard to the accession countries suggest that there may be opportunities for the diversion of trade from Antwerp and Rotterdam to Gdynia or Riga.   The data indicate that in 2002 about 12,800 TEUs of Irish exports and 8,822 of TEUs of imports LoLo travelled between Ireland and the new EU members in the study area. By 2008, if the average weight per TEU falls by 10% then this will have increased to 17,700 TEUs of exports and 12,673 TEUs of imports. These destinations will experience cost increases in the region of 10% on existing routes but this increase would be limited to around 5% if the trade was diverted to Gdynia or Riga. There would not appear to be any advantage in diverting to Hamburg as most of the tolls would still be payable. If the elasticity estimate of 1 is applied, there could be an opportunity for a new route to this area handling 1,500 TEUs of trade. However, once again, the question is whether this volume and the switching costs involved would make this route viable. The conclusion is, given the eastern expansion of the EU and the opportunities for growth, that this is a real possibility in the longer term although the emergence of this route within the time period up to 2008 is uncertain. In summary therefore, the analysis indicates potential for a new LoLo route through Gdynia or Riga handling in the region of 3,000 TEUs to emerge but that the switching costs may mean that a greater volume will be required before this emerges.

In the case of RoRo, the data indicate that a new route serving Zeebrugge directly would both reduce the current cost of RoRo delivery to the continent and would gain market share relative to existing routes if new tolls were introduced in the UK and Germany. Under the existing situation, alternative routes using the South of England are currently 26% more expensive than a possible direct Zeebrugge route. With the introduction of tolls, this cost advantage would increase to about 35% for delivery to Dortmund. Delivery to areas in Belgium and the Netherlands would have a larger

percentage gain. The percentage gain relative to the north of England route will also be larger. However, the Cork Roscoff route is unlikely to be affected to any degree.

This would appear to suggest that there is an important opportunity here. However, the question needs to be asked why, with a 26% cost differential already existing on this route, no such route is in operation? The answer would appear to be that RoRo traffic places a much lower emphasis on cost and a higher emphasis on timeliness and the Zeebrugge route would be somewhat slower than the existing routes. However, leaving this aside, if the cost differential increases to 35% compared to the current routes, there would be an opportunity here for a meaningful diversion of traffic. The data earlier in the report estimated that about 40% of RoRo tonnage from Ireland to the UK travelled onwards to France or the Netherlands. This amounted to about 1.5 million tonnes.   With a demand elasticity of 1, the expectation would be that in the region of 135,000 tonnes of this, in each direction, would be rerouted.

At an average weight of 15 tonnes per RoRo unit, this would amount to 9,000 units in each direction in 2002. The total weight of freight carried by RoRo grew at close to 20% per annum in the period 1995 to 2002. This is unlikely to be maintained. However, if it were to grow at 10% per annum in the period 2002-08 then this would suggest an opportunity for a route handling in the region of 16,000 RoRo units in each direction on an Ireland - Zeebrugge route in 2008.

6.3.3   Relevant Limiting Factors

Some important points are worth noting in terms of the approach that is taken here. First, the available data and the scope of the current project do not allow for new elasticities specific to Ireland to be calculated. This raises the possibility that elasticities from elsewhere may not be exact and so the results should be interpreted as best estimates or mid-points within confidence intervals. It is not unusual for this to be necessary and does not imply that the results are thereby devalued since there is nothing to suggest that the elasticities taken from the literature are inappropriate or that Irish conditions would lead to different values.

Second, the methodology is one of comparative statics i.e. it calculates the impact of a change in one variable on a starting situation to indicate an outcome. In the world of business, such a modelling of business decisions may be overly simplistic since there may be opportunities for operators to offset costs through some unforeseen alteration in operations or perhaps through passing on the cost if competitive conditions allow this to happen.

Third, the relative imbalance in the weight of Ireland's imports and exports is a problem that may get worse in the medium term. This imbalance varies according to the trading partner but is particularly pronounced in the case of the accession countries. The response to this to date has been to limit the number of ports to which services to Ireland call since this allows for the different extents of the imbalance to be averaged across a wider range of countries. This does not eliminate the problem but it moves it closer to an imbalance of 2 to 1 rather than the 10 to 1 that exists in relation to the relative weight of imports and exports to the accession countries. New routes could use pricing to ease this problem or a more complex structure than just a single origin and destination port but it is an issue that is likely to limit new routes.

Finally, and perhaps most importantly, this methodology does not include switching costs and inertia. For example, the methodology might indicate that a rise in costs on some routes would lead to changes in the competitiveness of alternative routes and would alter operations. However, as discussed earlier, trade routes rely on the existence of established facilities and many of these require capital investment and the development of information datasets. Changing to a different structure of flows, even where such a structure would result in lower transport costs, would imply considerable capital investment and the possibility of creating stranded assets. This would be most important in the case of LoLo or where loads from Ireland needed to be broken and recompiled for further transport to final destination. In addition, there would also be risks involved in being a first-mover to a new location or route structure. This would offset some of the potential gains from accessing the cost advantages that might accrue.

As a result of this final point, there is a clear incentive for business decision makers to remain with existing structures until there is a substantial difference between the costs associated with persisting with existing trade flows and adopting new structures with the attendant capital investments required. In other words, while the statistical model implies that an incremental change in flows will result, the structure of the business means that a large step change is more likely to occur after a period rather than a gradual alteration of activity. The cost changes identified, while suggesting in the statistical model that new opportunities might emerge, are relatively small in most cases and would not in themselves be sufficient to result in a major restructuring of trade flows in the short to medium term. However, over a longer period, when taken in the context of the eastward shift of economic activity in Europe, this situation could change.

7. Findings and Recommendations

7.1 Opportunities for New Short Sea Routes

The analysis of the structure of Irish trade flows in this report has been undertaken in the context of three important trends and developments that have determined the structure of the report. These are

- Ongoing growth in the value of Ireland's trade but changes in the structure of this trade;

- The accession of the countries of central and eastern Europe to the EU; and

- The proposed introduction of road tolls specifically in the UK and Germany.

The core hypothesis that provides the rationale for the work is that these factors will provide opportunities for the development of new short sea shipping routes between Ireland and Northern Europe to avail of the increase in demand for shipping as a result of the growth of trade between Ireland and economies in the Baltic region and the diversionary impact of the increase in road transport.

In addition to compiling a dataset that describes developments in Ireland's trade flows and the routes taken, the work contains three distinct pieces of analysis that address aspects of the topic from distinct perspectives. These are, in turn:

- The potential impact of the structure of trade and new trade partners on freight flows;

- The impact of the existing freight handling infrastructure in Europe on this structure; and

- The impact of the changes in relative costs on the decisions freight forwarders in choosing routes and modes for the transport of Irish inward and outward freight.

The dataset shows that Ireland has a somewhat unusual structure of freight handling with two ports – Rotterdam and Antwerp – dominating in LoLo and the UK acting as a landbridge for a large proportion of RoRo freight destined for continental Europe. The initial conclusion therefore is that landbridges in the UK and Continental Europe are an important characteristic of these flows and that there could be potential for changes in relative costs to alter this structure in favour of a greater proportion

travelling by sea to ports closer to the final destinations. However, the subsequent analysis results in a more complex outcome.

Closer analysis of flows with the study region identifies three important aspects that will affect the viability of any new route. First, trade with the accession countries is a very small part of Ireland's overall trade flows with the region. As a result, the eastern expansion of the EU, while providing an impetus to growth and integration will lead to growth from a very low base. Thus, the effect in the short to medium term of overall flows will be marginal. Second, there is a continuing and rapid trend for the overall weight and volume of Ireland's trade to decline. The evidence suggests that this will continue so that while there is continuing growth in the value of trade, the actual amount of freight to be moved will not grow rapidly. A further aspect of this has been that there is a growing need for more frequent delivery of finely timed freight at least in markets in Western Europe and this could be seen in the East in the future also. Third, this fall in the volume and weight of trade per unit of value is much more rapid for Irish exports as the economy restructures towards more high value knowledge intensive exports. The result is a growing imbalance in the weight of imports relative to exports. This is particularly noticeable in trade with the accession countries and has implications for the viability of any new routes.

As a result of these features of Ireland's trade flows, it cannot be concluded from this analysis that the accession of new member states to the EU and the ongoing eastern movement of economic activity in Europe would be likely to have a major impact on the structure of Ireland's trade flows. As a result, this development, while indicating the possibility that new trade flows could emerge, does not in itself provide a strong basis on which to suggest that there are viable opportunities for new sea routes to be developed.

The second element of analysis concentrates on the handling and management of freight in Europe and provides a fairly definite conclusion. Logistics has emerged as a key competitive weapon for firms and this has been particularly important for Ireland as a result of the decision of some major firms to locate European service centres in Ireland and the relative peripherality of the country. However, the implication of this is not that there must be a particular usage of transport modes but that the available modes must be highly efficient. As a result, logistics operators have developed complex freight handling systems and have invested heavily in infrastructure and in supporting systems. Two features of these systems are particularly evident. First, they are centred on a small number of locations that have been deemed to be the most efficient from a number of points of view, in particular Rotterdam and Antwerp in the case of freight flows to Ireland, although other centres have also been developed. Second, the systems have been designed to maximise

economies of scale which preserving flexibility in terms of the allocation of particular origin-destination pairs to particular routes. The key to this is centralised freight handling and warehousing with bundling and unbundling operations as required.

These developments have important implications for the structure of freight flows and the response to changes in trading relationships and relative costs. In effect, they enhance the flexibility of operations in terms of on-land transport but restrict the number of port-to-port pairs that can be serviced. Furthermore, in an era of change, there are very high switching costs due to the need to relocate key strategic assets and the possibility of creating stranded assets. As a result, change will not take place in an incremental fashion in response to marginal changes and there is likely to be considerable inertia in the short and medium term. In the longer term, if the change in trade flows is sustained and if the change in relative costs is maintained then a step change in the structure and location of assets for handling freight would be expected. For the issue under discussion in the current project this means that the viability of new routes would be restricted since they would be unable to access the economies of scale that exist in centralised freight handling system and would risk being outside the mainstream in terms of the main flows. However, the longer term possibility will continue to exist.

