



YRJÖ KAUKIAINEN

Shipping and Commodity Flows in the Late Eighteenth-Century Baltic

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Kiöbenhavn A:o 1786. M. Bang. Maritime Museum of Denmark.

Preface

I first became acquainted with the awe-inspiring thick volumes of the Sound Toll Records in the Danish National Archives some fifty years ago. Since then, I have exploited this data several times and in different modes, from the printed Sound Toll Tables to the modern digital resources. These earlier studies, however, concerned rather limited and less ambitious topics; in fact, my interests were mainly devoted to 19th-century shipping developments and more recent periods for which more sources are available. However, around 2020, I was involved in research trying to establish the identity of an unknown ship, wrecked on the skerries of southwest Finland in the 1740s. That work became a kind of turning point which plunged me deeply into the Sound Toll Records as well as most other relevant 18th-century Baltic shipping sources. It also encouraged me to delve deeper into the interesting developments and international dimensions of the Northern European shipping of this period. Subsequently, these new research interests resulted in three published articles on the shipping of three major Baltic ports: St. Petersburg, Lübeck and Copenhagen. Gradually, the interesting results of this research led my thoughts towards a more ambitious macro-level approach to the 18th-century shipping and maritime trade in the Baltic Sea area, a study to estimate its actual overall volume, scope and international importance.

Now as these pipe dreams are materializing in the form of this concise book, I would like to thank the publisher, *Suomalaisen Kirjallisuuden Seura (SKS)*, for accepting my study in their series *Studia Fennica Historica*. My special thanks are due to the Editor of the series, professor Sari Katajala-Peltomaa for her editorial input and for taking care of the arduous pre-publication process. I also thank the two anonymous referees for their useful, sometimes even provoking, comments. Last but not least, I thank the staff of SKS for the efficient and professional running of the publication process.

Helsinki, November 2025

Yrjö Kaukiainen

Introduction

1. A maritime road to economic transition

For a long time, the significant role of overseas trade has been taken for granted in the historical study of the 'Industrial Revolution', or the 'modern economic growth' (as the transition is nowadays usually called). In fact, Adam Smith was among the first to emphasize the significance of good maritime connections as a precondition for dynamic economic development.¹ In the 1960s, however, a new school of thought emerged claiming that domestic demand was more important in the British industrial breakthrough. This view also underlined the key role of mechanical inventions and manufacturing industries.²

Over the past three decades, however, a counter-current with a fresh interest in international trade has become apparent. This change in emphasis is connected with new research on the 'prehistory' of modern economic growth. It has been claimed that signs of a transition towards more dynamic economic development, above all an almost continuous (albeit modest) growth of real wages, can be found in the regions bordering the North Sea (i.e. the Dutch Republic and Britain) a century or two before the actual British Industrial Revolution.³

Such view of 'the long road to the industrial revolution' (an expression coined by Jan Luiten van Zanden) naturally implies a revision of the earlier emphasis on domestic demand and manufacturing. Instead, factors like foreign trade and maritime transport are gaining new ground in serious scholarly discussion. Robert C. Allen, in particular, has contributed to the debate with a number of important papers in which he finds that international trade had a significant impact on the early modern development of northwestern Europe.⁴

Such conclusions, however, have been based on indirect or circumstantial evidence: hardly any consistent statistics of European merchant tonnages and maritime trade can be found before the second quarter of the 19th century. For the late 18th century,

1. Cf. Smith 1776, Book I, Ch. III.

2. See e.g. Davis 1979, 9.

3. See e.g. van Zanden 2009.

4. Allen 2003, 432; see also Allen 2009.

there are just a few sporadic datasets which can be used to sketch a rough picture of the contemporary ocean and short-sea shipping. One of them are the results of a survey undertaken by the French government in 1786–1787 (Table 1). While it covers Europe fairly well, several of its figures may be classified as educated guesses; for example, the British tonnage is about ten percent lower than in some other sources and both the Danish and Swedish tonnages seem to have been overestimated.⁵

Table 1. European merchant marines in 1786–1787.

Thousand tons

Britain	889
France	729
The Dutch Republic	398
German North Sea and Baltic ports	155
Denmark-Norway	386
Sweden	169
Spain and Portugal	234
The Two Sicilies, Venice, Genoa	414

Source: Unger 1997, 261–262; Johansen 1992, 482.

Tonnage data naturally does not tell us how the respective merchant marines were utilized. Such pieces of information can only be roughly outlined from a few late eighteenth-century foreign-trade statistics, such as the British and Dutch ones. Unfortunately, they do not inform us about ship passages but rather of trade values. Still, they are able to reveal which were the main directions of the respective maritime trades. The statistics in question recorded the cash values of exports as well as imports but, as far as the focus is in sea transports, the latter are more interesting since the values of imported goods also included the costs of maritime (and other) freight.

Table 2. Dutch and British imports in the late 18th century by origin.

Percent of total value of imports (excl. colonial re-exports)

Importing country and period	Origin of imports					
	Northern Europe	N-western Europe	Southern Europe	Asia	The West Indies	North America
Dutch Republic, 1770s	18.6	21.2*	19.5	16.9	15.3**	
Britain, 1784–1786	16.7	9.9	12.6	21.8	20.1	6.6
Britain, 1794–1796	18.0	9.5	12.2	19.4	22.7	6.6

* Including Mediterranean France. ** The West Indies and North America.

Source: de Vries and van der Woude 1997, 497; Davis 1979, 92–93.

5. In these two cases the numbers of ships, at least, are some 20% higher than those in the respective national data. It is not certain that different national measures of ship sizes have been correctly converted.

Import values, however, present a biased picture of trade volumes. The well-known gravity model of trade postulates (by default) that trade costs (above all those for transport) increase with distance. On long distances they may grow to such an extent that cheap mass-produced goods cannot cover the price of haulage. In consequence, goods coming from the other side of the globe tend to be, on average, of higher value than those on board short-sea vessels. Thus, we may expect that the share of long-range imports would, in terms of volume, have been substantially lower than what their values suggest. In actual fact, northern Europe (in practice Norway and the Baltic region) may have equalled, if not exceeded, Asia or the West Indies in terms of material commodity flows to Britain and the Netherlands.

Harder evidence of ships, their voyages and cargoes can certainly be found in the archives of numerous seaports or respective regional and national archives. Collecting such data and piecing it together is, however, a very labour-intensive way to paint a bigger picture. Quite recently the current digital 'revolution' seems to have created new possibilities for the incorporation of vast numbers of scattered cases into a large consolidated database. The French-initiated Navigocorpus ('Corpus itineraries of merchant ships xvii-xix c.') is an interesting example of such a project.⁶ So far, however, none of the new databases can compete with an old archival (now even digitized) resource: the Sound Toll Records. Covering over three centuries of shipping between the North Sea and the Baltic, they relate to a very interesting period in the economic development of northwestern Europe. Of course, this data cannot be taken as a representative sample of all 'western' maritime trade but, as seen above, it presents a substantial element of it. Thus, it should be able to illuminate, in addition to the specific developments across the entire Baltic region, a few global trends. Moreover, it has already attracted vast amounts of solid historical research, upon which fresh study can be built.

2. The legacy of Sound Toll Registers

From 1429 to 1857, Denmark levied a toll of all vessels sailing through the Danish Sound (*Øresund*). This toll became a very important source of income for Denmark and, across all these years, the toll's bureaucrats recorded not only the relevant income but also information about the ships which paid the fees, thus preserving for the future the traces from four centuries of shipping.⁷

The accumulated data eventually comprised over 700 volumes of accounts, which occupied some sixty metres of shelf space in the Danish National Archives.⁸ Indeed, it was too large to be exploited in the same manner as conventional historical sources. Therefore, a veritable milestone in the early historiography of Baltic shipping was set in 1906, when Nina Ellinger Bang⁹ presented a 'key' to this data repository by

6. Navigocorpus.huma-num.fr.

7. For an overview, see Scherer 1875, 1–55; Degn (ed.) 2010, *passim*; Gøbel 2010, 306–308.

8. Gøbel 2010b, 308.

9. Although Georg Fredrich Sartorius' *Geschichte des hanseatischen Bundes* I–III (Göttingen 1802–1808) can be credited as the start of modern historical research of Baltic trade, Nina Bang (1866–1928) was probably the first historian to fully appreciate the source value of the

publishing the first volume of the *Sound Toll Tables*. Sixteen years later, it was followed by volume two, and subsequently, after her death in 1928, four more volumes were added to the series, finished by Knud Korst (1930–1953).¹⁰ Altogether, they present data from 1497 to 1783 (from the 1560s onwards without gaps), thus opening up for research, albeit in condensed form, this unique source material for late medieval and early modern shipping between the Baltic and the North Sea.

As generally understood, *Sound Toll Tables* (hereafter STT) are not proper source publications but excerpts and compilations from the original registers. While they record frequencies and quantities of several important variables, like the numbers of ships and the volumes of many commodities, they also omit lots of data which was regarded less essential. Not surprisingly, some of the editor's choices and interpretations were criticized soon after the first publication. The most persistent criticism and discussion has surrounded the question of whether shipmaster's home port also indicate the home port and nationality of the ship, as Nina Bang claimed. Time and again, examples of contrary cases have been presented but the relevance of the problem – at least with regard to nationalities – declines gradually as the record books started to classify ships in different categories according to their flags.¹¹

The printed *Sound Toll Tables* have also been criticized for tabulating ports of departures and arrivals in separate categories, thus making it impossible to reconstruct the actual trading routes. Even the tables of transported goods have been regarded as unsatisfactory as they only present annual data for a limited number of major commodities.¹² However, the STT have also been defended and – above all – persistently exploited for the economic and maritime history of the early modern era and have even been termed 'the Baltic historian's Bible'.¹³

The publishing of the tables beyond 1783 ceased due to lack of funding; thus, the toll registers for the last 73–74 years were left without the 'short-hand key' provided

Sound Toll Registers. While the publication project seems to have occupied her heavily from the mid-1890s onwards, she was also an active left-wing politician and became in 1924 the minister of education (as well as the first female minister in Denmark) in the country's first social democrat government (see *Dansk Biografisk Leksikon*: https://biografiskleksikon.lex.dk/Nina_Bang).

10. Nina Ellinger Bang, *Tabeller over skibsfart og varetransport gennem Øresund 1497–1660*, 2 vols., København 1906–1922; Nina Ellinger Bang og Knud Korst, *Tabeller over skibsfart og varetransport gennem Øresund 1661–1783 og gennem Storebælt 1701–1748*, 4 vols., København 1930–1953.
11. See e.g. Knoppers 1976, 13–15; Gøbel 2010, 321–322; Johansen 1983, 17–22. In the 18th century, there were six categories: Danish, Dutch, British, Swedish, non-privileged (ships from Prussia, Portugal, Lübeck, Danzig and Bremen) and others; thus, the captain's home port is important in just the categories five and six.
12. Knoppers 1976, 14; Gøbel 2010, 322.
13. Kumar 2018, 343–348; quotation from van Tielhof 2002, 344. Among the examples of earlier research that exploited STT, we can mention Walter Vogel, *Beiträge zur Statistik der deutschen Seeschiffahrt* (1928); Axel E. Christensen, *Dutch Trade to the Baltic about 1600* (1941); W. S. Unger, *Trade Through the Sound in the Seventeenth and Eighteenth Centuries* (1959); Sven-Erik Åström, *From Cloth to Iron I-II* (1963–1965); Artur Attman, *The Russian and Polish Markets in International Trade* (1973); Knoppers, *Dutch Trade with Russia* (1976).

by this 'Bible'. If there were plans to continue the tabulated compilations further,¹⁴ they did not materialize before the development of computer technology outdated this traditional mode of source-publishing.

The 'next-generation' Sound Toll database was born in the age of punched cards and magnetic tapes. In the early 1970s, Danish economic historian Hans Chr. Johansen initiated a project to produce a digital reproduction of all the shipping data contained in the Sound Toll Records from 1784 to 1795. Only the names of skippers were entered as plain text but the other non-numerical data (such as nationality, home ports, ports of departure and destinations, loaded/ballasted condition, commodities) was recorded in 3–6 -digit codes. The new database was finished in 1983 and was introduced in a concise book by Johansen: this contained both source criticism and fundamental analyses, as well as directions for use and a collection of statistics as a microfiche appendix. The Odense Sound Toll database was designed in an era before the internet and could only be accessed via the Danish Data Archives – until a revised internet version was published.¹⁵

The 'third-generation' Sound Toll database was made possible by the rapid development of computer processors and data storage technologies which have gradually opened totally new opportunities to create really big databases. Simultaneously, the rapid diffusion of personal computers and the internet increased the demand for online access to the data. The journey towards the present Sound Toll Registers Online (hereafter STRO) began in 2009 when the University of Groningen and the Frisian Historical and Literary Centre (Tresoar) united forces to create a new huge electronic database, comprising all the Sound Toll Registers from beginning to end. The Danish National Archives provided scans of the original records from which the data entry was undertaken by around fifty volunteers, supervised by a group of Dutch historians. All the passage data was entered according to an input template and the plain text was in some cases supplemented with special codes (such as codes for geographic names); in addition, the data was supplemented with scans of the original registers. The database was declared finished in 2020¹⁶ but already before that date scholars in maritime and economic history began to exploit those sections which became operational in the 2010s.¹⁷

At present the STRO comprises information about some 1.8 million passages through the Sound, and all of them can be browsed online. The user interface contains a fair selection of tools for searching, combining and classifying data: it even includes a system of standard geographic names which are linked with all known name variables and are also collected under the umbrella terms of 'small regions' and 'big regions'. Unfortunately, at the time of writing, all of these umbrella terms were not functioning correctly¹⁸ – obviously some 'finishing touches' are still needed.

14. According to Scheltjens and Veluwenkamp 2012, 302, a group of French historians planned an extension to the STT in the 1950s but no results of any such efforts have ever been published.

15. Gøbel 2010b, 322; Johansen 1983, 115–123.

16. Gøbel 2010b, 322–324; Scheltjens and Veluwenkamp 2012, 301–330; Veluwenkamp, Scheltjens and van der Woude 2021, 147–160.

17. As a representative sample see Veluwenkamp and Scheltjens (eds.), *Early Modern Shipping and Trade* (2018), a collection of ten independent essays.

18. For example, 'Russia around St. Petersburg' only yielded data on Narva, 'Esthonia' none at all, and 'South Baltic: East Prussia to Lubeck' did not yield any data from regions east of Swedish

3. *From passages to commodity flows: the aims and methods of this study*

The main goal of this study is to produce a well-founded overview, a macro-level analysis, of the Baltic trade in the latter half of the 18th century. On a practical level, this requires the collation of realistic series of actual cargo volumes or commodity flows. As ship sizes varied widely across different international trades, cargo volumes remain the only practical yardstick if we want to set Baltic shipping into a wider quantitative context.

As excellent source as the Sound Toll Registers are, they are not able to provide systematic macro-level data of commodity flows. While they do reveal the numbers of eastward and westward ship passages as well as the respective ports of departure and destination, they did not record the sizes of vessels visiting Elsinore – it was only from 1842 onwards that the tonnages were recorded. This means that such basic indicators of ship sizes, or transport capacities, are not systematically available for the period of this study.¹⁹

Numbers of passages can be considered to reflect, at least crudely, transport volumes; however, this correlation only holds good as long as vessel sizes remained more or less unchanged. Of course, such stability cannot be taken for granted: several earlier studies have suggested that the average sizes of ships transiting the Sound had already experienced a modest growth in the 17th century and the growth seems to have even continued during the next century. However, in a fleet of several thousand vessels such developments could not have been very fast. Thus, the average sizes of ships visiting Copenhagen seem to have increased by a quarter or a third from the 1750s to the 1780s while that of all westbound ships only grew by just a fifth during the same period.²⁰ These were not dramatic rates of change: in the case of Copenhagen about one percent a year, on average, and only half of that for the westward cargoes. With such low growth rates, the numbers of passages present tolerably realistic images of short-term fluctuations. However, across longer periods, these figures tend to lag behind the growth of actual commodity flows.

There is even another aspect to the problem of missing tonnages. Typical ship sizes did vary substantially across different ports, depending e.g. on the depth of fairways and the nature of the commodities traded. As can be seen from the figures in Table 3,

Pomerania. A strange thing is that the small regions 'Iceland', 'Greenland' and 'The Faroe Islands' which were fully operational in the previous (-2022) user interface yield unreasonably few results within the present interface. By far the most awkward problem is the fact that the search for big region 'The Baltic' (destination) retrieves far too low numbers of hits (e.g. for 1783 just 2151 while STT records 5564 eastwards passages for the same year); this means that there is no reasonable means of finding separate totals for eastward respectively westward passages. It should also be noted that in the STRO all of Schleswig (Da. Slesvig) is included in the small region of Denmark and the free city of Hamburg in the small region of Holstein. The STRO standard names should always be checked by browsing the relevant lists, found as an appendix in the database.