The third element of the analysis is a statistical analysis of the relative costs and changes in these costs that will occur as a result of the proposed introduction of road charges. The analysis indicates that there is some potential for the development of a new route serving Eastern Europe with LoLo freight and also a new RoRo route bypassing the UK landbridge into northern Europe. The conclusion is based on the analysis of changes in relative costs only but the data suggest that there would be sufficient volume to make these routes viable. However, the imbalance between the volume of imports and exports in the case of Eastern Europe and the importance of time in determining the competitiveness of RoRo routes suggests that the cost issues in themselves might not be sufficient to alter route choice by the freight forwarders.

The overall conclusion from the analysis therefore is that there is indeed potential for new routes to emerge as a result of the proposed tolls, but that the implied cost changes might not be sufficient to alter existing flows. Overall, the new costs will not impact greatly on Irish transport costs although there are implications for some routes. Given this situation, the question arises whether there is a role for policy to intervene to enhance the impact of the cost changes and bring forward a response in the shorter term?

Two areas of EU policy are relevant in responding to this question. First, the new tolls are being introduced not to raise revenue – and indeed there is a strong argument

that they should be introduced on a revenue neutral basis – but to elicit a response by diverting more freight to short sea from roads. What this study shows is that, in the case of Ireland, the impact will be limited by the perception of risk on the part of decision makers and the sunk costs that characterise the industry. Second, it is clearly in the interest of the EU to integrate the countries of Eastern Europe as comprehensively as is possible. However, the analysis suggests that the tolls in Germany in particular will act to place trade with these countries at a relative disadvantage when compared to trade between countries where the freight does not have to cross Germany. This would clearly be disadvantageous and requires that the potential costs are avoided, i.e. it supports the argument that the tolls should be revenue neutral for trade crossing Germany to another destination. One way to achieve this would be to use the revenue to enhance the cost differentials that have been created and promote short sea routes.

This provides the rationale for intervention on two fronts: tolls to make road transport less attractive and incentives to enhance the competitiveness of shipping. This is the approach that the EU has developed with its programmes an it is important that these opportunities are fully accessed by Ireland if there is going to be a change in the structure of trade flows that provides opportunities for viable new short sea routes in the short and medium term.

7.2   Areas for Policy Development

The conclusions of this work indicate that there is an opportunity for Irish policy to encourage the development of new short sea routes but that these might not emerge in the absence of incentives, although a number of current developments mean there is an environment in which change is possible. This indicates three general areas in which policy can operate.

The first is in promoting change through providing information and research on new opportunities as they emerge. This report has identified reasons why there might be resistance to change due to sunk costs even when more efficient operational structures emerge. The best way to get over this problem is through ensuring that there is a high degree of competition in the sector. Along with financial requirements, knowledge can act as a barrier to entry. However, by promoting new possibilities, policy can encourage action and new competition more rapidly than might otherwise be the case.

The second area is in direct promotion of new routes through subsidies. This research indicates clearly that while there are forces that will promote the development of new routes serving Eastern Europe, these forces are unlikely to be sufficiently strong, in the absence of intervention to enhance the cost differentials, to cause a major shift in the underlying factors that determine the structure of trade routes.

Third, it is essential that Irish ports are able to handle ships utilising the new routes and new modes of freight movement. The major growth that provides for the possibility of new short sea routes is unitised freight. However, research reviewed in this study indicates that a number of Ireland's most important ports will experience constraints on their ability to handle this freight efficiently in the medium term future. Any failure in this regard would have serious consequence for the ongoing competitiveness and development of the economy and would lead to strategies that could resist change on the part of operators faced with these new difficulties.

7.3   Recommendations for Further Work

Two distinct areas for further work came to the fore during our discussions and analyses:

- The impact on the Irish economy of road charging in the UK on both Irish trade with the UK, and in particular on HGV traffic transiting the UK enroute to Continental Europe, should be urgently and comprehensively examined.

- Significant difficulties were encountered during the course of our research with regard to sourcing particular types of maritime freight traffic statistics (e.g. identifying the actual routings which freight shipments take). Clearly the extant raft of statistical data which is currently published is very useful, but user needs do evolve over time. In particular we would suggest that the Central Statistics Office discuss with the relevant stakeholders their statistical requirements and how such statistics could best be collated going forward. A useful template may be the way in which data is collected on international passenger movements at Ireland's ports and airports.

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Appendix 1: Irish Trade with Countries in the Study Area

Table A1.1: Value of Ireland's Trade with the Study Area (1993-2002, €million)

	Imports	Exports
1993	2,867	6,704
1994	3,150	8,158
1995	3,699	10,867
1996	4,064	11,230
1997	4,482	12,908
1998	5,289	17,501
1999	5,959	18,432
2000	7,620	20,989
2001	8,280	23,480
2002	8,422	26,394

Table A1.2: Growth and Distribution of Trade by Value (1998-2002)

	% of region	% growth 1998-2002	
	2002	Exports	Imports
Belgium	41.2	271.5	70.4
Netherlands	15.4	10.5	50.7
Denmark	3.6	-7.3	165.3
Sweden	4.6	10.0	7.1
Finland	3.0	4.6	133.7
Estonia	0.2	102.6	545.9
Latvia	0.1	61.6	100.7
Lithuania	0.1	89.1	434.5
Poland	1.2	15.9	75.5
Czech Rep	1.0	45.8	177.8
Slovakia	0.2	111.7	40.5
Germany	29.5	-18.9	44.4
Totals	100.0	50.8	59.2

Table A1.3: Irish Exports by Value to the Study Area (€ million)

	1993	1995	1998	2000	2002
Belgium	80.3	127.6	3,645.4	4,113.2	13,543.9
Netherlands	1,390.9	2,457.7	3,165.4	4,687.0	3,496.9
Denmark	227.3	448.3	587.0	621.8	544.2
Sweden	433.7	693.3	1,089.1	1,336.1	1,198.2
Finland	102.8	237.4	289.3	405.3	302.5

Estonia	1.2	7.5	15.6	25.7	31.6
Latvia	0.7	9.3	9.9	16.7	16.0
Lithuania	1.5	2.8	9.2	12.0	17.4
Poland	42.4	108.8	243.4	361.0	282.1
Czech Rep	30.2	86.0	135.3	346.5	197.2
Slovakia	0.1	14.1	18.8	47.4	39.8
Germany	3330.0	5,127.2	8,292.6	9,414.7	6,724.2
Totals	5,641.1	9,320.0	17,501.0	21,387.4	26,394.0

Source: CSO *Trade Statistics*

Table A1.4: Irish Imports by Value to the Study Area (€ million)

	1993	1995	1998	2000	2002
Belgium	18.8	28.2	463.8	902.3	790.3
Netherlands	581.3	769.9	1,233.2	1,778.0	1,858.1
Denmark	143.9	184.5	261.7	657.5	694.2
Sweden	260.7	288.3	392.8	607.8	420.7
Finland	116.6	166.1	311.7	341.6	728.4
Estonia	0.1	2.3	3.7	15.8	23.9
Latvia	10.4	8.1	14.5	38.3	29.1
Lithuania	0.4	1.7	5.5	14.4	29.4
Poland	65.2	57.7	72.1	102.6	126.5
Czech Rep	11.1	26.2	51.4	109.9	142.8
Slovakia	0.3	4.7	12.1	17.7	17.0
Germany	1,400.6	1,852.6	2,466.8	3,336.2	3,561.6
Totals	2,609.4	3,390.3	5,289.3	7,922.3	8,422.0

Source: CSO Database

Table A1.5: Growth and Distribution of Trade by Weight (1998-2002)

		% growth 1998-2002	
	% of region 2002	Exports	Imports
Belgium	13.3	-17.8	46.4
Netherlands	33.0	4.0	6.8
Denmark	4.5	-5.0	115.6
Sweden	6.1	8.4	-21.4
Finland	3.6	-34.8	-4.6
Estonia	1.0	-73.1	149.7
Latvia	1.2	11.0	13.1
Lithuania	1.8	32.2	381.6
Poland	7.2	-56.0	18.1

Czech Rep	0.5	63.9	79.6
Slovakia	0.3	77.0	-27.7
Germany	27.4	-33.7	31.6
Totals	100.0	-14.7	22.8

Source: CSO Database

Table A1.6: Irish Exports by Weight to the Study Area (000's Tonnes)

	1993	1995	1998	2000	2002
Belgium	37.0	21.3	393.8	375.9	323.8
Netherlands	697.6	805.4	956.7	1,082.8	994.7
Denmark	55.7	64.7	74.1	114.8	70.3
Sweden	123.8	77.7	134.8	123.7	146.1
Finland	91.9	93.4	70.0	77.0	45.6
Estonia	0.4	8.0	4.8	0.7	1.3
Latvia	0.8	1.9	1.1	0.6	1.2
Lithuania	5.0	1.1	1.3	0.5	1.7
Poland	70.1	112.0	109.1	114.9	48.0
Czech Rep	3.9	5.8	7.3	11.7	12.0
Slovakia	0.0	0.4	1.7	10.6	3.1
Germany	688.5	636.9	799.0	698.3	529.4
Totals	1774.7	1828.6	2,553.7	2,611.6	2,177.2

Source: CSO Database

Table A1.7: Irish Imports by Weight from the Study Area (000's Tonnes)