Examples of erratic data have even been found: for example, westbound passages have occasionally been recorded as eastbound and vice versa (Kaukiainen 2021, 492, footnote 7 – however, it seems that most of them have been subsequently corrected).

19. Johansen 1983, 14. Lastages (Danish commercial lasts) were only registered for Danish vessels in domestic traffic and Swedish ships of less than 20 lasts.

20. Knoppers 1976, 284–288; Kaukiainen 2025, 19 (Table 2); Table 6, below.

there could be some really big differences in sizes between the Swedish herring-trade vessels and British and Dutch bulk-carriers. Accordingly, research of port-specific trends, or cargo volumes, would be a challenging task. For a macro-level analysis like this, however, such computing of local volumes was regarded as superfluous.

Table 3. Average sizes of ships from various countries or in different trades.
Danish commercial lasts (c. 2.4 British tons)

Region	1751–1760	1781–1790
Swedish west coast*	9	28
Norway	25	22
German North Sea	57	34
Great Britain	84	101
Netherlands	116	105
France, Iberia, Italy	54	74
North America	–	64
West Indies	100	116
Far East	250	236

* Herring-trade vessels.

Source: Periodical and regional random samples from STRO; Johansen 1983, 92–95; Swedish National Archives, Kommerskollegiet, Kammarkontoret, Dd Handelsflottan 1783–1798.

While the Sound Toll Records fail to reveal the sizes of ships, it offers, as a trade-off, a resource which helps to circumvent this limitation. The collection of duties produced very detailed documentation of the cargoes onboard (non-Danish) ships and such data can now be accessed online in the STRO. The only drawback is the huge volume of records: transforming hundreds and thousands of individual receipts into annual or commodity-specific totals would involve a lot of labour and/or computer time. Fortunately, there is a shortcut: summary annual data of the main commodities recorded in the Sound was printed in the Sound Toll Tables (STT, *Varetransport-volumes*), and similar data was also published by the Odense Sound Toll project for 1784–1795. It is true that the Sound Tables have been criticized for only presenting data on a high level of aggregation ('so that individual passages have disappeared from sight') and only for the most important categories of goods.²¹ However, such

21. See e.g. Veluwenkamp, Scheltjens and Van der Woude 2021, 153. The data on commodities is the most awkward element of the Sound Toll Registers. Not only is there a wide variety of different goods (for example, the index of commodities in Johansen's *Shipping and Trade* contains over 400 items), but it is further increased by variations in orthography. This means that the identification and classification of commodities can be a real challenge, in particular for those who don't have a good command of the Danish language. The STT is particularly useful because such tasks have already been performed by experienced Danish archivists with a good knowledge of relevant goods and measures. The Odense data, again, attached three-digits codes for different commodities.

The article by Veluwenkamp et al. (p. 153) even blame the Tables for the 'haphazard' combining of commodities into categories. This is so serious an accusation that it should be substantiated; however, no examples have been presented. Neither can such criticisms be found in the source they are referring to (Gøbel, *The Sound Toll Registers Online project*, 321–322).

a high level of aggregation is not a disadvantage in a study seeking to undertake a macro-level assessment - quite on the contrary. But there is still a downside: neither the summary tables of the STT nor the Odense-tables classify commodity volumes by port of departure or destination.

The eastward and westward commodity volumes were estimated from the Tables and the Odense data by first converting the different 18th-century weights and measures to metric tons and, subsequently, by applying so-called stowage factors (cubic volumes per ton), the commodity volumes are given in contemporary measures of shipping capacity (British tons and Nordic lasts, see Appendix I). Even if the summary data mentioned above does not include the full hundred percent of all goods transported through the Sound, the resulting estimates present a fairly comprehensive picture of these commodity flows. As calculating such estimates is a labour-intensive process, it seemed reasonable to accomplish this through a series of representative samples, instead of trying to create continuous annual data. This period of some thirty years (1751–1787) was covered by three five-year samples plus an ‘follow-up’ examination for 1801–1805 (see chapter 6, below). They should suffice to identify correctly the main trends for the overall growth as well as for different commodities and regions. (The results of these estimates can be found in chapters 6, 7 and 20–21.)

4. *A puzzle with missing pieces*

For decades, the study of Baltic shipping has been almost synonymous with the Sound Toll Registers. According to this research tradition, northern European shipping has been examined through the peephole of the Sound Toll. While this peephole is fairly wide, the resulting general picture is bound to be distorted. Thus, both the STT and STRO only tell us about Baltic exports of raw materials and capital goods destined to big West-European economies, Great Britain and the Dutch Republic, and to a lesser degree also to Atlantic France and the so-called ‘Latin market’ (swe. *latinska marknaden*). Yet there also were intra-Baltic markets for the same products: Swedish timber and tar were taken to Copenhagen and Lübeck, as well as iron to Danzig and East Prussia; on the other hand, hemp, flax, potash and tallow were exported from East Baltic ports to Sweden, eastern Denmark and German Baltic ports. Nor was all the East Baltic ‘surplus’ grain exported to the Netherlands, France and Iberia – there was also a steady market for it in Sweden and Norway, and occasionally even in Copenhagen. There also were intra-Baltic markets for imported consumer goods: wine as well as diverse handicraft and industrial products also came along German river routes to Lübeck and other outlets, from which they were re-exported all around the Baltic seaboard. Thus, Baltic exports and imports could even have both destinations and origins within the ‘Northern Mediterranean’.

The Sound Toll Registers are not able to tell us much about intra-Baltic shipping and commodity flows. When a ship left Elsinore (Helsingør), it also vanished from the horizon of the toll officers. It is, of course, common knowledge that the Baltic Sea has for long been a venue for busy shipping, a lot of which never went beyond the Sound – in fact some Baltic states like Sweden actually forbade ships hailing from minor ports sailing outside the Baltic Sea. Unfortunately, no all-inclusive sources like the Sound Toll Records have ever existed on intra-Baltic shipping – quite the contrary:

many primary sources of shipping were generated by more or less autonomous seaports (Lübeck, Danzig, Königsberg, Riga), not by states to which they (at least formally) were subjected. Only a few such sources have been preserved and even they are often beset with wide gaps.²² Regarding the source situation it is no wonder that the historiography of early modern Baltic shipping is still full of blank patches and that Baltic trade has commonly been regarded as a West-European activity which, parallel to the decline of the Hansa, more or less displaced the indigenous shipping traditions.²³

The blank spots in the history of intra-Baltic shipping naturally appeal to scholarly interest in searching data for a better overview. However, as already noted above, this will not be an easy task: such early modern data on shipping and trade, which could be compared with the Sound Toll Registers, has been preserved from only a couple old Hanseatic ports (i.e. the *zulagezoll* accounts of Lübeck and a few *fonds* in Riga central archive).²⁴ This means that no overview of intra-Baltic shipping can be based on them. However, there was one Baltic state which relatively early on started to register its economic contacts with other countries. Notwithstanding that Sweden had lost its position as a European great power in the Great Northern War (1700–1721), it still retained a high-quality bureaucracy. That is clearly demonstrated by the fact that, already in the late 1730s, a systematic compiling of shipping and foreign-trade statistics had been initiated. Since 1738, annual statistics on foreign trade, as well as statistics on foreign shipping, had been produced by the Swedish National Board of Trade (*Kommerskollegiet*).²⁵ Taken together, these annual reports give a fairly good overview of both shipping and commodity flows; a very valuable feature is that for many commodities Baltic origins and destinations are specified. There are no other Baltic sources with an equal level of coverage known to exist.

22. For an overview of archival sources, see Bes, Frankot and Brand (eds.) 2007, vol. 1–3.

23. As can be seen from the following fairly representative selection, there have been more research on the 17th than the 18th century: von Brandt, *Seehandel zwischen Schweden und Lübeck* (1947); Bogucka, *Amsterdam and the Baltic in the First Half of the 17th Century* (1973); Doroshenko, *Torgovlya i kupechestvo Rigi v XVII veke* (1971); Harder, *Seehandel zwischen Lübeck und Russland im 17/18. Jahrhundert* (1961); Elisabeth Harder-Gersdorff, *Lübeck, Danzig und Riga* (1978); Harder-Gerstorff, Elisabeth, *Mitteuropäische Gewerbezone und ostbaltischer Handel im 18. Jahrhundert* (1981); Monrad Møller, *Fra galeoth til galease: Studier I de kongerigske provinsers søfart I det 18. århundrede*, (1981); Högborg, *Utrikeshandel och sjöfart på 1700-talet* (1969).

For more recent studies, see Ressel, *The Impact of the Partitions of Poland* (2018); Yuta Kikuchi, *Tide through Lübeck instead of the Sound* (2018); Scheltjens, *North Eurasian Trade in World History* (2022).

24. Archiv der Hansestadt Lübeck, *Zulage -accounts from sundry years (usually each tenth) of the 17th and 18th centuries*. The data for Riga is only known from research published by prof. V. V. Doroshenko. In addition to his book on Riga's trade in the 17th century (*Torgovlya i kupechestvo Rigi*) he seemed to have extended his studies to the next century: at least he supplied statistics on Riga's exports in 1766–1784 to Arcadius Kahan, see Kahan 1985, 289 (Table 6.4).

25. Svenska riksarkivet, *Kommerskollegiet, Kammarkontoret: årsberättelser Dc Utrikeshandel och sjöfart*, ser. 1, 9 (1738–1799); *Dd Handelsflottan och dess bemanning*, ser. 1, 1769–1803. A compilation of foreign-trade statistics was subsequently printed in *Historisk statistik för Sverige, del 3. Utrikeshandel 1732–1970*. For the history of these statistics, see Vallerö 1969.

As the Swedish participation in Baltic trade was fairly extensive, these statistics present a major, indeed a critically important, contribution to the study of intra-Baltic shipping. While they cannot shed much light on the trade of other actors, their evidence can be supplemented with certain secondary local sources, in particular newspapers or journals which were published in several Baltic coastal cities during the 18th century. Typically, they published ship lists of arrivals and departures at their ports. One of the earliest to do so was the *Danziger Anzeigen*, in its first edition (1739).²⁶ Five years later the bilingual *Sankt Peterburgskije Vedomosti*/*St. Petersburgischer Zeitung* followed suit,²⁷ and from 1754 shipping lists for Lübeck can even be found in the *Lübeckischen Anzeigen*.²⁸ Unfortunately, the first Copenhagen newspaper, the *Kiøbenhavnske Danske Post-Tidender* (forerunner of the well-known *Berlingske Tidende*), produced such ship lists for only two short periods in the 1750s and 1760s.²⁹

In addition to newspapers, there are another type of useful printed sources: statistical publications by a number of well-known 18th-century ‘political arithmeticians’. Three of them, Anton Friedrich Büsching, Benedict Franz Hermann and Heinrich Friedrich von Storch, described the Russian Empire.³⁰ All three had an academic background, Büsching was theologian and geographer, Hermann mineralogist and von Storch economist; as the latter two were members of the St. Petersburg Academy of Sciences they even were able to access relevant governmental data. In contrast the fourth, J. Jepson Oddy, who published an extensive commercial overview of the whole Baltic Sea area (and even the German North Sea coast),³¹ was a well-established British merchant; according to the title page of his book he was a member of the Russian (*Muscovy*) and the Levant companies. The preface to his book implies that he had, through several visits to the northern parts of the Continent, achieved ‘peculiar advantages of local information’³² and, indeed, his book contains an amazing range of statistics from the Baltic area.

The three statistical publications on the Russian Empire present data on shipping across a period of six decades: Büsching for 1736–1764; Hermann for 1778–1787 and Storch, partly relying on Büsching’s and Hermann’s data, for until 1797. While their shipping statistics only present crude totals of arrivals and departures (with a number of chronological gaps) they are useful for filling gaps in *St. Petersburgischer Zeitung*’s

26. *Gemeinnützige Danziger Anzeigen Erfahrungen und Erläuterungen allerley nützlicher Dinge und Seltenheiten*, 1739–, PAN biblioteki Gdanskij. Volumes from 1770 also available online: Pomeranian digital library (<https://pbc.gda.pl/publication/25452>).

27. The shipping lists were published – with a few gaps – from 1744 to 1786. The newspaper was founded in 1727 and can be found in the Russian National Library, St. Petersburg. There are also microfilms of the German version in the Finnish National Library. The original lists seem to be preserved in the RGDA (Rossiiskij gosudartsvennij arhiv drevnih aktov) in Moscow.

28. *Lübeckische Anzeigen* 1751–, <https://digital-stadtbibliothek.luebeck.de>.

29. In 1762, the newspaper was renamed *De til Forsendelse med Posten allene privilegerede Kiøbenhavnske Tidender*. It is available online at *Det Kgl. Bibliotek*: <https://www2.statsbiblioteket.dk/mediestream/avis/>.

30. Büsching, *Magazin für die neue Historie und Geographie* (1769; Hermann, *Statistische Schilderung von Russland* (1790; von Storch, *Supplementband zum fünften, sechsten und siebenten Theil des historisch-statistischen Gemäldes des Russischen Reichs* (1803).

31. Oddy, *European Commerce* (1807).

32. Oddy 1807, vii.

data as well as stretching it beyond 1786. They also contain data on a number of other Russian ports and statistics of both St. Petersburg's and the country's overall foreign trade. In comparison, Oddy's book has a much wider geographic scope, with chapters on all important Baltic ports and states. The time-scale of his data varies a lot in different cases: for a few ports he is able to present statistics across the whole of the 18th century but, much more typically, they only concern the late 1780s and the 1790s – with latest data being added for the year 1804. Unfortunately, he does not specify his sources, but most of the data seems to be based on local, more or less official statistics. However, it should be remembered that even these may contain errors and inaccuracies.³³

Unfortunately, the data of Baltic commodity volumes is much more limited (actually it only consists of Swedish statistics), which means that the estimations involve sizeable margins of error. However, there is sufficient sundry information on ship sizes that provide reasonable backup for the meagre commodity data. (For estimates of Baltic passages see chapter 13.)

In this study, coastal trade is presented as a separate sub-class of Baltic trade albeit that it is difficult to draw precise boundaries between the two (chapters 14–18). This distinction makes sense mainly because of a special and fairly well-known category of coastal shipping: the supply of food and other necessities to the biggest seaboard metropolises required huge volumes of coastal transport. Yet, while it is clear that even smaller-scale 'peasant shipping' or 'village navigation' was common on most Baltic coasts, very few reliable statistics can be found for such localized shipping. Delving into such micro-scale research did not seem essential in a predominantly macro-level study. Even riverine transports, as essential as such feeder traffic was for the big exporting ports, had to be left outside this research.

33. Oddy's data agrees quite well with e. g. von Storch's statistics and even his table (page 369) of ships passing the Sound in 1790–1804 fits reasonably well with the STRO.

Shipping through the sound: structures and trends

5. The big picture

“ - the Sound was one of the world's most important shipping routes, connecting large markets in western Europe (Amsterdam and London) with the Baltic (Danzig, Liebau, Riga, Narva, St. Petersburg and Stockholm), where essential bulk goods such as grain and timber were produced - ”³⁴

The quotation from Erik Gøbel, above, tells us succinctly why the traffic through the Danish Sound was so important in early modern European history; indeed, the growth of this trade may be claimed to reflect the economic rise of the northwestern part of the continent.³⁵ The outlines of the development have often been summarized in the total number of passages, data which, after the publication of the STRO, can easily be followed from beginning to end (Figure 1, below). However, it must be remembered that, across such a long period, changes in the average ship sizes mean that the series only reflect actual commodity flows crudely.

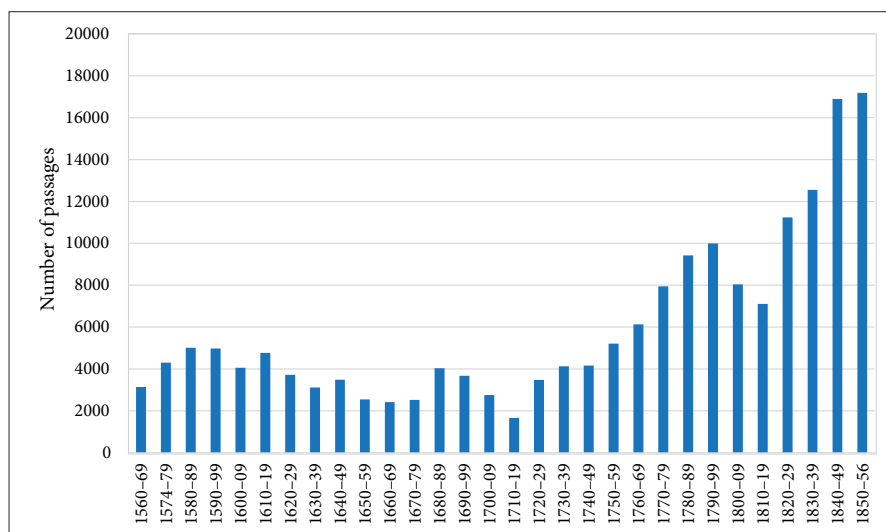
The first half of this timeline presents a series of substantial ups and downs. The fairly rapid growth of passages between the North Sea and the Baltic from the 1560s to the end of the century can be connected with the success story of the northern Netherlands, while the ensuing irregular falls obviously reflect the decline of Holland's herring fishery as well as the series of wars around the Baltic world and the North Sea (Swedish-Polish wars, the Thirty Years' War and Swedish-Danish wars). Some sort of recovery in the more peaceful 1680s and 1690s was followed by an even deeper decline during the Great Northern War. From the 1720s onward, the numbers of passages present an almost unbroken increase until the Napoleonic wars. At best, between 1750 and 1790, the growth trend reached as high as 1.6 percent a year. Indeed, while the shipping through the Sound recovered quite briskly after 1815, it was only able in the 1840s to exceed the growth rate of the period 1750–90.