	1993	1995	1998	2000	2002
Belgium	18.1	21.7	333.7	468.4	488.4
Netherlands	817.5	930.1	962.4	1,170.8	1,027.6
Denmark	51.9	109.1	95.3	149.3	205.5
Sweden	319.4	307.9	285.7	263.0	224.7
Finland	172.7	160.3	184.7	175.5	176.2
Estonia	0.1	10.8	24.9	45.0	62.2
Latvia	63.3	9.1	61.6	115.6	69.7
Lithuania	2.6	8.4	22.5	46.2	108.1
Poland	597.7	380.6	335.0	295.6	395.5
Czech Rep	11.0	6.5	11.0	16.8	19.8
Slovakia	0.0	4.9	20.8	18.3	15.1
Germany	1,038.6	1,079.4	874.1	962.1	1,150.7
Totals	3,092.9	3,028.8	3,211.7	3,726.6	3,943.5

Source: CSO Database

Figure A1.1: Tonnes of Irish Exports per €million of Value
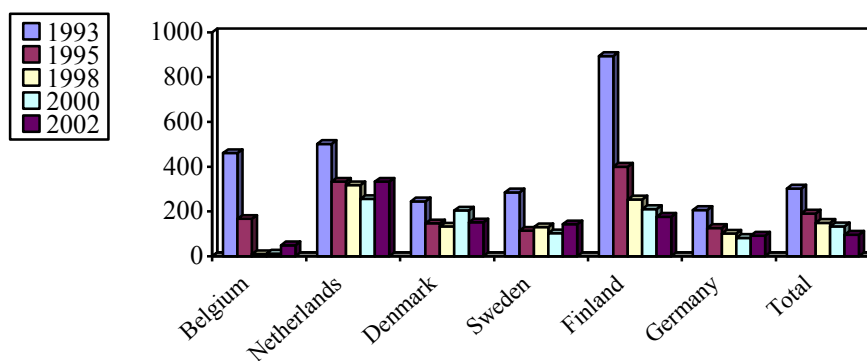
Figure A1.2: Tonnes of Irish Exports per €million of Value
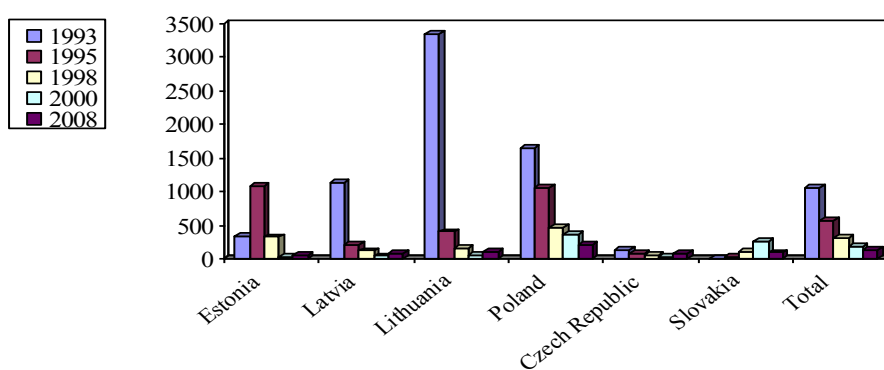
Figure A1.3: Tonnes of Irish Imports per €million of Value
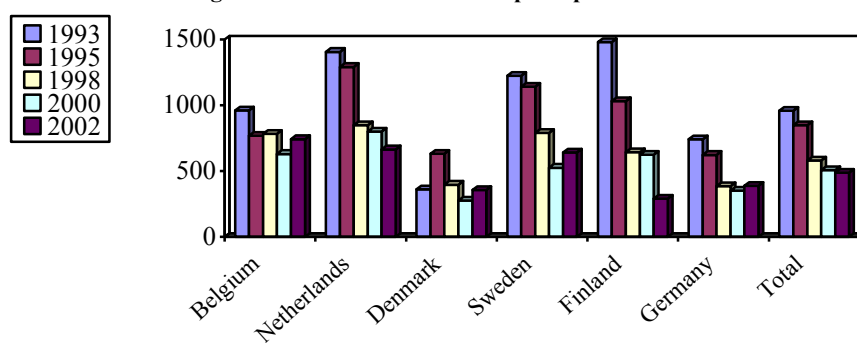
Figure A1.4: Tonnes of Irish Imports per €million of Value
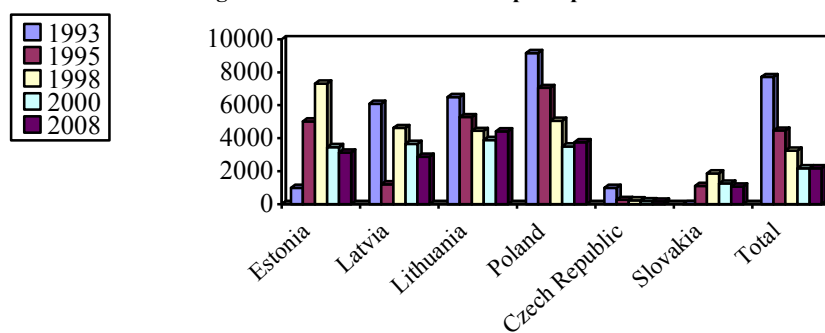
Table A1.8: Projected Weight of Trade to Study Area with Reduced Lightening

Forecast tonnes exports							% change from 2002
	2003	2004	2005	2006	2007	2008	
Belgium	320.0	329.0	341.5	346.7	351.9	357.2	10.3
Netherlands	988.6	1035.9	1096.9	1113.4	1130.1	1147.1	15.3
Denmark	72.2	75.0	78.6	79.8	81.0	82.2	17.0
Sweden	152.0	161.9	173.5	176.1	178.7	181.4	24.2
Finland	46.6	48.6	51.5	52.3	53.0	53.8	18.1
Germany	554.0	580.3	615.4	624.6	634.0	643.6	21.6
Totals	2133.4	2230.7	2357.4	2392.8	2428.8	2465.3	16.8
Tonnes import	2003	2004	2005	2006	2007	2008	
Belgium	474.1	474.2	481.6	493.5	505.8	518.3	6.1
Netherlands	993.6	1011.1	1040.7	1066.6	1093.0	1120.2	9.0
Denmark	203.7	209.1	215.4	220.8	226.2	231.9	12.8
Sweden	229.1	237.6	249.0	255.2	261.5	268.0	19.3
Finland	174.8	177.2	186.4	191.0	195.8	200.6	13.9
Germany	1153.0	1185.7	1192.7	1222.3	1252.6	1283.7	11.6
Totals	3228.4	3294.9	3365.8	3449.4	3535.0	3622.7	10.7
Tonnes export	2003	2004	2005	2006	2007	2008	
Estonia	1.3	1.3	1.4	1.4	1.5	1.5	16.2
Latvia	1.2	1.3	1.3	1.3	1.4	1.4	20.7
Lithuania	1.7	1.8	1.8	1.8	1.9	1.7	0.0
Poland	48.6	50.3	52.6	54.5	56.4	58.4	21.7
Czech Rep	11.9	11.6	11.4	11.9	12.3	12.0	0.0
Slovakia	3.4	3.6	3.6	3.7	3.9	4.0	29.2
Total	68.13	69.81	72.08	74.65	77.32	79.10	17.5
Tonnes import	2003	2004	2005	2006	2007	2008	
Estonia	64.8	67.6	71.1	74.8	78.6	82.7	33.0
Latvia	74.7	78.5	81.9	86.1	90.5	95.2	36.6
Lithuania	111.7	116.1	118.8	124.9	131.4	138.2	27.8
Poland	396.0	414.7	442.2	465.1	489.1	514.4	30.1
Czech Rep	20.0	20.0	20.3	21.4	22.5	23.6	19.4
Slovakia	16.4	17.2	17.8	18.7	19.6	20.7	36.8

| Total | 683.5 | 714.1 | 752.0 | 790.9 | 831.8 | 874.8 | 30.5 |

Appendix 2: Guide to SITC Sections (1 digit) and Divisions (2 digits)