The same crude passage rates have also been commonly used to describe the proportions of different nations involved in the North Sea – Baltic trade. Traditionally,

34. Gøbel 2010b, 310.

35. See e. g. de Pleijt and van Zanden 2016, 387–409.

Figure 1. Totals of east- and westward passages through the Danish Sound, 1560–1856.
Annual averages



Note: The Sound Toll was abolished in 1 April 1857. The traffic in the first three months of this year (1182 passages according to the STRO) has been excluded.

Source: Ole Degn, *Toldsatser, indtægter og regnskabsformer*, 142 (Table 3).

this has been a story of the Dutch hegemony and its gradual decline. Thus, the passage data suggests that, until the late 17th century, the share of Dutch vessels fluctuated between fifty and almost seventy percent while, for example, only a tenth of ships were of British origins. Towards the end of the century, the Dutch share declined to about a third – at least according to figures recorded in the STT. The reality, however, may have been somewhat different: in response to British and other discriminatory navigation and customs acts Dutch owners started to flag out tonnage to foreign ports; for example, it seems probable that, in the 1690s, a substantial share of Stockholm's merchant fleet was in fact owned by Dutch merchants.³⁶ After the Great Northern War, however, such flag changes seem to have become less common and the share of Dutch ships returned to around fifty percent. They still dominated the market for a while, but their margins were shrinking with the steady growth of British shipping and, at around 1775, the competitors were at an equal level at almost thirty percent each. The Anglo-Dutch naval conflict (1780–1784) dropped the Dutch share down to a mere ten percent of passages, while the British share remained at about thirty (however, in this case a fair part of the Dutch collapse was compensated by flagging-out ships to Emden and other East Frisian ports).³⁷ Later on, after the French occupation of the Dutch Republic (1895), the Dutch flag again vanished from the Baltic.³⁸ Nor did it

36. Heckscher 1949, 562.

37. STRO 1778–1784; the number of ships from Emden grew rapidly to over 1100 until 1783.

38. For the national rates see, in addition to STT 1661–1783 (in which statistics of nationality are presented in the preface), summaries by Erik Gøbel 2010b, 311 and Johansen 1983, 50.

regain its old status: in the 1840s, Dutch ships only accounted for some six percent of the passages through the Sound – but even the British share had then declined to a good twenty percent.³⁹

As already mentioned, average ship sizes increased slowly at least in the late 17th and across the 18th century.⁴⁰ Thus, rapidly growing passage rates very probably indicate that there was also real growth in maritime transport. However, the total numbers of eastward and westward passages – like those presented in Figure 1 – produce a very much inflated image. It is a well-known fact that goods carried westward from the Baltic required much more cargo space than those going in the opposite direction. Therefore, more tonnage had to be sent to the Baltic than was needed to carry the eastward cargo. This discrepancy is demonstrated by the high number of ballasted ships sailing eastwards while, on the other hand, almost all westbound vessels were fully loaded. Figures 2A and 2B, below, reveal clearly how big the imbalance was in the 18th century.

Already at first sight, there are distinctive differences separating one frequency curve from the other. While the series for *all* eastward passages are fairly compatible with the westward ones, the data for *loaded* Baltic-bound passages seems to be from a different world. There is, however, a logical explanation for this difference: the volume of eastward cargo was the result of intra-Baltic demand while the westward flows of commodities responded to the demands of regions west of the Sound; accordingly, they represented two different markets.

These markets were distinguished by their different staple goods. Most of the Baltic exports consisted of primary products and raw materials or capital goods. The export of grain from the East Baltic areas to the Netherlands had already started in the 16th century, and these exports were soon accompanied by potash, hemp, flax, tallow and leather. Swedish iron had been sold to Lübeck and Danzig since the Middle Ages and subsequently it began to be transported west of the Danish Sound – accompanied by copper in the 17th century. The export of Polish tar and pitch was initiated in the late 16th century and, in the next century, they became the stable products of Sweden and Finland. They were, in turn, followed by sawn and hewn timber from most North- and East Baltic ports. In contrast, Baltic imports consisted of traditional consumption goods for the urban upper and middle classes, such as wine, sugar, coffee and other so-called colonial goods; only salt and herring represented the more common (and rural) end of demand.

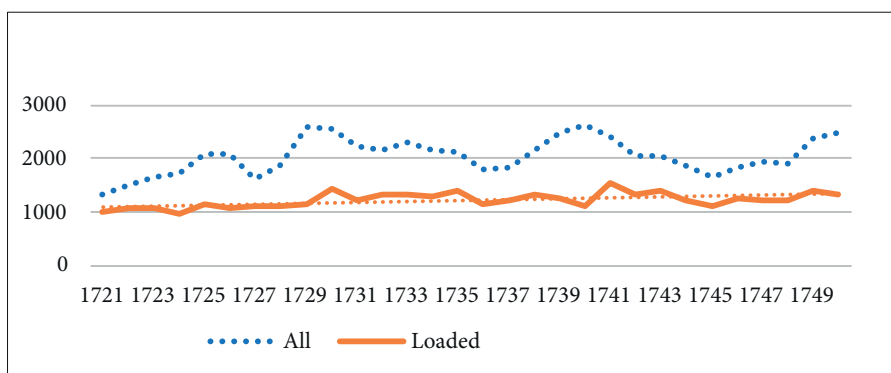
39. STRO 1841–1850.

40. See e.g. Knoppers 1976, 284–288.

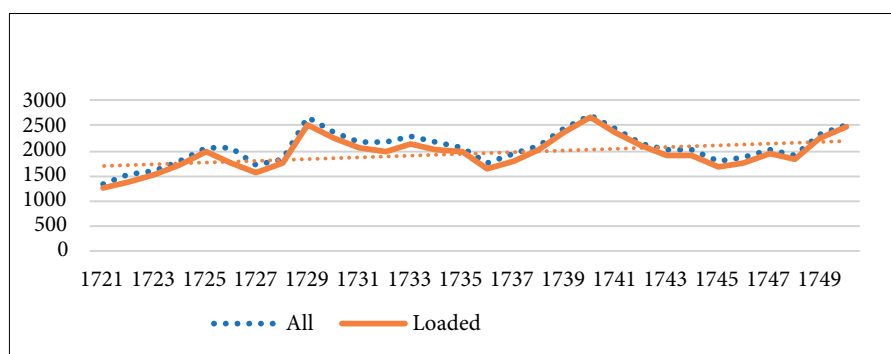
Figure 2. Passages of loaded and ballasted ships through the Sound.

2A. Passages 1721–1750

2A1. From the North Sea to the Baltic

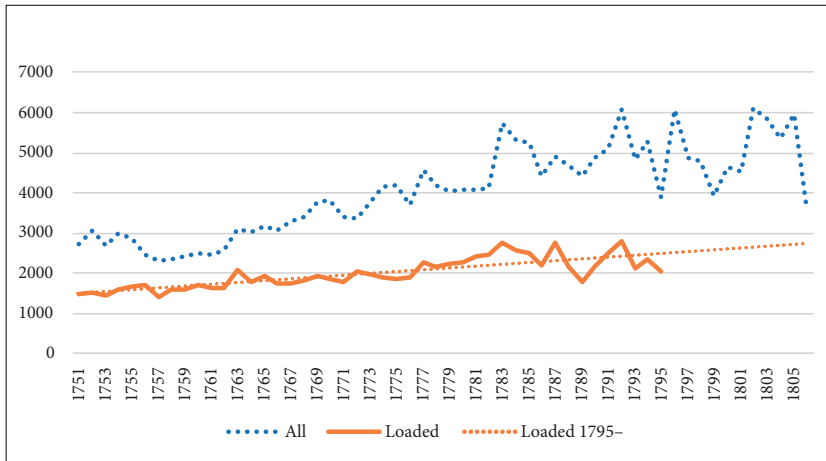


2A2. From the Baltic to the North Sea

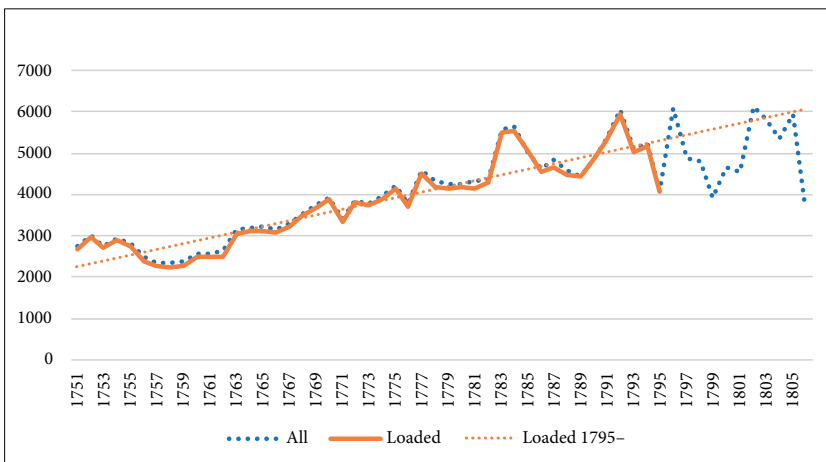


2B. Passages 1751–1806

2B1. From the North Sea to the Baltic



2B2. From the Baltic to the North Sea



Note: Unfortunately, the STRO does not offer any practical means of distinguishing between eastward and westward passages; thus, specific ballast ratios for eastbound and westbound ships cannot be calculated after 1795. The post-1795 curves for all passages are, therefore, crude surrogates, computed by dividing the total number of passages by two. Respective loaded passages have been estimated by searching ballasted voyages with a wildcard filter 'ba*' and removing irrelevant hits with more specific filters.⁴¹ Also ballasted westward voyages are deducted but as precise numbers of eastward passages are not available the numbers must be regarded approximate. They should still reflect tolerably the actual trends and fluctuations.

Source: STT 16 61–1783; Johansen 1983, 11–12 and microfiche Tables 10; STRO 1796–1805.

41. Typical variations include 'ballast', 'balast', 'bailast', 'baglast', 'ballasted' and 'baglasted' but even shorthand versions like 'bal', 'bals' and 'balst' are found. The only way to cope with all of them is to perform the search in two stages, starting with a very general wildcard 'ba*' and then eliminating mishits with searches like 'bar*' (for bar iron etc.) and 'ban*' (for band etc.).

These flows of different commodity-sets even developed in various ways. The larger westward ones are characterized by fairly big fluctuations, in particular between the 1720s and early 1760 and again from the late 1770s onwards. Just few of them may be termed business cycles – the decline in 1726–1728 (which mainly concerned Dutch shipping) probably echoed the uncertainties caused by the new Swedish navigation act (*produktplakatet*, announced in 1724 and implemented in 1729) and the boom around 1782–1783 was connected with the general boom in neutral shipping which was a consequence of the War of the American Revolution. Most of the fluctuations were, in fact, directly linked to the wars fought within the Baltic area: the depression in the 1730s reflected the War of the Polish Succession (in particular the siege of Danzig 1735)⁴² while the next one in the 1740s was contemporary with the War of the Austrian Succession⁴³; The Seven Years' War, again, left its distinctive marks on shipping between 1756 and 1763⁴⁴ and the Russo-Swedish War depressed passage rates by eliminating Swedish shipping and strangling the trade with St. Petersburg. Finally, after 1792, different phases of the French Revolution and the Napoleonic Wars made the frequent (more or less) martial cycles the 'new normal' even in the Baltic trade.

In comparison, there were smaller fluctuations in Baltic-bound cargo. Thus, no disturbance can be observed around 1727, and even the impact of the two wars of succession and the Seven Years' War was fairly modest. In the same vein, there was much less of an increase during the boom of the early 1780s for Baltic-bound cargoes than westbound passages. In the early 1780s, this slow growth turned into a distinct decline in eastbound trade.

Overall, westward cargoes increased faster than the eastward ones. In the period 1721–1750, the trends were still equal, about 0.8 percent a year both west and east but, subsequently in 1751–1795, the trend for loaded westward passages amounted to an average growth of two percent and that for Baltic-bound cargoes only grew by 1.3 percent. Yet, remembering that eastbound ships mainly carried consumer goods, a regular increment of well over one percent was a fairly good rate, at least compared with the number of potential consumers. During the latter half of the 18th century, the populations of Copenhagen and Stockholm only increased by about 0.5 percent a year and even the rapidly growing St. Petersburg did not record more than 0.8 percent while, across the same period, the total population of Sweden increased by 0.55 percent per annum.⁴⁵ In fact, the growth rate of eastward cargoes suggests that the standard of consumption grew faster than the population – at least as far as the upper classes of the Baltic cities were concerned.

42. The siege by Russian troops started in February and the city surrendered at the end of June. The siege naturally stopped the trade in one of the most important Baltic ports.

43. As Britain, Dutch Republic and Russia were on the Austrian side, opposing France, Prussia and Poland, the trade with eastern Baltic could continue more or less normally.

44. Now Britain was in alliance with Prussia and Russia while France was allied with Austria and Sweden; Russia moved to the French side after the death of Tsar Peter III. It seems obvious that the naval war between Britain and France even affected Baltic shipping negatively.

45. For sources about population, see: Copenhagen: Christensen and Mikkelsen 2006, 498; Stockholm and Sweden: *Historisk statistik för Sverige, Del 1. Befolkning*; St. Petersburg: I. I. Elisejeva & E. I. Gribova (eds.). *Sankt-Petersburg 1703–2002*. In most southern and eastern Baltic cities population growth was slower.

* * * *

The review of available sources leads to an inevitable conclusion: it is only for the latter half of the 18th century that a really panoramic picture of Baltic shipping can be sketched. While this is an example of an extra-scientific constraint, the time-limit does not seem too detrimental in this case. As was seen before (Fig 2), some sort of transition may have been taking place during the middle of the century in the traffic through the Sound: not only did the exports from the Baltic begin to grow faster but even a mild upward turn in the west–east cargoes could be detected. Thus, the period 1750–1795 seems more interesting than the first half of the century.

6. The westward main stream: passages and cargo volumes, 1751–1787

The Sound Toll Registers provide a natural starting-point for the research and they will also serve as a backdrop, a datum against which new findings – e.g. estimations of actual cargo volumes – can be set in a proper context. On the other hand, as already stated before, the big picture of shipping through the Sound is already so well known – in fact, in 1959 W. S. Unger presented a good overview of the most basic developments for the period 1661–1783⁴⁶ – that no detailed reiteration will be needed in this volume. Instead, a more comprehensive analysis of longer-term trends will be attempted by comparing three ‘normal’ five-year periods, 1751–1755, 1767–1771 and 1783–1787.⁴⁷ As can be guessed, the prime prerequisite for normality is that these were periods with no military conflicts. The last one, though, fits tightly between two: the American Revolutionary War (1775–1783, which even included the Anglo-Dutch naval conflict of 1780–1784) and the Russo-Swedish War (1788–1790). Yet, the implications of the former only started to be felt in Baltic shipping in the form of raising freight rates, while the latter war could not have had any advance effects before it actually broke out (July 1788).

Of course, even such formally peaceful periods may have included abnormal years in terms of weather or business cycles but, since there are no reliable ways of excluding such anomalies, their effect can at least be abated when presenting the data as five-year averages. In addition, one more five-year sample will be presented for 1801–1805, years that were far from normal – just to see how much the war-peace-war period following the French Revolution affected the volumes and structures of trade between West Europe and the Baltic world. Data for similar five-year periods – as far as the sources permit – will also be collected for intra-Baltic shipping.

Between 65 and 70 percent of all cargoes registered at Elsinore were carried out of the Baltic – measured in cargo volumes the share was higher still.⁴⁸ This clearly shows that westward was the high-demand leg in the maritime trade between the North Sea and the Baltic. This imbalance, however, does not necessarily suggest that the *value* of Baltic exports had exceeded that of respective imports – it only indicates that the former required much more cargo space than the latter.