0 Food and live animals

00 Live animals other than animals of Division 03

01 Meat & meat preparations

02 Dairy products & birds' eggs

03 Fish, crustaceans, molluscs and preparations thereof

04 Cereals & cereal preparations

05 Vegetables & fruit

06 Sugar, sugar preparation & honey

07 Coffee, tea cocoa, spices & manufactures thereof

08 Feeding stuff for animals (excl. unmilled cereals)

09 Miscellaneous edible products & preparations

1 Beverages and tobacco

11 Beverages

12 Tobacco & tobacco manufactures

2 Crude materials, inedible, except fuels

21 Hides, skins & furskins, raw

22 Oil seeds & oleaginous fruits

23 Crude rubber (include synthetic & reclaimed)

24 Cork & wood

25 Pulp & waste paper

26 Textile fibres & their wastes

27 Crude fertilisers & minerals, excl. coal, petroleum etc.

28 Metalliferous ores & metal scrap

29 Crude animal & vegetable materials nes

3 Mineral fuels, lubricants and related products

32 Coal, coke & briquettes

33 Petroleum, petroleum products & related materials

34 Gas, natural & manufactured

35 Electric current

4 Animal and vegetable oils, fats and waxes

41 Animal oils & fats

42 Fixed vegetable fats & oils

43 Animal or vegetable materials nes

5 Chemicals and related products nes

51 Organic chemicals

52 Inorganic chemicals

53 Dyeing, tanning & colouringmaterials

54 Medical & pharmaceutical products

55 Essential oils, perfume materials; toilet & cleansing preps

56 Fertilisers (other than those of Division 27)

57 Plastics in primary forms

58 Plastics in non-primary forms

59 Chemical materials & products nes

6 Manufactured goods classified chiefly by material

61 Leather; leather manufactures nes; dressed furskins

62 Rubber manufactures nes

63 Cork & wood manufactures (excl. furniture)

64 Paper, paperboard & articles thereof

65 Textile yarn, fabrics, made-up articles & related products

66 Non-metallic mineral manufactures nes

67 Iron & steel

68 Non-ferrous metals

69 Manufactures of metals nes

7 Machinery & transport equipment

71 Power generating machinery & equipment

72 Machinery specialised for particular industries

73 Metalworking machinery

74 General industrial machinery & equipment nes & parts nes

75 Office machines & automatic data processing machines

76 Telecommunications & sound equipment

77 Electrical machinery, apparatus & appliances nes & parts

78 Road vehicles (include. air-cushion vehicles)

79 Other transport equipment

8 Miscellaneous manufactured articles

81 Prefab buildings; plumbing & electrical fixtures & fittings

82 Furniture & parts thereof; bedding, cushions etc

83 Travel goods, handbags & similar containers

84 Articles of apparel; clothing accessories

85 Footwear

87 Professional, scientific & controlling apparatus nes

88 Photographic apparatus; optical goods; watches clocks

89 Miscellaneous manufactured articles nes

9   Commodities and transactions not classified elsewhere

Nes = not elsewhere specified

Appendix 3: Projected TEUs by LoLo by Route and Destination

TEUs export

Route	Destination	2002	2008	2008 (-5%)	2008 (-10%)
Non-Dublin via Belgium	B, NL	14,909	16,820	17,705	18,689
Non-Dublin via Belgium	Nor Swe, Fin	3,328	4,031	4,243	4,479
Non-Dublin via Belgium	Lat, Lith, Est	46	52	54	57
Non-Dublin via Belgium	Ger, Den	2,795	3,333	3,509	3,704
Non-Dublin via Belgium	Pol, Czech, Slov	244	285	300	317
Non-Dublin via Netherlands	B, NL	82,108	92,632	97,507	102,924
Non-Dublin via Netherlands	Nor Swe, Fin	1,983	2,402	2,528	2,669
Non-Dublin via Netherlands	Lat, Lith, Est	360	426	449	474
Non-Dublin via Netherlands	Ger, Den	10,000	11,926	12,554	13,251
Non-Dublin via Netherlands	Pol, Czech, Slov	1,791	2,247	2,365	2,497
Dublin through B and Nl	B, NL	14,613	16,852	17,739	18,725
Dublin through B and Nl	Nor Swe, Fin	24,389	29,541	31,095	32,823
Dublin through B and Nl	Lat, Lith, Est	1,130	1,338	1,409	1,487
Dublin through B and Nl	Ger, Den	89,106	106,268	111,861	118,076
Dublin through B and Nl	Pol, Czech, Slov	9,230	11,581	12,190	12,868
		256,032	299,734	315,510	333,038

Imports

Route	Dest	2002	2008	2008 (-5%)	2008 (-10%)
Non-Dublin via Belgium	B, NL	12,920	13,898	14,629	15,442
Non-Dublin via Belgium	Nor Swe, Fin	1,271	1,482	1,559	1,646
Non-Dublin via Belgium	Lat, Lith, Est	64	83	88	93
Non-Dublin via Belgium	Ger, Den	2,079	2,333	2,455	2,592
Non-Dublin via Belgium	Pol, Czech, Slov	163	210	221	233
Non-Dublin via Netherlands	B, NL	69,778	75,059	79,010	83,399
Non-Dublin via Netherlands	Nor Swe, Fin	1,871	2,181	2,296	2,423
Non-Dublin via Netherlands	Lat, Lith, Est	819	1,085	1,142	1,205
Non-Dublin via Netherlands	Ger, Den	11,018	12,362	13,012	13,735
Non-Dublin via Netherlands	Pol, Czech, Slov	922	1,187	1,249	1,319
Dublin through B and Nl	B, NL	30,765	33,093	34,835	36,770
Dublin through B and Nl	Nor Swe, Fin	6,415	7,478	7,871	8,308
Dublin through B and Nl	Lat, Lith, Est	587	772	813	858
Dublin through B and Nl	Ger, Den	100,121	112,330	118,242	124,811
Dublin through B and Nl	Pol, Czech, Slov	6,267	8,068	8,493	8,965
		245,060	271,620	285,915	301,800

Appendix 4: Unitised Services to/from Ireland – Frequencies and Operators

Ro-Ro Services Frequency and Operator

Operator	Route	Website Address	Approx. freq per week
Brittany Ferries	Cork – Roscoff	www.brittanyferries.ie	1
Grimaldi Euro-Med	Cork – Esbjerg/Wallhamn/Antwerp/Southampoton/Valetta/Piraeus/Ashdod/Haifa/Izmir/Limassol/Alexandria/Livorno/ Palermo/Salerno/Savona/Setubal/Portbury	www.grimaldi-freightcruises.com	1
Irish Ferries	Rosslare – Cherbourg/Roscoff	www.irishferries.com	3
Irish Ferries	Rosslare - Pembroke	www.irishferries.com	14
Irish Ferries	Dublin-Holyhead	www.irishferries.com	14
Irish Ferries Swift	Dublin – Holyhead	www.irishferries.com	28
Isle of Man Steam Packet Company	Dublin – Douglas	www.steam-packet.com	Seasonal
Norse Merchant Ferries	Belfast – Liverpool	www.norsemerchant.com	12
Norse Merchant Ferries	Dublin – Heysham	www.norsemerchant.com	12
Norse Merchant Ferries	Dublin – Liverpool	www.norsemerchant.com	12
P&O Irish Sea	Dublin – Liverpool	www.poirishsea.com	14
P&O Irish Sea	Rosslare – Cherbourg	www.poirishsea.com	3
P&O Irish Sea	Larne – Cairnryan	www.poirishsea.com	46
P&O Irish Sea	Larne – Troon (Fast ferry)	www.poirishsea.com	April-Sept. 14
P&O Irish Sea	Larne – Troon (Freight ferry)	www.poirishsea.com	6
Sea Cat	Belfast – Troon	www.steam-packet.com/seacat	112
Sea Cat	Dublin - Liverpool	www.steam-packet.com/seacat	7
Sea Truck Ferries	Warrenpoint - Heysham	www.seatruckferries.com	14

Stena Line	Rosslare – Fishguard	www.stenaline.ie	14 (additional fast ferry April-Sept 28)
Stena Line	Dun Laoghaire – Holyhead	www.stenaline.ie	21
Stena Line	Belfast – Stranraer	www.stenaline.ie	70
Stena Line	Larne – Fleetwood	www.stenaline.ie	20
Swansea Cork	Cork – Swansea	www.swansea-cork.ie	6

Source: IMDO

LoLo Services Frequency & Operators

Operator		Route	Website Address	Approx. freq per week
BG FreightLine Eucon /Eurofeeder	**Eucon Progress**	Dublin – Rotterdam	www.bgfreightline.com www.eurofeeders.com www.eucon.nl	1
BG FreightLine Eucon /Eurofeeder	**Yvette**	Rotterdam - Dublin	www.bgfreightline.com www.eurofeeders.com www.eucon.nl	1
BG FreightLine Eucon /Eurofeeder	**BG Ireland**	Rotterdam - Dublin	www.bgfreightline.com www.eurofeeders.com www.eucon.nl	1
BG FreightLine Eucon /Eurofeeder	**Jessica B.**	Dublin - Rotterdam	www.bgfreightline.com www.eurofeeders.com www.eucon.nl	1

BG FreightLine Eucon /Eurofeeder	**Jane**	Rotterdam - Belfast	www.bgfreightline.com www.eurofeeders.com www.eucon.nl	1
BG FreightLine Eucon /Eurofeeder	**Monika Ehler**	Belfast - Rotterdam	www.bgfreightline.com www.eurofeeders.com www.eucon.nl	1
BG FreightLine Eucon /Eurofeeder	**Margareta B.**	Rotterdam - Cork	www.bgfreightline.com www.eurofeeders.com www.eucon.nl	1
BG FreightLine Eucon /Eurofeeder	**North Sea Trader**	Cork - Rotterdam	www.bgfreightline.com www.eurofeeders.com www.eucon.nl	1
BG FreightLine Eucon /Eurofeeder	**Amrum Trader**	Dublin- Cork- Antwerp	www.bgfreightline.com www.eurofeeders.com www.eucon.nl	1
BG FreightLine Eucon /Eurofeeder	**Polarwind**	Dublin- Belfast- Dublin – Le Havre	www.bgfreightline.com www.eurofeeders.com www.eucon.nl	1
BG FreightLine Eucon /Eurofeeder	**Ryfjell**	Dublin- Belfast- Dublin – Le Havre	www.bgfreightline.com www.eurofeeders.com www.eucon.nl	1
BG FreightLine Eucon /Eurofeeder	**BG Rotterdam**	Antwerp – Le Havre – Dublin - Cork	www.bgfreightline.com www.eurofeeders.com www.eucon.nl	
BG FreightLine Eucon /Eurofeeder	**Emma**	Antwerp- Dublin- Belfast- Rotterdam	www.bgfreightline.com www.eurofeeders.com www.eucon.nl	1
BG FreightLine Eucon /Eurofeeder	**Euro Melody**	Southampton – Felixstowe- Tilbury – Dublin - Belfast	www.bgfreightline.com www.eurofeeders.com www.eucon.nl	1
BG FreightLine Eucon	**Gerd Sibum**	Rotterdam – Felixstowe -	www.bgfreightline.com	1

/Eurofeeder		Dublin	www.eurofeeders.com www.eucon.nl	
C2C	**LoLo**	Waterford – Warrenpoint –Zeebrugge -	www.c2clines.ie	2

C2C	**LoLo**	Waterford – Radicatel – Zeebrugge - Warrenpoint	www.c2clines.ie	2
CMA CGM	**LoLo**	Liverpool – Dublin - Liverpool	http://www.cma-cgm.com/	6
Coastal Line	**LoLo**	Dublin – Cardiff - Dublin	www.coastalcontainer.co.uk	2
Coastal Line	**LoLo**	Dublin – Liverpool	www.coastalcontainer.co.uk	6
Derek Horner	**LoLo**	Bristol – Cork – Le Havre	www.hornerd.ie	1
Derek Horner	**LoLo**	Liverpool - Dublin – Le Havre	www.hornerd.ie	1
Fast Shipping	**LoLo**	Drogheda-Szececin	www.lysline.no	1/21 days
Geest /Norfolkline	**LoLo**	Drogheda – Rotterdam	www.geestline.co.uk www.norfolkline.com	2
Geest /Norfolkline	**LoLo**	Dublin – Rotterdam	www.geestline.co.uk www.norfolkline.com	1
Jenkinson Agencies	**LoLo**	Dublin – Lisbon – Leixoes – Valletta – Piraeus – Limassol – Alexandria – Beirut – Ashdod- Haifa – Mersin - Salerno – Leixoes - Dublin	www.jenkinsonfreight.ie	1/10 days
Lys-Line	**LoLo**	Drogheda-Hundested – Lysekil - Oslo	www.lysline.no	1
Lys-Line	**LoLo**	Drogheda- Waterford - Hundested – Lysekil - Oslo	www.lysline.no	1/30
Mac Andrews	**LoLo**	Dublin - Zeebrugge	www.macandrews.net	1/7
Mac Andrews	**LoLo**	Dublin – Bristol – Nantes - Bilbao	www.macandrews.net	1/7
Mac Andrews	**LoLo**	Dublin – Le Havre	www.macandrews.net	1/7
Mac Andrews	**LoLo**	Dublin – Liverpool – Grennock – Rotterdam – Lisbon - Oporto	www.macandrews.net	1/7
Mediterranean Shipping Co	**LoLo**	Dublin – Belfast – Bristol – Antwerp – Vigo – Leixoes – Sines – Cadiz - Valencia	www.mscgva.ch	1
Norfolk Line	**LoLo**	Waterford – Rotterdam	www.norfolkline.com	3

Norfolk Line	**LoLo**	Waterford – Cherbourg	www.norfolkline.com	2
R.A. Burke	**LoLo**	Dublin – Leixoes – Valletta – Piraeus – Limassol – Ashdod – Haifa - Salerno	www.raburke.com	1/10 days
Seawheel Rheintainer	**LoLo**	Cork – Rotterdam - Dublin	www.seawheel.com	1
Seawheel	**LoLo**	Dublin – Rotterdam - Cork	www.seawheel.com	3
Seawheel	**LoLo**	Dublin - Bilbao	www.seawheel.com	2
Seawheel	**LoLo**	Waterford – Bristol	www.seawheel.com	3
Seawheel	**LoLo**	Dublin – Greenock	www.seawheel.com	1

Source: IMDO

Appendix 5: Questionnaire Circulated to Ports

Irish Short Sea Shipping Inter-European Trade Corridors

Study for the IMDO by Logistecon Economic and Management Consultants

Traffic Flows by Sea between Ireland and Northern Europe

All data supplied will be treated in **total confidence** and aggregated results across all ports will only be published. Any queries please contact John Mangan (087 6468056 / email john.mangan@imi.ie) or Kevin Hannigan (086 8274487 / khsk@eircom.net)

We would be most obliged if you could provide us with the following data in relation to your port for calendar year 2002.

In our questionnaire we distinguish ports in four regions:

UK

Belgium

Netherlands

Northern Europe - which refers to ports in Scandinavia, Germany and the Baltic region.

Name of Port_____

Number of RoRo units (loaded and empty): Export

To UK ports showing final destination = UK	
To UK ports showing final destination = Belgium / Netherlands / Lux	
To UK ports showing final destination = Germany / Denmark	
To UK ports showing final destination = Norway / Sweden / Finland	
To UK ports showing final destination = Latvia / Lithuania / Estonia	
To UK ports showing final destination = Poland / Czech Republic / Slovakia	

To BELGIAN ports showing final destination = Belgium / Netherlands / Lux	
To BELGIAN ports showing final destination = Germany / Denmark	
To BELGIAN ports showing final destination = Norway / Sweden / Finland	
To BELGIAN ports showing final destination = Latvia / Lithuania / Estonia	
To BELGIAN ports showing final destination = Poland / Czech Republic / Slovakia	

To NETHERLANDS ports showing final destination = Belgium / Netherlands / Lux	
To NETHERLANDS ports showing final destination = Germany / Denmark	
To NETHERLANDS ports showing final destination = Norway / Sweden / Finland	
To NETHERLANDS ports showing final destination = Latvia / Lithuania / Estonia	
To NETHERLANDS ports showing final destination = Poland / Czech Republic / Slovakia	

To OTHER NORTH EUROPEAN PORTS showing final destination = Belgium / Netherlands / Lux	
To OTHER NORTH EUROPEAN PORTS showing final destination = Germany / Denmark	
To OTHER NORTH EUROPEAN PORTS showing final destination = Norway / Sweden / Finland	
To OTHER NORTH EUROPEAN PORTS showing final destination = Latvia / Lithuania / Estonia	
To OTHER NORTH EUROPEAN PORTS showing final destination = Poland/Czech Rep/ Slovakia	

Number of RoRo units (loaded and empty): Import

From UK ports showing origin = UK	
From UK ports showing origin = Belgium / Netherlands / Lux	
From UK ports showing origin = Germany / Denmark	
From UK ports showing origin = Norway / Sweden / Finland	
From UK ports showing origin = Latvia / Lithuania / Estonia	
From UK ports showing origin = Poland / Czech Republic / Slovakia	

From BELGIAN ports showing origin = Belgium / Netherlands / Lux	
From BELGIAN ports showing origin = Germany / Denmark	
From BELGIAN ports showing origin = Norway / Sweden / Finland	
From BELGIAN ports showing origin = Latvia / Lithuania / Estonia	
From BELGIAN ports showing origin = Poland / Czech Republic / Slovakia	

From NETHERLANDS ports showing origin = Belgium / Netherlands / Lux	
From NETHERLANDS ports showing origin = Germany / Denmark	
From NETHERLANDS ports showing origin = Norway / Sweden / Finland	
From NETHERLANDS ports showing origin = Latvia / Lithuania / Estonia	
From NETHERLANDS ports showing origin = Poland / Czech Republic / Slovakia	

From OTHER NORTH EUROPEAN PORTS showing origin = Belgium / Netherlands / Lux	
From OTHER NORTH EUROPEAN PORTS showing origin = Germany / Denmark	
From OTHER NORTH EUROPEAN PORTS showing origin = Norway / Sweden / Finland	
From OTHER NORTH EUROPEAN PORTS showing origin = Latvia / Lithuania / Estonia	
From OTHER NORTH EUROPEAN PORTS showing origin = Poland/Czech Rep/ Slovakia	

Number of LoLo units in TEUs (loaded and empty): Export

To UK ports showing final destination = UK	
To UK ports showing final destination = Belgium / Netherlands / Lux	
To UK ports showing final destination = Germany / Denmark	
To UK ports showing final destination = Norway / Sweden / Finland	
To UK ports showing final destination = Latvia / Lithuania / Estonia	
To UK ports showing final destination = Poland / Czech Republic / Slovakia	

To BELGIAN ports showing final destination = Belgium / Netherlands / Lux	
To BELGIAN ports showing final destination = Germany / Denmark	
To BELGIAN ports showing final destination = Norway / Sweden / Finland	
To BELGIAN ports showing final destination = Latvia / Lithuania / Estonia	
To BELGIAN ports showing final destination = Poland / Czech Republic / Slovakia	

To NETHERLANDS ports showing final destination = Belgium / Netherlands / Lux	
To NETHERLANDS ports showing final destination = Germany / Denmark	
To NETHERLANDS ports showing final destination = Norway / Sweden / Finland	
To NETHERLANDS ports showing final destination = Latvia / Lithuania / Estonia	
To NETHERLANDS ports showing final destination = Poland / Czech Republic / Slovakia	

To OTHER NORTH EUROPEAN PORTS showing final destination = Belgium / Netherlands / Lux	
To OTHER NORTH EUROPEAN PORTS showing final destination = Germany / Denmark	
To OTHER NORTH EUROPEAN PORTS showing final destination = Norway / Sweden / Finland	
To OTHER NORTH EUROPEAN PORTS showing final destination = Latvia / Lithuania / Estonia	
To OTHER NORTH EUROPEAN PORTS showing final destination = Poland/Czech Rep/ Slovakia	

LoLo units in TEUs (loaded and empty): Import

From UK ports showing origin = UK	
From UK ports showing origin = Belgium / Netherlands / Lux	
From UK ports showing origin = Germany / Denmark	
From UK ports showing origin = Norway / Sweden / Finland	
From UK ports showing origin = Latvia / Lithuania / Estonia	
From UK ports showing origin = Poland / Czech Republic / Slovakia	

From BELGIAN ports showing origin = Belgium / Netherlands / Lux	
From BELGIAN ports showing origin = Germany / Denmark	
From BELGIAN ports showing origin = Norway / Sweden / Finland	
From BELGIAN ports showing origin = Latvia / Lithuania / Estonia	
From BELGIAN ports showing origin = Poland / Czech Republic / Slovakia	

From NETHERLANDS ports showing origin = Belgium / Netherlands / Lux	
From NETHERLANDS ports showing origin = Germany / Denmark	
From NETHERLANDS ports showing origin = Norway / Sweden / Finland	
From NETHERLANDS ports showing origin = Latvia / Lithuania / Estonia	
From NETHERLANDS ports showing origin = Poland / Czech Republic / Slovakia	