46. W. S. Unger, *Trade Through the Sound in the Seventeenth and Eighteenth Centuries* (1959).

47. As for the 1780s sample, the year 1783 has not been included when using the Odense data.

48. Cf. sources for Figure 2, above.

While the Sound Toll Registers preserve almost perfect imprints of westward shipping, it must be noted that they also contain some ‘white noise’. The toll station registered lots of traffic which was not related with this mainstream route and such irrelevant elements must, of course, be ignored in this analysis. In practice, they include local traffic between Denmark, Norway and Sweden and Swedish and Danish domestic shipping, as well as voyages to the Danish North-Atlantic possessions.⁴⁹ Inevitably, a few relevant passages may be lost with such arbitrary cleansing; yet, the sum totals in Table 4A (departures) represent 86–90 percent of all westbound loaded ships registered in these years, which must be quite close to the actual numbers of ships in this mainstream. On the other hand, the numbers are clearly lower for destinations (Table 4B), involving a loss of data at a rate of around twenty percent as compared with Table 4A. The difference mainly results from the fact that not all ships revealed a precise destination but instead reported only general directions like ‘to the Sound’, ‘to the North Sea’ or ‘to the Mediterranean’. Still, while the data on destinations cannot be regarded as complete, it must be fairly representative.⁵⁰

The data in Table 4 repeats the well-known fact that the westward departures from the Baltic world were strongly concentrated in its easternmost regions. No fewer than eighty percent, or more, of the cargoes in question were loaded in ports between St. Petersburg and Danzig – seventy percent, in fact, in the five biggest ports.⁵¹ Thus, only a fifth of the cargoes originated from the Swedish and German coasts.

The distribution of destinations was equally asymmetric. In the early 1750s, almost three-quarters of all cargoes were heading to the Dutch Republic or Great Britain (and were mainly carried by ships from these countries) and destinations such as the German North Sea ports increased the proportion to almost eighty percent. The gradual decline of the Dutch trade, in particular since the naval conflict with Britain, was more or less compensated for by the growth in imports to Britain and western German ports. The French, Iberian and west Mediterranean ports were also important places that supplied the Baltic countries with important consumption goods: wine, ‘colonial’ products and salt. They accounted for about a sixth of all westward departures, clearly exceeding the more distant ocean trade.

49. Most of Danish vessels did not pay the toll which means that there is no information about their cargoes. Nor have the few arrivals to Danish ports west of Elsinore been recorded as they represent Baltic shipping. Moreover, the STRO data for Swedish and Danish coastal traffic seems rather unsystematic: occasionally the numbers jump suddenly much higher than before but may even decline as rapidly. Cf. Kaukiainen 2025, 13 (note 26).

50. One additional source of errors may be the defective function of certain regional searches within the STRO – see note 18 above.

51. According to data collected by the Odense project for 1787 (Johansen 1983, 92–95) cargoes from ports between Danzig and St. Petersburg accounted 81% of all westbound cargoes (in British tons, excluding Danish ports).

Table 4. Westward traffic through the Sound, 1751–1787.

A: Ports of departure.

Five-year averages of passages

Regions and ports	1751–1755	1767–1771	1783–1787
East coast Sweden and Finland <i>thereof Stockholm</i>	272 190	280 194	373 222
Russia around St. Petersburg <i>thereof St. Petersburg</i>	501 250	604 392	800 539
Estonia, Livonia and Courland <i>thereof Riga</i>	498 385	617 443	800 574
East Prussia <i>thereof Memel</i> <i>thereof Königsberg/Pillau</i>	306 36 270	685 279 406	1611 755 856
Poland <i>thereof Danzig</i>	672 672	655 654	477 477
Prussia <i>thereof Stettin</i>	188 122	183 180	154 117
Swedish Pomerania, Wismar	28	42	93
Rostock, Lübeck, Kiel	50	38	38
Sum total	2515	3104	4346
<i>Percentage of five busiest ports (as above)</i>	70	70	74

Note: Only ports east of the Copenhagen-Malmö line have been included. Departures to Danish destinations have been excluded.

Source: STRO.

B: Destination regions

Five-year averages of passages

Regions	1751–1755	1763–1771	1783–1787
West coast of Sweden	39	102	395
Norway	96	285	102
Great Britain	472	753	1266
Dutch Republic	1097	1086	961
German North Sea ports	87	162	174
Atlantic France and Iberia	318	302	485
Medit. France and Italy	51	48	135
West Indies and South Atlantic	9	27	42
North America	5	5	17
Sum total	2174	2770	3577

Note: Only regions west of Denmark have been included. Departures from Denmark have been excluded.

Source: STRO.

Even if the Tables 3A–B only record passages, the growth of average ship sizes (see Table 6, below) was so modest that the major trends can be identified beyond reasonable doubt. In particular, the numbers demonstrate interesting changes in the hierarchy of the big East Baltic ports. The rapid rise of St. Petersburg is one of them, albeit it only matched Riga in the late 1780s. The growth of traffic in East Prussian ports was even more massive; they alone accounted for seventy percent of the overall growth in the ‘mainstream’ shipping. Quite the opposite happened in Danzig after the first Polish partition (1772): while the city still retained its independent status, it was separated from its Polish hinterland by a broad Prussian corridor and Prussian customs dues which quite effectively curbed its trade.⁵² Of the ‘non-mainstream’ regions, Prussian ports as well as Kiel, Lübeck and Rostock declined in importance while both Sweden and Swedish Pomerania experienced fairly steady growth.

Overall, the traffic in East Baltic ports increased at a fairly rapid rate. According to Table 3A the number of passages grew from the 1750s to 1780s by about seventy percent, or 1.7 percent per annum, on average. However, it must be remembered that such numbers are quite crude indicators of transport volumes. A more precise picture of the actual commodity flows requires the estimation of how much tonnage the transport of different goods required. Such calculations for half dozen Baltic exports and a couple of imports have already been presented by Hans Chr. Johansen in 1983.⁵³ More recently, such estimates have been reproduced on a more refined and grandiose scale by Werner Scheltjens: in a massive project, he homogenized and standardized all the STRO data from 1670 to 1856 by converting the various premodern weights and measures into metric tons.⁵⁴

As impressive as Scheltjens’ series are, they involve one sub-optimal feature: metric ton (weight) is not a practical unit to gauge maritime transport by. It certainly is a fully logical measure for masses of goods and it even correlates fairly well with the transport efforts from producers to ports. However, when the goods are to be moved from the quayside to the cargo-hold, the amount of cargo that can be stowed onboard does not depend primarily on the weight but more often on the volume of the goods to be carried.⁵⁵ Of course, a ship should not be loaded so heavily that its seaworthiness would suffer, but in real life most cargo consisted of relatively light goods which could fill all the cargo spaces long before the ship sank too low in the water. In the 18th

52. See e.g. Scheltjens 2022, 136.

53. Johansen 1983, 101–112. According to him the estimates refer to the ‘amount of space occupied by the goods in 1787’ – no accurate stowage ratios are yet indicated. The choice of 1787 as the benchmark year was unfortunate at least in one respect: during that year, Baltic grain markets were in turmoil as most of the rye and even wheat was shipped to Copenhagen to relieve the Danish famine.

54. Scheltjens 2022, 20, 210–211. His data is available online: *Tetradas*: tonnage estimates of trade through the Danish sound, 1670–1856, <https://journaldata.zbw.eu>. For discussion of different ways of measuring commodity flows, see Kaukiainen 2024 and Scheltjens 2024.

55. Gauging goods by either weight or volume can lead to dramatically different results, as the following example of the far ends of the weight scale demonstrates: while a ton of iron (with a specific gravity of 7.85) only occupied (including stowage materials) a space of 0.3 cubic metres, a ton of hemp (specific gravity of 0.3 if compressed) occupied ten times larger space (3 cbm.). In contrast, gauging by weight (in metric tons) would present iron’s bulk 26 times bigger than that of hemp.

century, typical sailing vessels had 1.6–1.7 cubic metres of holds for each metric ton,⁵⁶ which means that optimally loaded, all cargo spaces full and the ship ‘down to the marks’,⁵⁷ the average specific gravity of the cargo was around 0.6. Such ratio is quite typical still today.

Thus, it is clear that if we want to estimate how much shipping was needed to transport all the commodities through the Sound, their volumes must be converted into cargo-hold space. This can be done by applying the typical stowage factors of the relevant commodities (expressed normally as cubic metres per ton, see Appendix 1, below). They may, however, predict volumes slightly lower than those in real life: first, because the factors, by their very nature, indicate optimum rather than average stowage and, secondly, because the factors imply that all vessels were fully loaded, which was hardly ever the case. On the other hand, it must also be remembered that the principal *Varetransport* tables do not comprise all commodities but just a selection of the most important ones. However, even if they do not record the 100-percent totals it is clear that they comprise the bulk of the actual commodity flows.

Table 5. East–west passages: Estimated cargo space required by the main commodity groups, 1751–1787, annual averages

Thousands of lasts and tons, sums computed from unrounded numbers

Commodity group	1751–1755		1767–1771		1784–1787	
	Danish lasts	British tons	Danish lasts	British tons	Danish lasts	British tons
Timber	65.1	156.6	86.6	207.6	165.9	398.3
Grain	39.6	95.0	58.9	141.3	67.4	161.7
Hemp etc.*	38.5	92.3	37.8	90.8	55.2	132.5
Other	7.6	18.1	9.8	23.8	17.2	41.4
Sum total	150.8	362.0	193.1	463.5	305.7	733.9

*Hemp, flax, hempseeds and linseeds.

Source: Data retrieved from Bang og Korst, *Anden del, halvbind I-II* and Johansen 1983, Tables 4.1–15 and microfiche appendices. For stowage ratios and more details, see Appendix I.

The results of these estimates are summarized in Table 5. At least as far as the 1780s are concerned, the numbers agree tolerably well with those presented by Johansen for the year 1787: at least concerning the volumes for hemp, flax and linseed the estimates are quite close to each other.⁵⁸ On the other hand, Johansen’s figures for iron and balks are much higher. In the first case, this obviously result from a higher, weight-accented stowage rate, while in the latter the balks have been rated heavier than in some recent studies.⁵⁹ The examples naturally tell us that estimates of this kind often involve substantial margins of error.

56. In fact, the British ton represented in the late 18th century a cargo space of 1.7 cubic metres. See also Appendix 1.

57. Actually, no official requirements for minimum freeboard existed before the 1870s when British ships had to have compulsory marks of their maximum load line (so-called Plimsolls).

58. Johansen 1983, 101–112.

59. Gallagher 2016; Karvonen 2020.

How large a slice of the all-inclusive total do the commodities in Table 5 present? The Odense Sound Toll project estimated that in 1787 almost 850,000 (British) tons of shipping sailed westward through the *Øresund*. This figure, however, even included local traffic by Danish and Swedish ships as well as shipping to the Danish North-Atlantic possessions which, in Table 3A, were not accounted for in the east–west ‘mainstream’ traffic. If such ‘non-mainstream’ cargoes are disregarded, the overall tonnage sinks to about 790,000.⁶⁰ Accordingly, the grand total of 1783–1787 in the table above represents well over ninety percent of the overall east–west tonnage and, because of the implicit underrating mentioned above (differences between ideal and real-life loading-ratios), the real percentage could even be somewhat higher. Moreover, among the stowage ratios there were a few which, because of a particularly wide variations, had been applied with absolute minimum values; this concern, in particular, those of barks, hemp and flax. Thus, the estimates can be regarded not only as representative but even as fairly conservative. Accordingly, a number of important conclusions can be drawn from them.

Table 6. East–west passages: Relative changes of the main shipping indicators, 1751–1787
Indices, 1751/55 = 100

Indicator	1751/55	1767/71	1783/87
Number of ships	100	123	173
Volumes of cargo	100	128	203
Aver. cargo per ship	100	104	117

Source: Tables 3 and 5.

The index series (Table 6) summarize the development in a nutshell. It can be seen that, during these thirty years, cargo volumes increased faster than the number of passages, on average 2.2 percent a year. It can also be seen that this growth was clearly faster across the latter half of the period. Yet the average size of ships only grew by half a percent per annum. Thus, it is clear that the growth of cargo volumes depended more on the numbers of ships than their sizes.

Table 7. East–west passages: The structure of commodity flows
Percentages

Commodity group	1751/55	1767/71	1783/87
Timber	43	45	54
Grain	26	30	22
Hemp etc.	26	20	18
Other	5	5	6

Source: Table 5.

60. According to Johansen 1983, 92–95, the overall number of loaded westbound ships in 1787 was 4832 and the respective average British tonnage 175. The number of ‘mainstream’ vessels (Table 2A) was ten percent lower but their average tonnage can be estimated to 182 tons, thus resulting a total of 793,000 tons.

The estimated commodity volumes reveal that timber strongly dominated the Baltic exports, and they also demonstrate some gradual and fairly logical structural changes (Table 7). The most obvious of them is the continuous increase of timber products from a good forty to about 55 percent. The reverse can be seen in the relative decline of vegetable fibres (hemp and flax as well as respective seeds); on the other hand, the export of grain fluctuated in fairly long cycles, reflecting harvests and existing reserves. Interestingly, the Swedish traditional staple products, tar and iron (included in the category Other), recorded rather low cargo volumes, albeit both demonstrate a rising long-term trend.⁶¹ Yet, the conclusions must be made with due caution: even if just a scanty tenth of the commodity flows remain outside this estimate, some margins of error still exist. At least the shares of grain as well as of hemp and flax may be a bit inflated – simply because almost complete data could be compiled for them. On the other hand, as numbers of wood products, such as laths, wainscot logs, rafters, handspikes and wooden shovels, are missing, the dominant position of timber may have been even slightly larger than the estimate suggests.

Table 8. East–west passages: Proportions of biggest national fleets (loaded ships)

	1751/55				1787			
	Dutch	British	Swedish	All ships	Dutch	British	Swedish	All ships
Passages, no	1069	567	240	2810	658	1473	1132	4832
Passages. %	38	20	9	100	14	30	23	100
Cargo, tons*	180	78	22	361	165	344	111	790
Cargo, %	50	22	6	100	21	44	14	100

*Thousands, excluding data for Danish ports

Source: STT Varetransport 1751–1755; Odense Sound Toll project: Estimation of westbound tonnages, Johansen 1983, 92–95.

The data for commodity flows shown above can even be exploited to produce more meaningful estimates of national market shares than mere passage rates. As both the Dutch and the British employed bigger vessels in their Baltic trade than most of their competitors, they also accounted for more cargo in proportion. Table 8 suggests that, in terms of volume, no less than a half of all westbound Baltic cargo was, in the early 1750s, loaded in Dutch vessels while the British clearly trailed behind with a good fifth. However, as the first runner-up, Sweden, only accounted for six percent, it can be said that the two western sea-powers clearly dominated the trade with their combined share of almost three-fourths. Not surprisingly, the tonnage estimations for 1787 demonstrate that a rather dramatic turn took place across the intervening three decades, in particular during the Anglo-Dutch naval conflict.⁶² However, even the two western sea-powers' combined market share declined somewhat (down to 65%) as the British expansion did not quite match the Dutch decline. Accordingly, Baltic maritime powers, above all Sweden, managed some catching-up.

61. Iron in particular, having a high specific gravity, required very little space in the hold. This made it popular as ballast: quite often iron could be carried freight-free (*franco fracht*).

62. However, as Dutch ships in the early 1780s were flagged out to East Frisian ports (see chapter 4, above) their actual voyaging did not drop as much as the formal figures suggest.

7. The west–east counter currents: passages and cargo volumes, 1751–1787

The big picture presented above has already revealed the fundamental difference between westward and eastward passages through the Sound: while practically all outward-bound ships were fully loaded, about half of those sailing in the opposite direction were ballasted, sailing with no paying cargo. However, not all the shipping to the Baltic had this feature – in actual fact there were big variations depending on the nationality of the vessels as well as their ports of departure (as shown in Table 9).

Table 9. Eastward traffic through the Sound by ports of departure.
Five-year averages of passages

A: 1751–1755.

Regions of departure	All vessels	Ballasted	Loaded	Ball %
Great Britain	379	239	140	63
Dutch Republic	836	561	275	67
German North Sea coast	153	90	63	59
Austrian Netherlands	10	10	0	100
Atlantic France	311	39	272	13
Spain and Portugal	81	1	80	1
Medit. France and Italy	33	0	33	0
West Indies and America	10	3	7	30
Sum total	1813	943	870	52

B: 1784–1787

Regions of departure	All vessels	Ballasted	Loaded	Ball %
Great Britain	1535	1026	509	67
Dutch Republic	994	736	383	74
German North Sea coast	294	218	76	74
Austrian Netherlands	77	74	3	96
Atlantic France	375	74	301	20
Spain and Portugal	208	5	203	2
Medit. France and Italy	119	1	118	0
West Indies and America	47	2	45	96
Africa and Asia	14	0	14	0
Sum total	3663	2011	1652	55

Source: 1751–1755: STRO; 1784–1787: Johansen 1983, Microfiche appendix table 9.

Note: Not including Danish, Norwegian and Swedish west coast ports, as well as regions with less than one departure a year. 'Ballasted' also include ships with some cargo and ballast. For the method of estimating the number of loaded voyages, see Note to Figure 2B.

The numbers of ballasted voyages for 1751–1755 must be regarded as approximative. Departure-specific data for these years can only be reproduced by searching in the STRO data, a search which is made difficult by wide orthographical variations.⁶³ However, the differences are so clear, and even fairly permanent, that the regions can easily be divided into two distinct groups. The majority of ships coming from Dutch, British and other North Sea ports, even including the Austrian Netherlands,⁶⁴ arrived with no or a very small paying cargo. As was already noted before, this can be explained by the imbalance of trade: the high demand for Baltic products in western Europe required increasing numbers of ships to be sent eastwards to fetch such goods. At the same time, the bulk of saleable West-European products remained modest. These consisted mainly of textiles which, compared with their value, required little space in cargo holds: in the 1750s, for example, their combined weight seldom exceeded 150 tons.⁶⁵

Nonetheless in the 17th century, Amsterdam had acted as an important entrepôt for the Baltic countries, furnishing them with Atlantic salt, wine and colonial goods.⁶⁶ In the following century, new Swedish and Danish navigation acts undermined the Dutch domination of such re-exports and the Nordic monarchies, as well as the old Hanseatic ports, Lübeck, Stettin and Danzig in particular, increased their direct trade with French and Iberian ports. However, Dutch ships still retained an important position in the carrying trade: for example, in 1767–1771, they loaded over forty percent of all wine and almost forty percent of salt coming to the Baltic area. However, such cargoes could only employ some sixteen percent of the Dutch Baltic-bound tonnage.⁶⁷ On the other hand, herring exports – which earlier had been very important – were dwindling and, lacking other opportunities, some ships loaded low-value ballast cargoes like bricks or roofing tiles.

Even Britain sent small amounts of wine and colonial goods to the Baltic. British ships also up-topped Baltic salt supplies with Liverpool rock salt: from the 1750s to the 1780s, these imports grew from a good 2000 to 16,000 tons (or from eleven to almost 30 percent of all salt coming to the Baltic area). Yet such cargo, at best, only employed some seven percent of the British eastward-sailing tonnage.⁶⁸ Moreover, the situation became worse because of the decline in Scottish herring exports.

Table 9, however, tells us that between thirty and forty percent of British ships arrived at Elsinore with some sort of cargo. Such figures reflect the fact that British ships started to load coal for ballast, instead of stone or gravel, and quite often even grindstones were taken as an additional ballast-cargo. Both commodities had an important advantage of being duty-free in the Sound. This may, of course, imply that

63. For the method of the wildcard search, see note to Figure 2 B, above.

64. Austrian Netherlands is a kind of special case: the shipping consisted mainly of imports of 'Chinese goods' from Copenhagen with hardly anything in the opposite direction.

65. STT *Varetransport* tables.

66. Cf. e.g. de Vries and van de Woude 1997, 406–429.

67. STT *Varetransport* tables. In these years, Dutch ships carried almost 10,000 *fad* (tuns) of wine a year, as well as over 15,000 lasts of salt, which required a total cargo space of c. 31,000 British tons; at the same time, the Dutch Baltic-bound tonnage amounted to c. 190,000 Br. tons.

68. STT *Varetransport* tables; Johansen, *Shipping and Trade*, microfiche appendix tables. The demand for cargo space for Liverpool salt has been estimated in 1751/1755 to c. 6000 and in 1784/1787 to c. 25,000 British tons.

such cargoes were not registered as carefully as dutiable goods – and this was, in fact, the case in the 1740s when coal cargoes started to be common.⁶⁹ At first, Copenhagen was the most popular destination, since it lay precisely on the direct route towards East Baltic ports, but subsequently similar cargoes also went to Stockholm, Stettin, Danzig and a number of other Baltic ports. In the early 1750s, the average size of coal cargoes for which the weights are known already amounted to 56 chalders (c. 150 tons), which suggests that a number of ships actually were fully loaded. Supposing that half of loaded British ships carried coal, such average would involve total imports of at least 7000–8000 tons. Subsequently, coal imports grew at a good pace: in 1767–1771 no fewer than almost 28,000 tons a year was registered in the Sound and in the period 1784–1787 the annual average grew to 43,000 tons.⁷⁰

The trade from France and southwest Europe was totally different. With the minor exception of certain North French trades, almost all ships returned to the Sound fully laden. Even in another respect this was an interesting venue for shipping and trade. While Dutch and British vessels more or less dominated the eastbound trade with Dutch and British goods, the French, Spanish, Portuguese and Italian products were only seldom brought to the Baltic onboard ships flying these flags – on the contrary, the carrying trades between France and southwest Europe and the Baltic were totally dominated by Dutch, Danish, Swedish and a few other Baltic ships.⁷¹ Thus, for example, in 1751–1755, while on average 390 laden vessels from these southern destinations were recorded in Elsinore, only six of them were French and two Spanish. Such asymmetry probably was a legacy of the earlier Dutch domination which kept the southern trading partners at bay: when Baltic competitors managed to undermine it, they even (probably helped by adopted skills) ‘inherited’ fair shares of the earlier Dutch shipping monopoly.

French and southern European imports only included two real bulk-commodities, salt which for volume could be compared with rye in the westbound trade, and wine which required roughly the same cargo space as linseed. The rest of these imports consisted of a wide variety of less bulky but quite valuable commodities, mainly foodstuffs and stimulants: spirits, vinegar, sugar, coffee, cocoa, tea, tobacco, fruits (in particular lemons), prunes, raisins, spices and so on. This wide assortment of goods gauged by a vast collection of different measures and weights, often consisting of a plethora of small consignments in indefinite packages, makes the estimation of their overall volumes a challenging task. The Sound Toll Tables combined these items into the category *kolonialvarer* (colonial goods) but, unfortunately, did not specify which precise commodities were included. This makes it impossible to replicate the collection for the period 1784–1787 by exploiting the commodity tables of the Odense data. In order to maintain compatibility, the Tables’ data of *kolonialvarer* for 1782–1783 were used instead.

However, there is one more problem connected with *kolonialvarer*. Klas Rönnbäck has demonstrated that colonial products, in particular sugar, from the Danish West

69. STRO 1740–1760. Quite often the register only recorded ‘*lading steen kull*’ (a load of coal). Grindstones were neither tallied nor weighted.

70. STT *Varetransport* tables 1767–1771; Johansen 1983, microfiche appendix tables 11.

71. C.f. Pourchasse 2007, 230–.

Indian Islands were not included at all in the Sound registers.⁷² In accordance with his observations, the cargo estimates for colonial imports have been increased by estimated percentages, fifty for 1751–1755, seventy for 1767–1771 and eighty for 1783–1787.

Table 10. West–east passages: Estimated cargo space required by the main commodity groups, 1751–1787, annual averages.

Thousands of lasts and tons, sums computed from unrounded numbers.

Commodity group	1751–1755		1767–1771		1784–1787	
	Danish lasts	British tons	Danish lasts	British tons	Danish lasts	British tons
Coal	2.8	6.7	9.7	23.3	15.1	36.2
Salt	23.1	55.4	25.6	61.5	36.3	87.1
Wine	5.6	13.4	6.6	15.8	7.7	18.5
Colonial	4.2	10.1	8.7	20.4	13.7	32.8
Sum total	35.7	85.6	50.6	121.0	72.7	174.6

Source: Data retrieved from Bang og Korst, *Anden del, halvbind I-II* and Johansen 1983, Tables 4.1–15 and microfiche appendices. For stowage ratios and more details, see Appendix I.

Table 10 presents estimates of the cargo space which was needed to carry the most important eastbound commodities. In this case, comparisons with Johansen's estimates can only be made for two commodities, salt and wine, but in both cases they tally fairly well.⁷³

Compared with respective westbound commodity flows, these volumes were dramatically lower, from one-quarter to a fifth of the former. The big differences raise an obvious question of whether the eastward estimate covers all the commodities well enough. For one sector, departures from France and other southwestern European ports, the credibility of the figures can easily be fathomed by dividing the sum of cargo volumes – of course first subtracting those of British coal and salt – with the number of loaded ships arriving from these destinations. For the early 1750s, the average cargo per ship amounted to no less than 176 British tons and, for the 1780s, somewhat lower at 158 British tons. Both represent quite reasonable cargo-sizes, regarding the trade in question: for example, in 1769, the Swedish ships sailing to French and Iberian ports had an average size of 87 Swedish lasts or 175 British tons. An obvious conclusion is that the estimates for this southern sector are fairly realistic. Accordingly, the most important (and self-evident) reason for the low overall level of the eastward commodity flows was connected with the fact that most ships from the west, in particular the Netherlands and Great Britain, sailed to Elsinore with little or no paying cargo.

Tables 10 and 11 suggest that the west–east commodity flows grew quite briskly, in fact, by 2.3 percent a year (see Table 11, below). This was slightly faster than the respective growth rate of the eastbound ones computed before (2.2 percent). However, if the British coal and rock-salt imports are discounted, the growth rates clearly sink

72. Rönnbäck 2010, 234–237.

73. Johansen 1983, 101–121. For salt the estimates are: Johansen (1787) 82,000 tons and this study (1783–1787) 87,000 tons; for wine the respective tonnages are c. 20,000 and 19,000.

lower. Accordingly, it can be concluded that the commodity volumes coming from the French and Iberian ports only grew by a bit over one percent a year across this period.

Table 11. Indices and growth rates of west–east cargo volumes, 1751–1787.
Annual averages.

	1751–1755	1767–1771	1784–1787
Index, 1751–1755 = 100	100	141	204
Growth rate from previous period	–	2.2	2.3
Index, excl. coal and British salt	100	121	145
Growth rate from previous period	–	1.2	1.1

Source: Appendix Table 2; STT *Varetransport* tables; Johansen 1983, microfiche appendix tables.

Unlike the trade between the Baltic area and Western Europe (Britain and the Netherlands in particular) the outward and inward flows of this ‘southern’ trade seem to have been quite well balanced. While the numbers of ships heading to France and Iberia in Table 3 B were slightly lower than the corresponding departures in Table 9 (in 1751/1755 the difference was six and in 1784/1787 ten percent), it must be remembered that the data on destinations is marred by unknowns to the extent of some 20 percent. The low ballast ratios among those returning ships rather suggest that roughly equal tonnages were employed on south- as well as northbound legs and if there was any excess capacity it was rather found on the latter.

Two typical patterns can be discerned in the ‘southern’ trades. The first one consisted of round voyages by ships from Denmark, Sweden, Danzig, Lübeck and other Baltic seaports sailing south with goods for which there was demand in the so-called ‘Latin market’, and returning back to the north with salt, wine and different ‘colonial’ goods. The most important exports were timber products and grain, with iron, hemp, linen and some Chinese and East Indian products (obviously provided by the Danish and Swedish East Indian companies) complementing the cargoes.⁷⁴ The second pattern were followed by (mostly) Dutch ships which also brought southern products to e.g. Danzig, Riga or St. Petersburg but returned with Baltic ‘mainstream’ exports to Amsterdam or other ports in the Netherlands.⁷⁵ Unfortunately, the summary sources on which the estimate of westbound cargoes were based do not allow any separate estimation of southbound commodities – nor of any precise distinction of voyage patterns. Some rough guesses can only be proposed. Supposing that all southbound ships were fully loaded their overall cargoes would have amounted to about thirty percent of westbound timber products and grain, taken together. For one sub-class even more precise shares can be presented. Barrel staves were a staple product of the German Baltic coast from Lübeck to Danzig, and it is fairly certain that the bulk of them went to wine-producing regions. From the 1750s to 1780s, they accounted

74. Cf. Kaukiainen 2025, 19.

75. Conclusions based on samples of Dutch ships, STRO, 1760s, 1770s and 1780s; c. f. Kaukiainen 2021a, 502–505.

a steady 10–12 percent of all southbound cargo (or 5% of the total westbound volume) and paid for (at least) some 16 percent of all Baltic-bound wine.⁷⁶

An interesting feature is that the Baltic southbound shipping even gave birth to some triangle trade. While Sweden seems have been able to fill its ships with domestic timber products (including tar) and iron, as well as Danzig with grain, Denmark actually had a short supply of both. Danish agriculture, of course, was able to produce a massive surplus but the lion's share of it was drained by the monarchy's oversized capital, Copenhagen. In order to get saleable barter for southern products the Danes, in particular Copenhagen merchants, had to import Swedish, Norwegian and Baltic timber products as well as East Baltic grain. The latter were often sent southwards straight from an eastern loading port but quite commonly were also brought to the capital and reloaded into bigger ships – together with East and West Indian colonial products.⁷⁷

Even another type of triangle trade became common in the Danish and Swedish monarchies. Many ships started their southward voyages late in the autumn and, after unloading at their destination port, stayed in the south and passed the winter (when the northern domestic ports were covered with ice) carrying different tramp-freight cargo between West-European and Mediterranean ports. In the next spring, they loaded salt or wine and other local produce and returned home – but sometimes they spent even longer periods in the south. Such southern freight voyages were particularly common during the wars between western powers: as both Denmark and Sweden remained neutral their ships were able to replace the tonnage of belligerent nations. The first upswing of Nordic overwinter tramp-shipping took place during the Seven Years' War and the years of the American Revolutionary War gave rise to the next, which developed into a real boom.⁷⁸

* * * *

One additional, albeit fairly autonomous and rather modest counter-current, the trade in Swedish west-coast herring, must still be surveyed. Until the 1750s, the Dutch and Scottish North Sea fishing had (in addition to the Norwegian) supplied much of the herring consumed in the Baltic area. Around the middle of the decade, however, some bio-ecological upheaval induced the North Sea herring to abandon its

76. Estimate based on STT *Varetransport* tables and Appendix tables 1 and 2.

77. Cf. Kaukiainen 2025, 18. That proper export goods were sometimes in short supply is suggested by the fact that, in the 1750s, a quarter of southbound Copenhagen vessels departed in ballast.

78. Gobel 2010a, 183; Johansen 1983, 489,492. For example, in 1787, the Schleswig-Holstein ports of Flensburg, Aabenraa and Altona sent 188 ships to France and the Mediterranean and Copenhagen 65 more. Even high numbers of Norwegian vessels participated in such cross trades. In 1782, 415 Swedish ships of 43,100 lasts (c. 83,000 British tons) or over 60% of the country's merchant tonnage remained 'on voyages' on southern waters at the end of the year. In 1780–1782 1544 Swedish ships left for destinations beyond the Sound and only 959 returned, which shows that many vessels spent a few years in foreign waters (but ships were often even sold abroad). Swedish National Archives, Kommerskollegium, Kammarkontoret, Utrikeshandel och sjöfart, ser. 9, Handelsflottan och dess bemanning, ser. 1; Toivanen 1983, 302–303.

traditional Scottish spawning grounds in favour of the Swedish west-coast skerries. Quite unexpectedly, the coastal regions north of Gothenburg (*Bohuslän*) were thus overwhelmed by a new natural resource. As even Norway's herring catches, almost simultaneously, started to fail,⁷⁹ the Swedish west coast became the most important supplier of herring to the Baltic as well as the North Sea area for the next five decades.

It seems that Swedes initially had problems accustoming themselves with the new opportunities, both in terms of landing the catches as well as transporting and selling them. At first, most of the herring went to domestic destinations and imports from Norway even continued until 1756.⁸⁰ Gradually, with improving skills and larger-scale fishing, the export trade started to grow: from some 23,000 barrels (1900 lasts) a year in the late 1750s the average exports soared in the 1760s to 140,000–160,000 barrels, attained 180,000 barrels in the early 1780s and even exceeded 200,000 in the period 1786–1800. About eighty percent of the exports were shipped to the Baltic area, but minor quantities even went to Great Britain and southwestern Europe.⁸¹ Even domestic markets remained important with great quantities of herring being shipped to the east coast of Sweden, in particular to Stockholm.⁸²

Table 12. Passages from the Swedish west coast to the Baltic, 1751–1787.
Annual averages.

Period	1751–1755			1767–1771			1783–1787		
From	Gothen- burg	Other west	Total	Gothen- burg	Other West	Total	Gothen- burg	Other west	Total
To domestic destinations	18	29	47	70	61	131	123	115	238
To foreign destinations*	22	19	41	82	61	143	98	62	160
Sum total	40	48	88	152	122	274	221	177	398

*Excluding Denmark
Source: STRO.

Still in the early 1750s, interest in Baltic trade seems to have been very modest in the Swedish western coast – for example, Gothenburg's shipping (exports of bar iron) was mainly directed toward west, in particular to Britain.⁸³ The explosive growth in fishing brought a sudden change in this pattern: departures to foreign destinations (of which we, of course, mainly know about those going to the Baltic) trebled in the course of ten to fifteen years and the growth was even faster in Gothenburg. When the rapid boom of the herring fisheries subsequently stabilized, even the expansion of Baltic shipping moderated. On the other hand, domestic shipping of herring seems still to have grown at a fairly good rate. However, the division of voyages to domestic

79. In 1751–1755 Norway exported some 1600 lasts salted herring a year to the Baltic but, in 1767–1771, the average sunk to c. 740 lasts. STT *Varetransport* tables.

80. Högberg 1969, 165–168.

81. *Historisk statistik för Sverige, Del 3. Utrikeshandel 1732–1970*, Table 1.13.