From OTHER NORTH EUROPEAN PORTS showing origin = Belgium / Netherlands / Lux	
From OTHER NORTH EUROPEAN PORTS showing origin = Germany / Denmark	
From OTHER NORTH EUROPEAN PORTS showing origin = Norway / Sweden / Finland	
From OTHER NORTH EUROPEAN PORTS showing origin = Latvia / Lithuania / Estonia	
From OTHER NORTH EUROPEAN PORTS showing origin = Poland/Czech Rep/ Slovakia	

Total tonnage of bulk and all other goods in tonnes: Export

To UK ports showing final destination = UK	
To UK ports showing final destination = Belgium / Netherlands / Lux	
To UK ports showing final destination = Germany / Denmark	
To UK ports showing final destination = Norway / Sweden / Finland	
To UK ports showing final destination = Latvia / Lithuania / Estonia	
To UK ports showing final destination = Poland / Czech Republic / Slovakia	

To BELGIAN ports showing final destination = Belgium / Netherlands / Lux	
To BELGIAN ports showing final destination = Germany / Denmark	
To BELGIAN ports showing final destination = Norway / Sweden / Finland	
To BELGIAN ports showing final destination = Latvia / Lithuania / Estonia	
To BELGIAN ports showing final destination = Poland / Czech Republic / Slovakia	

To NETHERLANDS ports showing final destination = Belgium / Netherlands / Lux	
To NETHERLANDS ports showing final destination = Germany / Denmark	
To NETHERLANDS ports showing final destination = Norway / Sweden / Finland	
To NETHERLANDS ports showing final destination = Latvia / Lithuania / Estonia	
To NETHERLANDS ports showing final destination = Poland / Czech Republic / Slovakia	

To OTHER NORTH EUROPEAN PORTS showing final destination = Belgium / Netherlands / Lux	
To OTHER NORTH EUROPEAN PORTS showing final destination = Germany / Denmark	
To OTHER NORTH EUROPEAN PORTS showing final destination = Norway / Sweden / Finland	
To OTHER NORTH EUROPEAN PORTS showing final destination = Latvia / Lithuania / Estonia	
To OTHER NORTH EUROPEAN PORTS showing final destination = Poland/Czech Rep/ Slovakia	

Total tonnage of bulk and all other goods in tonnes: Import

From UK ports showing origin = UK	
From UK ports showing origin = Belgium / Netherlands / Lux	
From UK ports showing origin = Germany / Denmark	
From UK ports showing origin = Norway / Sweden / Finland	
From UK ports showing origin = Latvia / Lithuania / Estonia	
From UK ports showing origin = Poland / Czech Republic / Slovakia	

From BELGIAN ports showing origin = Belgium / Netherlands / Lux	
From BELGIAN ports showing origin = Germany / Denmark	
From BELGIAN ports showing origin = Norway / Sweden / Finland	
From BELGIAN ports showing origin = Latvia / Lithuania / Estonia	
From BELGIAN ports showing origin = Poland / Czech Republic / Slovakia	

From NETHERLANDS ports showing origin = Belgium / Netherlands / Lux	
From NETHERLANDS ports showing origin = Germany / Denmark	
From NETHERLANDS ports showing origin = Norway / Sweden / Finland	
From NETHERLANDS ports showing origin = Latvia / Lithuania / Estonia	
From NETHERLANDS ports showing origin = Poland / Czech Republic / Slovakia	

From OTHER NORTH EUROPEAN PORTS showing origin = Belgium / Netherlands / Lux	
From OTHER NORTH EUROPEAN PORTS showing origin = Germany / Denmark	
From OTHER NORTH EUROPEAN PORTS showing origin = Norway / Sweden / Finland	
From OTHER NORTH EUROPEAN PORTS showing origin = Latvia / Lithuania / Estonia	
From OTHER NORTH EUROPEAN PORTS showing origin = Poland/Czech Rep/ Slovakia	

Please supply details of the shipping services (outbound services only) currently operating from your port

Scheduled Liner services

	Number of weekly services	Total available capacity on these services
RoRo to UK		
RoRo to Continental Europe		
LoLo to UK		
LoLo to Belgium		
LoLo to Netherlands		
LoLo to France		
Bulk to UK		
Bulk to Continental Europe		
Bulk to Scandinavia		

General unscheduled Services

	Weekly	Total available capacity on these services
RoRo to UK		
RoRo to Continental Europe		
LoLo to UK		
LoLo to Belgium		
LoLo to Netherlands		
LoLo to France		

Bulk to UK		
Bulk to Continental Europe		

END

Appendix 6: Data on Routes Used by Freight

Provide the data underlying the maps here:

Data for Map 1: LoLo Trade by Partner Port

	Imports	Exports
British ports	79,229	42,938
Belgian	49,157	58,781
Netherlands	196,341	197,331
Baltic Ports	16,153	17,375

Data for Map 2: Non-Dublin LoLo Freight through Belgian Ports (TEUs)

	Imports to Ireland	Exports from Ireland
Belgium, Netherlands, Luxembourg	12,920	14,909
Germany, Denmark	2,079	2,795
Norway, Sweden, Finland	1,271	3,328
Latvia, Lithuania, Estonia	64	46
Poland, Czech Rep, Slovakia	163	244

Data for Map 3: Non-Dublin LoLo Freight through Netherlands Ports (TEUs)

	Imports to Ireland	Exports from Ireland
Belgium, Netherlands, Luxembourg	69,778	82,108
Germany, Denmark	11,018	10,000
Norway, Sweden, Finland	1,871	1,983
Latvia, Lithuania, Estonia	819	360

Poland, Czech Rep, Slovakia	922	1,791

Data for Map 4: TEUs to/from Dublin Port from/to Trading Partner via Antwerp and Rotterdam

	Imports	Exports
Belgium, Netherlands, Luxembourg	30,765	14,613
Germany, Denmark	100,121	89,106
Norway, Sweden, Finland	6,415	24,389
Latvia, Lithuania, Estonia	587	1,130
Poland, Czech Rep, Slovakia	6,267	9,230

Data for Map 5: RoRo Freight through Britain (Outward only)

	Total Carried	Final destination	Tonnes
To Britain	3,721,000	Britain	2,214,000
Onward to Netherlands	33,500	Netherlands	11,000
		Germany & Denmark	22,500
Onward to France	1,473,500	France	346,000
		Belgium & Netherlands	308,000
		Germany and Denmark	396,500
		Sweden	53,000
		Other Areas	370,000
Total			3,721,000

Appendix 7: Tolls, Permits and Licence Costs for HGVs in Europe

Permits and licences

EU and CEMT licences

Trucks with a loading capacity of 500 kg or more that perform commercial transport need to have a special licence. National transport requires a national licence, transnational transport within the EU requires an EU-licence. Most transport outside the EU requires a trip permit. With a CEMT-licence, transport and transit is possible in 43 countries (including all EU countries). The CEMT licences are in three categories: 'green', 'supergreen' and Euro3-safe'. The trucks need to be certified according to these standards. In 2004, The Netherlands for example, has 1,137 CEMT licences, of which 110 'green', 691 'supergreen' and 336 'Euro3-safe'. The licence is valid for one year, except for some short-period licences. Austria, Italy and Greece have restrictions for the number of licences to be used on their territory. For example the number of Dutch licences are restricted in Austria (64), Italy (184) and Greece (234). Austria only accepts 'supergreen' licences and no short-period licences.

Trip permits in Switzerland

Since 1 January 2001, Switzerland has an agreement with the EU with regard to road haulage through Switzerland. The agreement includes:

- Implementation of a new and higher tax per tonnekilometre, the so called LSVA;

- Increase of the maximum permissible gross laden weight from 28 tonnes to 34 tonnes and in 2005 to 40 tonnes.

At the same time, two new trip permits have been introduced:

- the '28-tonnes permit' for transit transport with vehicles up to 28 tonnes;

- the '40-tonnes permit' for transit transport with heavier vehicles of 34 or 40 tonnes.

Each permit is only valid for a one way trip. The number of permits is limited per country. The price of a permit is 3 Euro. Vehicles with a maximum permissible gross laden weight lower than 28 tonne do not need a trip permit (they have to pay the EuroVignette, see below).

Trip permits in Austria

Austria is the only country in the EU using a quota by dividing only a restricted number of eco-points. The European Parliament is against this concept, because it conflicts with the concept of free traffic and transport in Europe. In November 2003, the EU decided on a new Eco-point system for Austria for 2004, 2005 and 2006. Each transit trip with a truck requires 6, 7 or 8 eco-points. At the moment, Austria does not accept this new decision so there is no enforcement at present. Austria threatens with measures like weekend prohibition and long lasting road repairs.

Prices of permits and licences

The following table shows the prices for licences and trip permits.

Euro licence	€ 360.70
CEMT licence	€ 326.80
Trip permit	€ 1.30
Trip permit for Switzerland	€ 3.00
Eco-point transit Austria	€ 0.30

Eurovignette (Be, Ne, Lu, Du, De, Sw)

If you make use of HGV transport on the highway network of Belgium, The Netherlands, Luxembourg, Germany, Denmark or Sweden, you are obliged to pay Heavy Vehicle Tax. This only accounts for trucks or combinations with a maximum permissible gross laden weight of 12.000 tonnes or more. In some cases dispensation is applicable:

- Police vehicles, fire brigade, vehicles for road maintenance, circus trucks

- Dispensation on request when use is being made of only a very short distance of the highway network (in the surroundings of ports or airports or between two nearby business parks).