82. See e.g. Johansen 1983, 59–62.

83. Högberg 1969, 70–72.

and foreign destinations should not be taken too literally; it is quite probable that a number of Baltic-destined vessels first visited a Swedish port, and may even have evaded the Sound Toll by sailing east along the Swedish side.⁸⁴

Swedish foreign-trade statistics make it possible to estimate quite accurately the volume of herring exports in terms of cargo space (Table 13). From almost zero in the early 1750 the average lastages soared to over 10,000 British tons in 1766–1770 and exceeded 15,000 tons in 1781–1785. In comparison, however, these tonnages did not quite attain the corresponding volumes of wine coming to the Baltic area and, at best in the 1780s, they hardly reached a tenth of the bulk of westbound grain cargoes from the Baltic area.

Table 13. Estimated cargo space required by the export of salted herring from the Swedish west coast to Baltic ports, 1751–1785, annual averages.

Period	Tons	Dan. lasts	Br. tons
1751–1755	45	14	32
1766–1770	16,000	4800	11,300
1781–1785	22,100	6600	15,600

Source: *Historisk statistik för Sverige, Del 3. Utrikeshandel 1732–1970*, Table 1.13.

Typically, herring-carrying vessels were small, some 20–30 Swedish lasts (40–60 British tons), quite seldom as much as 50 lasts; indeed, in the most popular Baltic ports the average size of Swedish vessels varied between 25 and 36 lasts (50–70 Br. tons).⁸⁵ Therefore, the growing exports generated quite busy shipping – at least as regards the numbers of passages.

All these ships from the west coast had to pass through the *Øresund* and the destinations of a substantial share of them must, accordingly, be found in the Sound Toll Registers. Moreover, their voyages have also been summarized in the contemporary Swedish shipping statistics. According to these sources, the most popular Baltic destinations for herring cargoes in the 1770s and 1780s were Swedish Pomerania (in particular Stralsund), Danzig, Königsberg and Riga.⁸⁶ In addition to a steady demand for fish, these ports had another attraction: they were sellers of grain which was in relatively short supply in the West-Swedish coastal regions. Not surprisingly, many herring boats returned home with rye or malt. A small sample among Gothenburg vessels (1767–1769 and 1785–1786) revealed that 80–90 percent of those which returned directly home carried a cargo of grain. However, the number of ships returning directly from abroad was lower than those that initially departed, which suggests that a number of returners first carried grain to some East-Swedish ports.⁸⁷

84. If the volume of Baltic exports is divided by the number of ships sailing to foreign (Baltic) destinations, the resulting average cargo would have been in 1766–1770 about 79 British tons and in 1781–1785 98 tons. These tonnages exceed the average sizes of Swedish vessels in the most important herring-importing Baltic ports by some 40% (see below). This difference suggests that there were more foreign-destined herring vessels than the STRO indicates.

85. STRO; Svenska riksarkivet, Kommerskollegiet, Kammarkontoret: Handel och sjöfart, ser.1, 9.

86. C.f. the previous footnote.

87. STRO, ships departed from and destined for Gothenburg, 1767–1769 and 1785–1786.

Even many Norwegian ships carried home Baltic grain; their numbers fluctuated normally between 50 and 150 per annum. Their voyages, however, differed from the Swedish patterns in one important respect: since exports of Norwegian herring had declined strongly, many of these ships had, instead, to carry timber products to Denmark and, after unloading them, they proceeded in ballast to Baltic grain ports.

The flows of Baltic grain to the Swedish west coast and Norway have, of course, been included in the overall estimate of westward cargoes, as already discussed. The precise proportion cannot be reliably accounted for⁸⁸ but it seems probable that the combined volume was clearly less than a tenth of the overall grain exports from the Baltic area.

8. Concluding remarks

For quite some time, historical research on shipping through the Sound seems to have interested more in the westward than eastward commodity flows.⁸⁹ Since the former mainly consisted of raw materials they may have had a connection with industrial development in the Netherlands and Great Britain; reciprocally, they are also relevant for the economic development of the exporting countries, like Sweden and Russia. The primacy of the east-to-west trade can even be justified by the fact that many more goods were moved in that direction than towards the Baltic area. This study even seems to strengthen such an emphasis: while the numbers of loaded passages indicate that the westward direction was superior by a ratio of two to one, the estimates of cargo volumes, presented above, show an even bigger imbalance with ratios of 4–4.5 to one.

Such imbalance naturally had major implications for the economics of transport. If the costs of the entire return voyage had to be covered by the freight revenue of just one leg, the costs for a single cargo were bound to be higher than in the case of a more balanced utilization of transport capacity. British eastward cargoes of coal and salt as well as Dutch transports of southern produce to Baltic ports of course alleviated the problem but given how big the gap between the high- and low-demand legs was, it did not make significant difference. Yet, it should be remembered that circumstances like this are far from abnormal in freight markets and should rather be regarded as a result rather than a cause. Moreover, on short and medium-long voyages the biggest costs by far were those of loading and unloading (see chapter 24, below). As most of these could be avoided when sailing without cargo, occasional ballasted legs did not necessarily ruin the overall profitability. However, this demand gap may have affected

88. The Swedish foreign-trade statistics naturally comprise the imports of grain to the west coast but only specify the imports of the four most important ports (including Gothenburg). Gothenburg's imports were around 13% of the Swedish total, which can be estimated to represent about 30% of all westbound Baltic grain. Accordingly, Gothenburg's imports may have represented less than 4% of the Baltic total while the rest of the west coast obviously imported less than that.

89. For example, Hans Chr. Johansen has estimated the shipping volumes of a number of westbound commodities but of eastbound ones only for salt and wine: Johansen 1983, 101, 106, 108.

the producer prices in the eastern Baltic. That, however, is a question which cannot be answered by only looking at the physical dimensions of shipping and trade.

An equally important issue is that the measuring of commodity flows in terms of cargo volumes, or the physical bulk, ignores another important parameter of mercantile trade: the value of goods. It has already been noted that the average value of westward cargoes may have declined with the relative growth of timber exports. Even bigger differences in values will be encountered if we compare the eastward and westward commodity flows: while the former often consisted of expensive southern or 'colonial' goods, the latter were typically composed of bulk goods: low-price primary products or raw materials. Unfortunately, no macro-level comparisons are possible with the existing statistics of toll revenues: they only record the overall income but do not present separate figures for westward and eastward passages. However, differences between them can be illustrated by a few examples. As the Sound Toll was an *ad valorem* duty (normally approximating one percent)⁹⁰ a fairly good idea of the actual values can be reached by looking at the tolls paid (as recorded in the STRO). Just a quick glance at this material suggests a substantial dispersal across the value-scale. At the low-value end, a small random example (early 1780s) of 30 cargoes of barks (and occasional other timber products)⁹¹ accounted for a median toll charge of only 10–20 *rigsdaler* and a maximum bill of 74.⁹² In contrast, 30 random cargoes with wine, sugar and other 'colonial' goods⁹³ presented an over ten times higher median value at 260 *rigsdaler*, a minimum charge of 44 and a maximum of 670. Similar examples of cargoes with grain and hemp or flax had clearly higher toll-bills than those for timber but they still seldom exceeded the minimum levels of ships with wine.⁹⁴ In any case, the examples above strongly suggest that value-wise the eastward commodity flows were more substantial than their physical bulk may indicate.

The statistics for the toll revenues can, however, be exploited to produce a rough estimate of the value of all goods carried east- and westward through the Sound. This is possible because the toll tariff remained the same from 1645 to the early 19th century – thus the toll revenues can (with small reservations) be taken as a fixed-price series and no corrections for eventual inflation are needed. The overall revenue in 1750–1759 was on average c. 240,200 *rigsdaler* a year and, thirty years later, almost the double at c. 460,500 *rigsdaler*.⁹⁵ This suggests that, even in terms of monetary value,

90. Johansen 1989, 21.

91. Retrieved by searching commodities with a wild card term 'bielk*'; the examples were randomized by arranging them in alphabetical order according to skippers' family names and taking the first 30 eligible cases.

92. In just three cases the charge exceeded 50 rd., but the ships in question were unusually large, clearly over 500 British tons.

93. Retrieved using wild card 'vi*n' (and otherwise sampled in the same manner as bark-cargoes). As the wine toll was 3%, the respective charges have been reduced to 1/3.

94. Median for grain c. 50 rd. and for flax c. 100 rd.

95. The revenue sums naturally represent just about one percent of the actual trade values. There were a few exceptions from the fixed toll rates: goods which were not mentioned in the 1645 Christianopol-tariff were charged one percent of their current value. During the three decades under comparison, the toll revenue for them may have grown above the average as at least Danish prices increased by 60–70% between 1750 and early 1780s. Degn 2010, 142, Monrad Møller 2010, 483–484; Abildgren 2009, 285–286.

the trade through the Sound grew substantially, close to two percent a year. At the same time, the overall cargo volumes had even risen slightly more. This decrease of average commodity prices reflected the relative increase in cheap goods.

Intra-Baltic shipping

9. *Insiders and outsiders in Baltic ports*

In the eighteenth century there were, in the Baltic area, almost a hundred ports from which ships at least occasionally delivered cargoes west of the Sound.⁹⁶ In addition, there must have been several others which only were occupied with various intra-Baltic trades, and smaller havens for humble coastal traders would have boosted the numbers higher still.

Table 14 demonstrates how wide the differences between big and small Russian ports could be. As may be expected, the smaller Estonian ports mainly received ships from other Baltic ports. The overall picture, however, was not quite as simple: paradoxically, the biggest Russian centre for intra-Baltic shipping was Riga from which, during these very years, more ships made Baltic voyages than from all others taken together. Actually, these figures were slightly unusual even for Riga – more normally, departures beyond the Sound exceeded Baltic departures by a quarter or a third. Yet, this example stresses an important point: many big ports with a high volume of extra-Baltic exports could also be major centres of intra-Baltic shipping.

Table 14. Departures from Russian Baltic ports, 1761–1763.

Annual averages

1= Total number of ships 2= Number of passages westward through the Sound

3= 1 minus 2, indicating the number of ships for Baltic destinations 4= Percentage of Baltic departures.

Port	1	2	3	4
St. Petersburg	332	211	121	19
Riga	957	462	495	52
Pernau	72	14	58	81
Arensburg	34	3	30	91
Habsal	7	1	6	86
Reval	145	23	122	84
Narva	115	79	36	31
Viborg	80	58	22	28
Fredrikshamn	37	12	25	68

Source: von Storch 1803, 29.

96. For example, in 1783–1787, some 90 Baltic ports, mentioned as destinations and/or place of departure, can be found in STRO.

In addition to the Russian ports, there are a number of other Baltic ports for which there are at least sporadic shipping statistics available. With respect to the total number of ships, arrived and/or departed, the crude rates of intra-Baltic shipping can be computed (as was done in Table 14) by subtracting the respective departures westward through the Sound (according to the STRO) from these totals. A sundry collection of such data is presented in appendix tables 3: D–H. As a summary, Table 15 shows the numbers of passages to Baltic destinations as well as their proportions of the overall traffic.

Table 15. Baltic shipping in a number of Russian, East Prussian, Polish and other South Baltic ports.

Departures, annual averages

Port	Period	Baltic passages	Baltic pass. %	Port	Period	Baltic Passages	Baltic pass. %
St. Petersburg	1749–1752	116	37	Danzig	1752	219	22
	1758–1764	111	33		1765, 1769	522	45
	1765–1768	143	33		1770–1772	489	45
	1772–1775	145	24		1773–1775	362	48
	1776–1779	158	24		1776–1780	206	37
	1783–1786	169	24		1782–1785	351	50
Riga	1751–1755	133	26	Stettin	1777	1069	86
	1758–1764	244	41		1782	1044	89
	1765–1768	370	43		1783	1125	93
	1772–1775	245	28		1789	1015	91
	1777–1781*	310	41	Rostock	1788	395	76
	1784–1786	320	37	Lübeck	1754–1760	377	96
Memel	1749	77	70		1761–1770	508	97
	1762	74	57		1771–1780	537	96
	1783	85	11		1781–1785	604	97
Königsberg	1765	489	59	* 1777, 1779, 1781			
	1768	344	45	Source: Appendix tables 3: A–H; Rostock: Oddy			
	1769	337	52	1807, 288.			

The eclectic data of Table 15, since it is not a random sample, cannot be exploited as the basis for proper extrapolations. However, it can still shed some light on the structures and patterns of intra-Baltic shipping. First, we can see that the eastern and southern seaboard of the Baltic can be divided into two distinct parts, with a dividing line somewhere west of Danzig. The eastern part is characterized by big ports from which a lively traffic was directed beyond the Sound. They could even attract lots of Baltic vessels, but the latter normally represented, in terms of passages, between 25 and 50 percent of the total. The western part, again, consisted of ports with very modest participation in shipping west of the Sound but strong ‘Hanseatic’ traditions of trade with Sweden and Russia. It is obvious that, in addition to the three major ports included in Table 15, the same even applied to the smaller towns of Wismar and Kiel as well as many ports in Swedish Pomerania.

In four cases, St. Petersburg, Riga, Danzig and Lübeck, the statistics are so continuous, stretching across four decades, that they may reveal whether there were

any distinct development trends. In the case of St. Petersburg, a fairly clear relative decline of Baltic departures can, in fact, be detected until the 1770s. In actual numbers, however, Baltic voyages increased overall by some fifty percent but, as the departures to the Sound more than doubled across the same time, the role of Baltic shipping was clearly diminishing. Riga, on the other hand, presents a different picture with Baltic departures growing faster than voyages through the Sound. Such a contrast between Russia's two biggest ports is simply explained by the fact that the expanding British shipping dominated St. Peterburg while Riga in contrast depended on the declining Dutch influence.⁹⁷ Accordingly, the latter's long-trades suffered but it still retained a strong position in Baltic shipping.

Danzig still seems to have been the leading centre of Baltic shipping in the 1760s. However, its development was strongly affected by the First Partition of Poland which started a long-term decline. At first the partition harmed its Baltic trade to a limited degree but, subsequently, Baltic arrivals and departures sank to less than a half of the previous heyday-levels.

At least equally dramatic was the development of Memel – but in a totally different direction. Albeit the data only concerns three separate years, the latter two help us to understand the big change caused by the opening of the forest resources in the Niemen basin after 1764. In a few years, Memel became the biggest exporter of barks in the whole Baltic area whereas, before that, it had been a minor Baltic-oriented port.⁹⁸

In contrast with the preceding ports, the data for Lübeck tells us of its stable growth in which the extra-Baltic element only accounted for a steady three or four percent of voyages.⁹⁹ The case of Stettin seems fairly similar although the data only covers a time-span of twelve years.

Again, it must be pointed out that, so far, the role of Baltic shipping has only been gauged by variables (passages, departures) which rate small boats equal with big ships. Such numbers are not satisfactory for estimates of the actual volumes of shipping, or commodity flows. Therefore, the next necessary step is to utilize the better data found in the Swedish statistics on shipping and foreign trade.

10. Sweden and the Baltic

Sweden controlled by far the longest stretches of Baltic coastal regions.¹⁰⁰ Around these coasts it had, in the 1750s, 25 seaports with foreign-trading rights (so-called staple towns, *stapelstäder*) and, in the course of the next five decades, their number increased to 45. Most of these ports were engaged in active and expanding shipping: in 1774 the country's merchant tonnage amounted to almost 35,000 Swedish lasts (or about 70,000 British tons) and ten years later the same tonnage had grown to about 70,000 lasts. The precise proportion of Baltic tonnage cannot be determined but, according to the contemporary shipping statistics, at least 80 percent of all recorded

97. See e. g. Kaukiainen 2021a, 501; Kaukiainen 2023, 426–428.

98. Oddy 1807 *Commerce*, 220–221; Johansen 1983, 108–109.

99. Kaukiainen 2022, 371.

100. Since 1744, the border with Russia was on the river Kymi in southeastern Finland.

voyages were normally sailed within the Baltic and these voyages accumulated over 60 percent of the respective lastages.¹⁰¹ Sweden's importance in the Baltic is also shown by the fact that in Lübeck they regularly topped the list of visitors, accounting for about a third of all arrivals; moreover, in the heyday of Danzig before the First Partition of Poland, Swedish ships quite often outnumbered the Dutch in the port (however, they used to be smaller than the latter).¹⁰²

Swedish shipping statistics present a comprehensive and fairly detailed picture across most of the Swedish foreign-trading ports. The summaries divide the voyages into several regional groups regarding the *ports* of departure and destination; such classification makes it possible to separate Baltic shipping from longer trades. Only in one respect is this division imperfect: as Swedish *ships* were not divided into regional groups, the west-coast herring trade, with ports of departure west of the Sound, were not presented as a separate category. However, most of these voyages can be identified, when necessary, from the STRO data. In several respects this herring trade can also be seen as an integral element of Baltic shipping.

Nevertheless in another respect, the Swedish shipping statistics are less perfect: they do not record any domestic shipping. Yet the country had substantial numbers of ships which only sailed between Swedish ports – mainly because they belonged to towns or boroughs which were not allowed to participate in foreign shipping. According to statistics from 1747, the Swedish merchant navy comprised 515 foreign-trading vessels (of 28,940 lasts) and (excluding ships on the big interior lakes) 384 vessels in domestic trade (12,060 lasts) – thus the latter represented no less than a third of the total lastage. The bulk of this 'domestic' fleet (some 150 ships of over 8400 lasts) came from the small ports around the Gulf of Bothnia, and they were almost exclusively occupied in supplying Stockholm with exports of important backwoods-products: tar, pitch and sawn timber.¹⁰³ No similar statistics of domestic shipping are available from later decades, but it seems obvious that its relative role diminished after the 1760s, as a number of Bothnian towns were granted the right to sail directly abroad. However, the Swedish foreign-trade statistics show that Stockholm continued to receive increasing volumes of tar and other forest produce, and this suggests that the Bothnian domestic shipping was still growing, at least moderately.¹⁰⁴

The data on departures and arrivals displayed in Table 16 thus only concerns shipping to and from foreign countries, but even the arrivals and departures of foreign vessels are included. However, the role of the latter was – thanks to the Swedish navigation act – unusually modest: on average about ten percent. For the 1750s, reports from a few minor ports are missing and it is possible that, even later, there are small gaps in the data.¹⁰⁵ A series of irregular fluctuations took place in the early

101. Svenska riksarkivet, Kommerskollegiet, Kammarkontoret: Handel och sjöfart, 9. The ratios were quite similar in both the 1770s and 1780s. It must, of course, be remembered that Baltic voyages were much shorter than voyages beyond the Sound.

102. Kaukiainen 2022, 372; *De til Forsendelse med Posten allene privilegerede Kiøbenhavnske Tidender*, 9/1765 and 8/1770; *Danziger Anzeigen* 1770–1772; Oddy 1807, 259.

103. Almqvist 1949, 379–381.

104. In 1751–1755, Stockholm's exports of tar and pitch represented a cargo volume of c. 4300 lasts and it increased to 4450 lasts in 1765–1770 and 5300 lasts in 1781–1785; *Historisk statistik för Sverige, Del 3. Utrikeshandel 1732–1970*, Table 1.14.

105. From 1769, the data was summarized in national overview tables but, before that, the overall picture has to be compiled from separate reports from various ports. In the early 1750s,

1770s and, while they may suggest faults in the data, they seem rather to be connected with a non-mercantile misfortune: harvest failure leading to high mortality in 1771.¹⁰⁶ An additional suspect feature of the data are the figures for shipping to and from Denmark: still in the late 1760s, they accounted for by far the largest numbers of vessels but, as the average size of them only was about twelve Swedish lasts, the traffic mainly consisted of pure coastal shipping. Surprisingly, the number of vessels subsequently declined by at least a half while their average size simultaneously doubled; with no other obvious explanations, it seems almost certain that the smallest boats had been excluded from the statistics. In any case, these fluctuations again demonstrate (like the earlier observations from the Sound Toll Records) how unsystematic the data on shipping between Denmark and Sweden could be.

Table 16. Loaded departures and arrivals in Swedish Baltic shipping, 1751–1787. Including both Swedish and foreign vessels, annual averages.

A: Departures

Destination Region	1753–1755		1769–1771		1783–1787	
	Ships	Swe. lasts	Ships	Swe. lasts	Ships	Swe. lasts
Russia	243	8085	258	6840	330	14,881
Königsberg	67	1516	151	3849	368	13,231
Danzig	148	3646	246	5936	128	2966
Pomerania	179	5343	198	6438	152	6037
German places	285	9479	405	16,896	578	19,055
Denmark	561	7725	686	8165	378	9460
Total, excl. Denmark	937	28,248	1258	39,959	1556	56,170
Total, incl. Denmark	1498	35,973	1728	48,124	1934	65,630

B: Arrivals

Region arrived from	1753–1755		1769–1771		1783–1787	
	Ships	Swe. lasts	Ships	Swe. Lasts	Ships	Swe. lasts
Russia	242	8148	219	7134	410	17,989
Königsberg	75	2058	150	3854	588	18,316
Danzig	169	4060	252	5995	247	5608
Pomerania	236	9080	213	8219	222	8340
German places	218	6094	249	8780	252	7397
Denmark	611	8478	620	7713	270	9620
Total, excl. Denmark	940	29,440	1083	33,982	1719	59,673
Total, incl. Denmark	1551	37,918	1703	41,695	2061	67,319

Source: Svenska riksarkivet, Kommerskollegiet, Kammarkontoret: Handel och sjöfart, ser. 1, 9.

a few port-reports are regularly missing – however, less commonly in 1753–1755 than before. Most importantly, the data for Stockholm and Gothenburg (which represent 80–85 percent of overall shipping movements) is complete. The most serious gap is the total lack of data from Gävle but it only accounts for below three percent of the total. In half a dozen cases, data was missing for just one year and in such cases the respective average has been computed for the remaining two years. Naturally, no gaps are visible in the national overview tables.

106. Dribe, Olsson and Svensson 2015, 18. A long and cold winter may even have contributed to abnormally low shipping activities in 1771: according to STRO, the first Swedish ship only arrived in Elsinore on 9 May, while normally they were recorded around the middle of April. In any case, grain imports were fatally small in the summer and only increased substantially in the summer of 1772.

The evidence of shipping statistics can be backed up with the contemporary data for Swedish foreign trade. Using the same conversion rates as earlier for Sound Toll commodities they can also be expressed as cargo space equivalents (Table 17). It can be seen that both data sets indicate substantial and fairly steady growth, albeit they do not fully agree in terms of growth rates.

Excluding traffic to and from Denmark, the aggregate lastage of departures and arrivals increased by no less than 100 percent, denoting average growth rates of 2.2 (departures) and 2.3 percent (arrivals). Interestingly, this is almost synonymous with the overall trend of the Sound passages between 1750 and 1790; however, the foreign-trade statistics suggest that Swedish Baltic export growth was clearly slower (1.4% a year) while imports boosted double as fast (c. 3% a year).

Table 17. Swedish exports and imports within the Baltic: Estimated cargo space required by the main commodities, 1751–1787, annual averages.

Thousand lasts and tons, sums computed from unrounded numbers

A: Exports						
Commodity group	1751–1755		1767–1771		1783–1787	
	Danish lasts	British tons	Danish lasts	British tons	Danish lasts	British tons
Timber	4.1	9.7	9.3	22.2	10.6	25.3
Tar, pitch	1.3	3.0	1.8	4.4	2.0	4.9
Lime*	5.4	12.9	4.6	11.0	3.3	7.9
Iron	0.7	1.7	0.7	1.7	0.8	1.9
Salt**	0.6	1.4	0.4	1.0	1.9	4.6
Herring	0.0	0.0	4.8	11.6	7.2	17.3
Total	12.1	29.0	21.6	51.8	25.8	61.9
Total in Swe. lasts	14.2	.	25.4	.	30.4	.

* lime and limestone

** re-exports

B: Imports						
Commodity group	1751–1755		1767–1771		1783–1787	
	Danish lasts	British tons	Danish lasts	British tons	Danish lasts	British tons
Grain	15.3	36.8	19.0	45.7	43.6	104.7
Hemp etc.	1.6	3.7	1.6	3.9	2.6	6.2
Other	0.1	0.2	0.2	0.4	0.1	0.3
Total	17.9	42.8	21.6	51.9	46.3	114.2
Total in Swe. lasts	21.1	.	25.4	.	54.5	.

Source: *Historisk statistik för Sverige, Del 3. Utrikeshandel 1732–1970*, Tables 1.1–1.21. Contemporary measures converted to lasts according to stowage factors presented in Appendix 1. For more details, see Appendix Table 3.

When comparing the data from these two sources it can be seen that the shipping statistics clearly have higher lastages than the estimated volumes of foreign trade. When expressed as Swedish lasts, the latter only amount to 50–74 percent of the former for exports and 69–93 percent for imports. Imperfect data is obviously at least part of reason for these big differences: as the foreign-trade statistics do not specify Baltic shares for all commodities, the volumes presented in Table 17 must be too low. They also suggest that Swedish Baltic vessels were not always fully loaded. Moreover, it seems possible that their registered lastages could sometimes be quite arbitrary (probably too high): a precise system of ship measurement was only introduced in 1778.¹⁰⁷ On the other hand, cargo volumes per ships increased more (over 40%) than the average lastages recorded in the shipping statistics (only 15%). This may suggest that the deployment of tonnages became more efficient after the 1750s.

Overall, Swedish shipping statistics reveal a relatively balanced structure with well-matched departing and arriving tonnages. In contrast, the foreign-trade statistics suggest that departing vessels often carried less cargo than those returning home. Part of this disequilibrium may be explained by iron exports. As these were concentrated in Stockholm and Gävle, it is possible that ships leaving those ports were carrying such heavy cargo that they could not fill their cargo holds to the brim. In any case, it is obvious that imports required more space than exports, that homeward was the high-demand leg in Swedish shipping. This, again, reflects the fact that Sweden, and in particular Stockholm, was heavily dependent on imports of Baltic grain. As can be seen in Table 17 B, the share of grain amounted up to 90 percent of import cargoes. In the early 1780s, imports of rye expanded to such volumes that the estimated volume of grain cargoes exceeded the registered overall lastages of arriving ships.

As was seen in Table 16, the Swedish shipping statistics divided the Baltic ports of departure and destination into six regional groups:¹⁰⁸ Denmark (which may even include ports west of Elsinore), Russia which also encompasses Courland (Windau and Libau), Königsberg (with other East Prussian ports Memel and Pillau), Danzig (and Elbing), Pomerania (which must refer to both Wismar and Swedish Pomerania), and Holstein, Lübeck and 'several German places' (*flere Tyske orter*). The last category obviously even includes Schleswig as well as the rest of the German Baltic coast from Rostock to as far as Stolp in Hinterpommern. Interestingly, Swedish shipping statistics reveal that the overall balance between departures and arrivals did not apply to the regional numbers – quite on the contrary. Thus, many more ships sailed to 'Holstein and German places' than returned from such destinations; moreover, the share of returners declined steadily until they, in the 1780s, only accounted for some forty percent of departing tonnage. On the other hand, arrivals from Pomerania and East Baltic ports clearly exceeded the number of departures. These asymmetries, in fact, reveal a common and persistent voyage pattern which can be explained by the structure of the Swedish Baltic trade.

107. The last was standardized in 1726. Andersson 1945–1946, 60; Kongl. reglemente 11 Apr. 1778, Stiernman, *Samling* 1778. It seems that the earlier lastages were sometimes based on thumb-rules of how much goods were normally stowed per one last.

108. Such a division had been used since the first summary tables in 1769. The reports from Stockholm had applied an almost similar division at least since 1751.

Around the middle of the 18th century, timber products were the fastest growing sector of Swedish exports; gradually, they exceeded in importance the traditional key products tar and pitch. With the growth in production, exports to the Baltic area increased particularly fast: between the early 1750s and 1780s, the Baltic share of ordinary boards grew from a third to over 70 percent, and even the respective share of tar increased from a quarter to about 40 percent. While the statistics did not define this destination (*Österjömrådet*) more precisely, it is clear that only the ports on the southwestern coasts of Germany, Denmark, Holstein and Mecklenburg could have been realistic destinations: ports along the Baltic coasts eastwards from Pomerania did not import timber products – they were exporting them.

After the Great Northern War, Sweden had lost its former grain outlets Riga and Reval (Tallinn) and was now compelled to import some five to seven percent of its consumption of cereals from abroad. As practically all the Danish grain surplus was consumed by the capital, Copenhagen (see chapter 15, below), Sweden had to rely on other granaries. Around 1750, Swedish Pomerania was still the most popular of them (obviously because most customs charges could then be avoided) but gradually the East Baltic, in particular Russian ports (Riga and Reval) overtook it.¹⁰⁹ Stockholm, naturally, attracted the lion's share of these imports; in the period 1745–1805, it fluctuated between 72 and 48 percent. However, this does not necessarily prove that the whole population of the Swedish capital was being fed with foreign grain; in actual fact a substantial proportion must have been re-distributed to the capital's northern hinterlands, the so-called *Bergslagen*.¹¹⁰ These were regions with relatively small farms and a numerous non-farming population engaged in mining and ironworks and, accordingly, grain was in short supply there. As many important Stockholm merchants had big interests in iron production and exports, they had good reasons to provide for the material security of *Bergslagen*. Thus, in a sense, imports were even supporting exporting industries.

As grain totally dominated Swedish imports and most of them normally were destined to the capital, 40–60 percent of all ships returning to Sweden had to visit various grain ports and then proceed to Stockholm. Therefore, many ships landing timber products in West Baltic ports did not normally load any return cargoes back home but continued, instead, to Pomeranian or East Baltic ports. Since freights for this leg were not easy to find, most of them had to sail in ballast.¹¹¹ Only ships carrying west-coast herring to the Baltic were able to avoid such triangle voyages: most of their cargoes were heading directly to grain-exporting ports.

109. *Historisk statistik för Sverige, Del 3. Utrikeshandel 1732–1970*, Tables 1.1 and 1.8; Heckscher 1949, 160–161. Even Russian imports enjoyed a special advantage: according to the Peace Treaty of Nystad Sweden was allowed to import substantial amounts of grain from Russia customs-free.

110. C. f. Heckscher 1949, 380–384.

111. C. f. Kaukiainen 2022, 377–378.

Table 18. Comparison of loaded passages and cargo volumes in eastward traffic through the Sound and Swedish Baltic trade.

Annual averages, number of passages and thousand British tons

		1751–1755	1784–1787	index of growth
Sound eastbound	Passages	870	1652	190
	Br. tons	85.6	174.2	204
Swedish Baltic departures	Passages	937	1556	166
	Br. tons	56.6	112.3	198
Swedish Baltic arrivals	Passages	940	1719	183
	Br. tons	90.3	186.2	249
Swedish export cargo	Br. tons	29.0	61.9	213
Swedish import cargo	Br. tons	42.8	114.2	267

Source: Tables 9, 10, 16 and 17.

A comparison of eastward passages through the Sound and the passages of Swedish ships indicates that both employed quite similar numbers of ships. However, while the vessels in the former trade were clearly bigger, the difference in size was at least partly compensated by the fact that Swedish vessels were regularly sailing return voyages. Thus, in the early 1750s, Swedish Baltic vessels (according to the country's foreign-trade statistics) moved some 72,000 British tons of cargo while the estimated eastbound cargo volumes amounted to 86,000 tons. However, in the mid-1780s, both volumes reached some 175,000 tons, which suggests that the Swedish shipping was clearly growing faster. Indeed, the average Swedish cargo had increased from 38 British tons in the 1750s to 54 tons, while the averages in the eastbound traffic through the Sound had only grown from 98 to 105 tons.

The numbers even show that Swedish Baltic shipping even grew slightly faster than the westbound traffic through the Sound. However, its growth rate fell clearly below that of Swedish shipping beyond the Sound. Between the early 1750s and 1780s, such long-trade passages grew by an imposing factor of 3.5 (or, on average, over four percent per annum) and their overall share of all westward voyages jumped from twelve to over twenty percent.¹¹² Most of this rapid growth is explained by the American Revolutionary War. The conflict disturbed heavily the merchant shipping of the belligerents, Britain and France – and to some degree even that of Spain and the Dutch Republic. At the same time, the two Nordic monarchies, Denmark and Sweden, experienced a dramatic shipping boom when the demand for neutral tonnage (as well as freight rates) grew rapidly. While long-trade shipping peaked in both countries around 1780,¹¹³ the trade within the Baltic did not experience any similar impetus.

112. According to the STT.

113. In this respect, Sweden exceeded Denmark (and its capital Copenhagen): between 1769–1771 and 1779–1781, Swedish passages increased on average 7.5% a year while the respective growth rates were 5.0% for Denmark and 6.0% for Copenhagen. Even the actual numbers of Swedish passages were in 1779–1781 (according to the STRO) two times higher than those of Denmark.

11. Lübeck and the German Baltic

In one respect the 'free and Hanse town' Lübeck was a complete contrast of Swedish shipping centres. While the maritime trade of the latter was totally dominated by domestic tonnage, only about a third of ships visiting the port of Lübeck were locally owned,¹¹⁴ making it one of the busiest inter-Baltic meeting-places. However, the hardcore of its shipping, trade with Russia, was firmly in the hands of the local burghers and their guilds of *Novgorodfahrers* and *Rigafahrers*. This sector of their maritime activities was, in essence, a Baltic-scale mirror image of the typical commodity flows through the Sound: valuable consumer goods were exported to the east and bartered for cheaper primary products and raw materials.

Shipping movements to and from the port of Lübeck can be closely followed from the weekly ship-lists of the *Lübeckische Anzeigen* which have been preserved as unbroken series from 1754 to the end of the century and beyond. The shortcoming of the data is its extremely brief format: only the skippers' names and ports which they are coming from or departing for are reported but no information about the ships' tonnages or cargoes, not even whether ships were loaded or in ballast, is included.¹¹⁵ Nonetheless, they reveal the basic shipping trends and fluctuations as well as structures of the trading networks. This data for three sample periods is displayed in Table 19, below.