The rates are defined in Directive 1999/62/EC of The European Parliament and of The Council of 17 June 1999 on the charging of heavy goods vehicles for the use of certain infrastructures:

RATES IN 2003	3 or less axles	4 or more axles
Rates per year		
Euro 0	€ 960	€ 1,550
Euro 1	€ 850	€ 1,400
Euro 2	€ 750	€ 1,250
Rates per month		
Euro 0	€ 96	€ 155
Euro 1	€ 85	€ 140
Euro 2	€ 75	€ 125
Rates per week		

Euro 0	€ 26	€ 41
Euro 1	€ 23	€ 37
Euro 2	€ 20	€ 33
Rates per day (all vehicle types)	€ 8	€ 8

Truck tolling

Truck tolling is in operation in the following countries: Switzerland, France, Spain, Italy, Hungary, Portugal, Slovenia, Norway, Greece, Croatia and Serbia and Montenegro. The size of the toll differs per highway section and per type of vehicle. Truck tolling is also planned to become operational in the following countries: Germany, Sweden, England, The Netherlands. Close to operation is the German toll system called LKW-Maut. The plan is for a road toll to be levied on German motorways for HGVs of 12 tonnes permissible gross weight and above[44]. The amount of the toll is calculated on the basis of the distance travelled on toll sections, the number of axles and the emissions class. The toll will replace the existing Eurovignette in Germany.

Tolling in Switzerland

As noted above, since 1 January 2001, Switzerland has an agreement with the EU about road haulage through Switzerland which includes implementation of a new and higher tax per tonnekilometer, the so called LSVA.

The LSVA or Heavy Vehicle Fee (HVF)

The principles as well as the broader framework for fee calculation are defined in the legal framework (Swiss constitution, HVF Law and ordinances): The fee burdens heavy vehicles with a total weight above 3.5 tonnes, with exceptions, according to the principle of liability (driving more leads to higher fees). Fee collection is based on the principle of self-declaration. This means that the owners of the vehicles and, in the case of foreign vehicles, the drivers, are responsible for their declarations as well as for the proper functioning of the equipment (e.g. on-board units for the registration of data). The HVF for vehicles, used for transporting goods, is calculated on the basis of the kilometres driven, the maximum weight of the vehicle permitted as well as the emission class of the trucks.

The Fee is:

- for trucks with a max weight of 18 tonnes and of Euro 0-type: 0,36 SFr per kilometre;

- for trucks with a max weight of 30 tonnes and of Euro 1-type: 0,504 SFr per kilometre;

- for trucks with a max weight of 34 tonnes and of Euro 2/3-type: 0,483 SFr per kilometre.

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[44] Introduction of LKW-Maut has been delayed on a number of occasions and is now planned for 2005.

Toll roads in France

Section	1 or 2 axles	3 or 4 axles
AIX-EN-PROVENCE - CANNES	23,10 €	31,60 €
AIX-EN-PROVENCE - LA SAULCE	20,20 €	27,80 €
AIX EN PROVENCE - MENTON	34,10 €	47,00 €
AIX-EN-PROVENCE - NICE	28,00 €	38,40 €
AIX-EN-PROVENCE - PARIS	99,40 €	136,20 €
AIX-EN-PROVENCE - TOULON	12,60 €	17,50 €
AIX-EN-PROVENCE - VALENCE	25,10 €	35,30 €
ALBERTVILLE - PARIS	89,60 €	121,40
AMIENS - REIMS	20,70 €	28,20 €
ANGERS - BOURGUEIL	10,20 €	13,20 €
ANGERS - CHOLET	7,30 €	9,70 €
ANGERS - NANTES	16,20 €	20,40 €
ANGERS - PARIS	45,90 €	63,50 €
BAYONNE - TOULOUSE	31,00 €	42,50 €
BORDEAUX - HENDAYE	12,50 €	17,00 €
BORDEAUX - MUSSIDAN	11,70 €	17,10 €
BORDEAUX - PARIS	95,50 €	130,00 €
BORDEAUX - ROCHEFORT	21,50 €	28,80 €
BORDEAUX - TOULOUSE	30,70 €	41,80 €
BOULOGNE SUR MER - PARIS	33,30 €	48,60 €
CAEN - PARIS (A13)	22,90 €	33,00 €
CAEN - PARIS (A14*)	45,40 €	63,00 €
CALAIS - CAEN (Pont de Normandie)	39,20 €	59,90 €
CALAIS - PARIS (A26-A1)	36,10 €	48,40 €
CALAIS - PARIS (A16)	33,30 €	48,60 €
CALAIS - REIMS	35,00 €	47,20 €
CANNES - PARIS	122,50 €	167,80 €

CHAMBÉRY - ALBERTVILLE	8,70 €	11,90 €
CHAMBÉRY - CHAMONIX	22,10 €	29,80 €
CHAMBÉRY - CRUSEILLES BARRIÈRE	14,20 €	19,90 €
CHAMBÉRY - GENÈVE	18,10 €	24,90 €
CHAMBÉRY - MODANE	26,80 €	36,10 €
CHAMBÉRY - PARIS	80,90 €	109,50 €
CHAMONIX - PARIS (A6)	94,10 €	126,50 €
CHAMONIX - PARIS (A5)	95,60 €	128,80 €
CLERMONT-FERRAND - PARIS	67,40 €	91,20 €
CLERMONT FERRAND - ST ÉTIENNE	18,70 €	24,90 €
COSNE-SUR-LOIRE - PARIS	21,30 €	29,00 €
DEAUVILLE - PARIS (A13)	17,60 €	25,00 €
DEAUVILLE - PARIS (A14*)	40,10 €	55,00 €
GENÈVE - PARIS (A6)	82,30 €	111,60 €
GENÈVE - PARIS (A5)	83,80 €	113,90 €
GRENOBLE - ALBERTVILLE	13,60 €	18,50 €
GRENOBLE - CHAMBÉRY	9,30 €	12,80 €
GRENOBLE - MODANE	31,90 €	42,50 €
GRENOBLE - PARIS	79,20 €	107,60 €
HENDAYE - PARIS	108,00 €	147,00 €
LA DÉFENSE - ORGEVAL : A14*	22,50 €	30,00 €
LE HAVRE - PARIS (Pont de Tancarville A13)	18,00 €	26,00 €
LE HAVRE - PARIS (Pont de Tancarville A14*)	40,50 €	56,00 €
LE HAVRE - ST-SAËNS	12,00 €	16,80 €
LE PERTHUS - PARIS	127,80 €	174,20 €
LILLE - PARIS	25,70 €	34,50 €
LILLE - REIMS	24,00 €	32,80 €
LYON - AIX-EN-PROVENCE	38,00 €	52,20 €
LYON - CHAMBÉRY	19,50 €	25,50 €
LYON - CHAMONIX (A42 - A40)	41,00 €	54,10 €
LYON - GENÈVE (A42 - A40)	29,20 €	39,20 €
LYON - GRENOBLE	17,80 €	23,60 €

LYON - MONTPELLIER	39,30 €	53,60 €
LYON - NANCY	54,90 €	75,90 €
LYON - PARIS (A6)	61,40 €	84,00 €
LYON - PARIS (A5)	62,90 €	86,30 €
MARSEILLE - PARIS	99,40 €	136,20 €
MENTON - PARIS	133,50 €	183,20 €
METZ - PARIS	43,10 €	56,80 €
MODANE - PARIS	107,70 €	145,60 €
MONTPELLIER - AIX-EN-PROVENCE	15,70 €	21,00 €
MONTPELLIER - ARLES	8,70 €	11,80 €
MONTPELLIER - LE PERTHUS	27,10 €	36,60 €
MONTPELLIER - PARIS	100,70 €	137,60 €
MONTPELLIER - VALENCE	26,10 €	36,80 €
MULHOUSE - LYON	54,00 €	74,60 €
MULHOUSE - PARIS (A6)	72,40 €	99,40 €
MULHOUSE - PARIS (A5)	71,10 €	98,40 €
NANCY - CHAMONIX	81,90 €	110,80 €
NANCY - GENÈVE	70,10 €	95,90 €
NANTES - BORDEAUX	46,20 €	61,80 €
NANTES - PARIS	62,10 €	83,90 €
NICE - PARIS	127,40 €	174,60 €
REIMS - CHAMONIX	104,60 €	140,20 €
REIMS - GENÈVE	92,80 €	125,30 €
REIMS - LYON	73,40 €	99,30 €
REIMS - PARIS	18,50 €	24,10 €
RENNES - PARIS	50,30 €	71,40 €
ROUEN - CAEN	13,30 €	19,20 €
ROUEN - PARIS (A13)	9,60 €	13,80 €
ROUEN - PARIS (A14*)	32,10 €	43,80 €
SAINT GERMAIN LES VERGNES - LE SANCY	16,10 €	23,30 €
ST-MARTIN-DE-CRAU - AIX-EN-PROVENCE	7,00 €	9,20 €
SARREBRUCK - PARIS	50,70 €	67,20 €

STRASBOURG - PARIS	64,80 €	85,90 €
TOULON - PARIS	112,00 €	153,70 €
TOULOUSE - HENDAYE	37,40 €	51,40 €
TOULOUSE - LE PERTHUS	32,90 €	44,00 €
TOULOUSE - MONTPELLIER	35,00 €	47,00 €
TOULOUSE - PAMIERS	9,00 €	12,20 €
TOULOUSE - PARIS	126,20 €	171,80 €
TOURS - BORDEAUX	55,10 €	75,20 €
TOURS - PARIS	40,40 €	54,80 €
VALENCE - GRENOBLE	14,90 €	20,10 €
VALENCIENNES - PARIS	23,60 €	31,60 €
VALENCIENNES - REIMS	20,20 €	27,80 €
TUNNEL DU PUYMORENS	15,30 €	25,40 €
TUNNEL MAURICE LEMAIRE	11,00 €	21,00 €
TUNNEL DU FREJUS (ONE WAY, EURO 0-1)	104,40 €	209,90 €
TUNNEL DU FREJUS (ONE WAY, EURO 2-3)	98,30 €	197,40 €
TUNNEL DU FREJUS (RETOUR, EURO 0-1)	167,60 €	339,90 €
TUNNEL DU FREJUS (RETOUR, EURO 2-3)	157,60 €	319,70 €

TUNNEL DU MONT BLANC: Same as TUNEEL DU FREJUS

Toll roads in Austria: successful introduction of Austrian Maut in 2004

Electronic tolling for trucks on Austrian main (highway) roads has been introduced without technical problems on 1 January 2004. In total, 422 control and booking stations have been installed on the 2,000 km long highway network, functioning on microwave technique. The toll portals are placed above the driving lanes in both directions. With the help of antennae, they make contact with passing trucks. These trucks need to have a 5-euro costing 'GO-Box' behind the front window of the truck. Payment can be done afterwards ('on account') or beforehand with payment cards. A laser scanner checks the speed, length and type of vehicle on 100 different places. The trucks are photographed from both the front and the rear. The information is then erased when the information fits the information on the GO-Box. This system is meant to be as a transitional system until 2012, when it will be replaced by a system based on satellite communication and navigation. About 100 so-called 'Maut-sheriffs' are hunting trespassers. Wrong programming of the GO-Box costs 120 euro, a missing GO-Box results in a penalty of 220 euro. About 100,000 Austrian trucks and 300,000 foreign trucks each year will result in a 600 million euro income.

Toll roads in Italy

Section	Length	CAT 2	CAT 3	CAT 4
A1 MILANO - NAPOLI	803,5 km	€ 46,70	€ 74,30	€ 89,00
A4 MILANO - BRESCIA	93,5 km	€ 6,30	€ 10,00	€ 12,00
A7 SERRAVALLE - GENOVA	50,0 km	€ 3,50	€ 5,60	€ 6,70
A8 MILANO - VARESE	45,3 km	€ 2,60	€ 4,00	€ 4,80
A9 LAINATE - COMO - CHIASSO	32,4 km	€ 2,50	€ 4,00	€ 4,80
A10 GENOVA - SAVONA	45,5 km	€ 3,30	€ 5,30	€ 6,30
A11 FIRENZE - PISA NORD	81,7 km	€ 5,50	€ 8,70	€ 10,50
A12 GENOVA - SESTRI LEVANTE	48,7 km	€ 3,80	€ 6,00	€ 7,20
A12 ROMA - CIVITAVECCHIA	65,4 km	€ 3,80	€ 6,20	€ 7,40
A13 BOLOGNA - PADOVA	127,3 km	€ 6,60	€ 10,50	€ 12,60
A14 BOLOGNA - TARANTO	781,4 km	€ 43,90	€ 69,90	€ 83,70
A16 NAPOLI - CANOSA	172,3 km	€ 12,30	€ 19,50	€ 23,30
A23 UDINE - TARVISIO	101,2 km	€ 6,20	€ 9,90	€ 11,90
A26 VOLTRI - GRAVELLONA	268,9 km	€ 12,90	€ 20,50	€ 24,60
A27 VENEZIA - BELLUNO	82,2 km	€ 5,60	€ 9,00	€ 10,80
A30 CASERTA - SALERNO	55,3 km	€ 3,40	€ 5,40	€ 6,50

(www.autostrade.it)

Toll roads in Spain

Tolls are payable on the following motorways:

Section	CAT 2	CAT 3	CAT 4
A1 Burgus – Aminon	€ 8,65	€ 15,30	€ 16,6
A2 El Vendrell - Alfajarin	€ 25,00	€ 37,25	€ 37,25
A4 Dos Hermanas – Puerto Real	€ 10,25	€ 11,35	€ 11,35
A6 Villalba – Adanero	€ 15,20	€ 17,10	€ 17,10
A7 La Jonquera – Barcelona North	€ 16,50	€ 20,68	€ 20,83
A7 Barcelona South – Salou	€ 12,95	€ 16,35	€ 16,35

A7 Salou – Puzol	€ 23,20	€ 25,50	€25,50
A7 Silla – San Juan	€ 15,40	€ 16,90	€16,90
A8 Bilbao (Accesos Oeste) – San Sebastian	€ 20,25	€ 22,50	€22,50
A8 San Sebastian – Irun (French border)	€ 3,30	€ 3,65	€ 3,65
A9 La Coruna – Santiago	€ 7,51	€ 9,26	€ 9,26
A9 Pontevedra – Vigo	€ 3,95	€ 5,27	€ 5,27
A15 Pamplona (Irurzun) to Tudela (A68)	€ 3,34	€ 3,34	€ 3,34
A18 Barcelona – Manresa North (mo-fr)	€ 6,02	€ 6,02	€ 7,54
A18 Barcelona – Manresa North (sa-su)	€ 10,95	€ 10,95	€ 13,71
A19 Barcelona (Montgat) – Malgrat	€ 5,12	€ 5,88	€ 6,38
A66 Bilbao – Zaragoza	€ 39,00	€ 39,00	€ 45,25

Toll roads in Portugal

A1 Alverca – Santarem	€ 5,10	€ 6,55	€ 7,20
A1 Santarem – Fatima	€ 5,55	€ 7,10	€ 7,85
A1 Fatima – Coimbra (South)	€ 8,20	€ 10,50	€ 17,50
A1 Coimbra (South) – Aveiro (South)	€ 4,05	€ 5,25	€ 5,85
A1 Aveiro (South) – Grijo	€ 6,25	€ 7,95	€ 8,80
A2 Coina (near Lisboa) – Marateca	€ 6,25	€ 7,95	€ 6,05
A2 Maraceta – Grandola (South)	€ 8,10	€ 10,45	€ 11,60
A3 Porto (Maia) – Braga – Valenca	€ 11,75	€ 15,20	€ 16,85
A4 Porto (Ermesinde) – Amarante	€ 5,50	€ 7,05	€ 7,75
A5 Lisboa to Cascais	€ 2,05	€ 2,05	€ 2,05
A6 Marateca to Montemor-o-Novo	€ 5,95	€ 7,55	€ 8,40
A6 Montemor – Elvas (Spanish border)	€ 11,85	€ 15,30	€ 16,95

Toll roads in Denmark

The Great Belt Link:

Among the many ferry routes which have linked the Danish islands for centuries, by far the most important has been the route across the Great Belt between Funen and

Zealand. The Link comprises the East Bridge, a 6,790 m long suspension bridge between Zealand and the small island of Sprogø, a 6,611 m long combined rail and road bridge between Sprogø and Funen, and an 8,000 m long immersed rail tunnel between Zealand and Sprogø. Toll fees for individual vehicles are determined automatically on the basis of the vehicle's height and length. When calculating the length of a vehicle, tow-bars, projecting freight, loose items and trailers are taken into account.

Vehicles	Up to 3 m	3 to 6 m	6 to 10 m	over 10 m
Less than 2,7 m high	125 DKK*	245 DKK	370 DKK	370 DKK
Over 2,7 m high under 3.500 Kg		245 DKK	610 DKK**	610 DKK*
Over 2,7 m high over 3.500 Kg		610 DKK	610 DKK**	965 DKK*
Trucks over 50 tons		special toll fees (call +45 3393 5200)		

The Oresund Link

With the opening in 2000 of the Øresund Link , a seventeen-kilometre-long road and rail bridge connects Denmark (Copenhagen) with Sweden (Malmo).

Toll roads in Belgium

Liefkenshoektunnel (Ring Antwerp): Prices for vehicles lower than 2.5m are 140BEF(3.5€) or 108BEF(2.7€) (teletol), higher than 2.5m, 560BEF(14€) or /433BEF(10.83€) (teletol).

Toll roads in Greece

There are two toll highways in Greece. One goes from Athens to the Peloponnesus and the other goes from Athens to Thessaloniki. The cost is about US$1 - US$3 for the tolls.

Appendix 8: Euro Rate Comparisons for Mainland Europe Haulage

45 ft LoLo Containers

European Origin / Destination	Import rate	Export rate
Amsterdam	815	365
Brussels	830	380
Berlin	1495	1045
Warsaw	2220	1770
Copenhagen	1625	1175
Tallinn (40ft)	2530	2430
Helsinki (40ft)	1880	1800

40ft RoRo Containers

European Origin / Destination	Import rate	Export rate
Amsterdam	1700	970
Brussels	1500	1000
Berlin	2100	1550
Warsaw	1600	

Appendix 9: Typical Haulage Costs

Haulage Analysis, 44 tonne truck with 5 axels (€, January 2002)

1. Truck purchase (without tyres) yearly rate : (*)	
1.1 Depreciation purchase costs	15,850.00
Road Tractor	13,600.00
Trailer	2,250.00
1.2 Tax (property transfer, registration rights, etc)	included in purchase
Total	**15,850.00**
2. Insurance	
2.1 Civil Responsibility (compulsory rights)	
2.2 Fire & Theft	
2.3 Tax	
Total	**4,800.00**
3. Truck taxes	
3.1 Truck ownership	900.00
3.2 Others	1,250.00
Total	**2,150.00**
4. Tyres	
4.1 Road Tractor	1,440.00
4.2 Trailer	2,880.00
Total	**4,320.00**
5. Cost of Fuel (**)	
5.1 Trade Price	13,125.00
5.2 Excise duties	13,125.00
Total (Price at the pump without T.V.A.)	**26,250.00**
6. Maintenance and Repairs	
6.1 Labour	3,840.00
6.2 Spare parts	3,840.00
6.3 Lubricants (lube oils)	5,040.00
Total	**12,720.00**

7. Motorway Tolls		
7.1 Motorway Tolls	Not specified	
7.2 Trip Permits	Not specified	
Total	**0.00**	
8. Driver Yearly Cost		
8.1 Driver Yearly Cost	47,960.00	
GENERAL TOTAL	**114,050.00**	

(*)   Life of the truck = 6 year; Cost of road tractor = €81,600; Cost of trailer = €13,500

 (**)   Fuel priced at €0.83 per litre x 0.31 litre per km x 120,000 km. (Cost of one litre of fuel is comprised of trade price €0.35 plus excise duties €0.35 plus T.V.A. 19% (€0.13) giving a total of €0.83 per litre