Table 19. Departures and arrivals in the port of Lübeck, 1754–1787.
Numbers of ships, annual averages. Excluding local coastal trade.

Region of origin or destination	Departures to			Arrivals from		
	1754– 1756	1767– 1771	1783– 1787	1754– 1756	1767– 1771	1783– 1787
Sweden and Finland	82	119	157	122	172	220
Russia, Courland*	116	138	198	91	104	107
Danzig (with Elbing)	22	52	45	17	19	15
Prussia, Prussian Pomerania	25	19	35	24	19	33
Swedish Pomerania	27	33	69	22	20	42
Eastern Denmark	48	71	48	46	58	57
Total of Baltic	336	459	613	337	411	557
North Sea regions** and beyond	17	19	20	65	57	61
Grand total	353	478	633	402	468	618

*incl. Russian Finland ** Norway, Great Britain and the Dutch Republic.

Source: *Lübeckische Anzeigen* 1754–1787, Ship-lists.

The numbers demonstrate that even Lübeck experienced substantial growth in traffic during these three decades. For departures it was actually roughly similar (c. 2%) to the corresponding Swedish rate but it was slightly lower in terms of arrivals. The

114. Kaukiainen 2022, 388.

115. Kaukiainen 2022, 363.

prominent role of Swedish shipping is clearly evident: they accounted 36–42 percent of Baltic arrivals. That their share of departures was clearly lower depended, of course, on the trade patterns which were noted before: many Swedish ships left Lübeck for Swedish Pomerania or eastern grain ports, instead of returning directly home.

The number two direction, according to Table 19, was Denmark, but this was mainly short-distance trade with small ships; in terms of lastage they would have ranked low. Apart from these, Lübeck received hundreds of small boats from the nearby islands and coasts (as well as from Holstein and Mecklenburg) bringing different farm products, firewood and fish to the city; quite similar local trade took also place in the environs of Copenhagen and Stockholm. Their numbers fluctuated between 250 and 400, sometimes even higher, and accounted normally for a third of the port's total figures.¹¹⁶ However, their small cargoes cannot have represented any major part of the total commodity flows and neither could their voyages by any definition be regarded real Baltic-scale shipping.

The real number two was undoubtedly Russia which controlled important Baltic ports from St. Petersburg to Riga, and even the Duchy of Courland (which formally belonged to Poland but was in fact a client state of the Russian Empire) could be included in this region.¹¹⁷ It accounted for about a quarter of arrivals and, as a destination, it actually surpassed Sweden by a clear margin. However, the number of departures was inflated by skippers from Great Britain and the Dutch Republic who, after unloading an import cargo, sailed on to the big export ports like Riga, Narva or St. Petersburg. Arrivals from Russia, on the other hand, mainly consisted of returning Lübecan ships. In comparison, trade with East Prussia, Danzig and Pomerania involved lower numbers of voyages.

The ship-lists of Kronstadt¹¹⁸ present a mirror image of shipping between Russia and Germany, thus even setting Lübeck in a wider context. According to them, German ports (excluding East Prussia but including Holstein) held a strong position in Russian trade, accounting for around 55–63 percent of all Baltic departures from Kronstadt. In this group Lübeck held the biggest market share (at least in terms of the number of ships); however, it reduced gradually from 38 to 30 percent.¹¹⁹

116. *Lübeckische Anzeigen*, lists of arrivals and departures. In 1800–1805, the total number of arrivals in the port was recorded as 7530 and those of departures as 7758 (cf. H. J. und C. G. Behrens 1829, 216–217). Arrivals in non-coastal shipping, that is from Rostock and farther, amounted to 5061 and respective departures to 5218, which means that the share of coastal traffic was 33% in both categories.

117. Courland's bond with Russia started in 1711 when Peter I's niece Anna Ivanovna was married to the Duke of Courland. As the Duke died right after the wedding ceremonies, Anna became the ruling duchess. A personal union ensued when Anna was crowned the tsar (tsarevna) of Russia (1730). A few years later, she permitted her lover Ernst Johann von Biron to be elected the duke and, subsequently, his heirs ruled the duchy under the protection of Russia. In the third partition of Poland (1795), Courland was incorporated into Russia.

118. *St. Petersburgische Zeitung* (microfilms in the Finnish National Library).

119. Kaukiainen 2021a, 495–499; data retrieved from Kronstadt ship-lists.

Table 20. Baltic departures from Kronstadt, 1749–1786.
Annual averages (sums counted from unrounded numbers)

Destination	1749–1752	1767–1768, 1772–1773	1783–1786
Sweden and Finland	12	21	40
Russian ports	8	5	7
East Prussia	1	2	2
Danzig (with Elbing)	8	8	10
Stettin	21	25	26
Swedish Pomerania	1	1	7
Rostock	12	10	16
Lübeck	27	38	43
Holstein (Kiel)	3	6	10
Denmark	10	20*	23*
Total Baltic	101	135	185

*excluding departures 'to the Sound'.

Source: Data retrieved from Kronstadt ship-lists of *St. Petersburgische Zeitung*.

Documents preserved in *Stadtarchiv Lübeck* make it possible to sketch a more detailed picture of the city's Russian trade. Ships sailing for Riga or St. Petersburg were normally carrying selections of wine, sugar, tobacco and other 'colonial goods' as well as different finished products, occasionally even real luxury goods like porcelain, watches and French snuff-boxes.¹²⁰ Their cargo holds were thus filled with numerous smaller consignments, exactly like the more recent liners – and they even had departure times fixed well in advance. As the volume of such exports of *stückgut* (general cargo) were limited, not all ships were fully loaded and a number of the less fortunate had to leave in ballast.¹²¹ On the other hand, these cargoes had high monetary values: according to Oddy, imports from Lübeck to Riga in 1803 were priced at 640,383 roubles. This clearly exceeded the corresponding British figure and represented no less than a quarter of all Riga's imports.¹²²

Return voyages required more tonnage as lots of bulk goods were imported from Russia. Like the cargoes cleared at Elsinore, they included hemp, flax, iron and grain. Interestingly, tallow was imported in unusual volumes: in several years Lübeck received more tallow than was carried through the Sound.¹²³ On the other hand, no low-value timber products were brought from Russia – obviously Sweden had satisfied such demand. The average value of imports was particularly boosted by

120. See e. g. Harder 1961, 98–100. Such a luxury cargo was found in a ship which sank in the Finnish southwest archipelago in the autumn of 1747; c. f. Nurmio-Lahdenmäki (ed.) 2006, 67, 124–323. More recently, it has become obvious that the ship in question was not the *St. Michel* sailing from Amsterdam, as presumed earlier, but some, so far unknown, most probably Lübeck-based vessel; c.f. Kaukiainen 2021b, 10–14.

121. Harder 1961, 80 (footnote 149); Kaukiainen 2022, 366, 279–280.

122. Oddy 1807, 143. From the mid-1780s, many of them flew a Russian flag of convenience.

123. Harder, *Seehandel*, 89.

plentiful deliveries of juft-leather:¹²⁴ at least in 1749 leather accounted for over forty percent of the total value of Russian goods – with tallow ranked second at around twenty percent. As the value of imports, after they doubled in the 1740s, remained relatively stable from 1748 to the 1760s, it seems possible that even their composition may have been roughly similar.¹²⁵ In any case, it seems obvious that the bulk-cargoes carried to Lübeck presented lower values than the corresponding cargoes to Russia: in 1803, Lübeck's imports from Riga were only priced at two-thirds of the same year's exports. This was nothing exceptional as Lübeck had from time to time a positive balance of trade with the Russian Empire.¹²⁶

Kronstadt ship-lists prove that Stettin also maintained regular and fairly busy contacts with the Russian capital and, in a more modest scale, this even was the case of Rostock and Kiel. That at least Stettin imported similar Russian products as Lübeck can be concluded from a report that the city traded juft-leather, hemp and linseed.¹²⁷ Whether it provided St. Petersburg with wine and other urban consumer goods can be examined by perusing the data for eastward imports of such commodities at Elsinore. The Sound Toll Tables recorded, *inter alia*, the volumes of wine and 'colonial goods' carried under different flags to the Baltic. As the data is classified according to the nationality (*hjemsted*) of the ships (or the skippers) it is not able to reveal the precise amounts unloaded in different ports; however, since the Baltic states typically tried to carry the valuable southern products onboard domestic ships, the differences between total imports and those brought on their own ships could be small. On the other hand, excessive volumes of such imports in small ports may reveal cases of so-called entrepôt trade, or re-exports, while very small imports in the bigger ones suggest dependence on foreign carriers.

The structures and fluctuations of this trade can easily be mapped by following an almost perfect marker for the mixed cargoes of sugar, coffee, tobacco, spices etc.: the imports of French wine (Table 21, below). At least in the Baltic area the key actor was traditionally the Dutch Republic. Its market position seems to have been shaken a bit during the War of Austrian Succession (during which French ports were closed to Dutch ships) and, quite clearly, local importers like Denmark or Lübeck profited from the situation. However, the Dutch managed – probably helped by the turmoil created by the Seven Years' War – to restore their market share, and at the end of the 1760s, their ships delivered over forty percent of the French wine on the Baltic market. They were not able to hold on to such a high share for long, and with the War of the American Revolution a new decline started, accelerated by the Anglo-Dutch Naval Conflict. As could be expected, their Baltic competitors quickly increased their imports.

124. According to Harder 1961, 88, leather became a fashionable upholstery in the 18th century.

125. Harder 1961, 110 and Table VII.

126. Kahan 1985, 244–245.

127. Oddy 1807, 267.

Table 21. Imports of French wine to the Baltic area by ships of selected countries or ports.

Tuns (à 904 litres) on average per annum

Country/port	1751–1755	1767–1771	1781–1783
Dutch Rep.	3900	9600	50
Denmark	2170	2020	3080
Baltic Holstein	930	450	1860
Sweden	2050	1940	3220
Lübeck	2650	1850	2850
Stettin	1800	1380	3340
Danzig	2750	1650	310
Königsberg	450	270	1290
St. Petersburg	170	1970	1950

Source: STT, *Varetransport*, Tables 1.

Apart from the Dutch, there were five major carriers of wine-cargo: Denmark, Sweden, Lübeck, Stettin and Danzig, while Königsberg and St. Petersburg still in the 1750s relied on foreign suppliers. Danzig's imports, however, were on the decline and fell heavily after the First Partition of Poland but, in contrast, Königsberg and St. Petersburg increased their imports under their own flags.¹²⁸

It seems remarkable that a number of smallish seaports could compete with the Dutch Republic and two Nordic monarchies. Of course, it must be remembered that practically all French wine was consumed by the urban upper classes, but even so there were vast discrepancies between the volume of imports and the numbers of potential consumers. Thus, in relation to the contemporary population of Copenhagen, the Danish annual import supply fluctuated around 25–30 litres per head and the levels were roughly the same in the case of Sweden (relating to Stockholm plus Karlskrona and Norrköping); on the other hand, the respective ratios in Lübeck and Stettin were much higher, at least 70–80 and up to 130–170 litres per capita.¹²⁹ Supposing that the Danish and Swedish ratios represented a normal 18th-century urban consumption, it seems clear that these two Hanseatic ports were importing enough wine to satisfy the demand of urban centres three or four times bigger. Even ships from Danzig in the 1750s brought wine well in excess of the demand at home.

In the case of Lübeck the import surplus perfectly matches the picture of its Russian trade, presented before. Wine, tobacco, sugar, coffee, spices and other southern products were shipped to the port on domestic as well as foreign ships (the former

128. However, practically all long-traders in the Russian capital were Dutch- or Lübeck-owned flag-of-convenience ships; see Kaukiainen 2021a, 504; Kaukiainen 2022, 380–381.

129. In Denmark, the capital (with a population of c. 80,000 in 1769) dominated both foreign trade and the entire urban system: no other Danish urban centre had a population that exceeded 10,000. In Sweden, Göteborg was not included in the calculation (c. 80,000) because it did not import wine via the Sound. Lübeck's population was around 20,000 and that of Stettin slightly lower. For these 1760s–1780s populations see e. g. Christensen and Mikkelsen 2006; Lilja 1994, 254–256; Kopitzsch 1988, 556; I. I. Elisejeva & E. I. Gribova (eds.) 2002; de Vries 1984, Appendix 1.

being usually in majority). Local merchant houses stored the goods and organized further shipments according to different receivers' demands. Thus, the city was acting as a middleman between southwest Europe and the Baltic world and developed into a first-rate regional 'entrepôt' distribution and transshipment centre. The example it emulated was, of course, Amsterdam.

The success of Lübeck's entrepôt trade was naturally based on St. Petersburg's rapid population growth: already in the early 1780s, it was approaching 180,000 (see footnote 129). That created, in fact, a demand for wine and other southern products which Lübeck alone could not satisfy. Obviously Stettin's merchants also had a share in this trade. However, the ship-lists of Kronstadt testify that Lübeck retained a clear and an even increasing edge in shipping to the Russian capital: in the early 1780s, it recorded 65 percent more visits to Kronstadt than its competitor.¹³⁰ Moreover, the data from Riga demonstrates that, at least in 1803, the value of imports from all the Prussian ports (which of course include Stettin) was quite trivial compared to those of Lübeck.¹³¹ It is, of course, possible that Stettin exported wine to other German or East Prussian ports, but a much more obvious destination must have been the capital of Prussia, Berlin. It lies just 130 kilometres southwest of the port and was linked to it by good waterways: the River Oder and the Finow canal.¹³² In the 18th century, Berlin was growing almost as fast as St. Petersburg: in the 1780s, its population was approaching 150,000. This made it the biggest market in Germany for wine as well as for other foreign consumer goods.

Even Rostock maintained regular connections to St. Petersburg through a limited number of ships. At least before 1756 (until that year, very brief descriptions of cargo can be found in Kronstadt ship-lists) most of them imported local products, apples and pears; very probably their ships were relatively small. The vessels that arrived from Kiel must have been even smaller – their cargoes typically consisted of oysters and lemons. However, even Rostock frequently sent ships beyond the Sound.

The southern and southeastern coasts of the Baltic were bordered by a chain of seaports with Hanseatic pedigrees. This implies that they were linked by German language and similar economic traditions of their upper social strata. While many of them engaged in more important trade with 'outsiders' than between each other, it seems self-evident that they also had lively mutual communications and – at least – smaller-scale trade. As much of such trade was undertaken with small vessels covering these short coastal distances, it has, typically, just left sporadic traces in contemporary sources. In any case, if some 1000–1100 Baltic voyages a year (apart from a hundred beyond the Sound) were frequently accounted for at the port of Stettin, there must have been lots of trips between various North German and East Prussian towns.

130. See Table 18. The ratio has been computed based on departures – arriving ships even included e.g. British vessels which arrived in ballast in order to load a cargo destined beyond the Sound.

131. See note 126, above.

132. Oddy 1807, 270–271.

12. Copenhagen and the Danish monarchy

Denmark and Sweden had a long history of bitter enmity which, in fact, culminated in the 17th century with the latter winning substantial areas from its southern neighbour. The outcome of the Great Northern War restored some balance between them by ending the Swedish position as a great power. This, of course, did not end the mutual economic competition but, notwithstanding that, Sweden and Denmark managed to collaborate by joining in August 1780 the League of Armed Neutrality, initiated by Catherine II.¹³³

Overall, the merchant navy of the Danish monarchy was almost twice as big as that of Sweden. On the other hand, it was more heterogeneous, consisting of four more or less detached fleets. Copenhagen was the dominant centre: its merchant tonnage was almost three times larger than those of all other seaports in Denmark proper, and its share of arrivals in Denmark, recorded in the Sound Toll, fluctuated between 75 and 85 percent.¹³⁴ The Duchies Schleswig and Holstein had three major seaports, Aabenraa, Flensburg and Altona, which actively participated in foreign long-distance trade, but there were also a number of minor ports which, exactly as the so-called provincial ports of Denmark proper, were mainly engaged in smaller-scale coastal and Baltic shipping. The fourth element, Norway, had substantial long-distance trade, as well as Baltic and coastal fleets; in total tonnages they represented about forty percent of the monarchy's overall merchant navy.¹³⁵

As Denmark did not produce any systematic shipping statistics like Sweden, the basic data for its development must be collected from several sources. The best overview that can be ascertained is that of the capital's shipping. Since it had a strong emphasis on Atlantic and colonial trade, its fluctuations and overall developments can be followed by exploiting the Sound Toll Records. However, there is an obvious limitation: anything happening east of the Sound falls beyond the scope of Elsinore. For two brief periods, as long as the *Kjøbenhavnske Danske Post-Tidender* (1749–1762) – a forerunner of the well-known *Berlingske Tidende* – and its next edition (1762–)¹³⁶ published ship-lists from the port of Copenhagen, data on Baltic arrivals and departures is available. Unfortunately, the printing of these lists was discontinued in the autumn of 1771. Thereafter the data on Danish Baltic shipping consists of bits and pieces.

As has already been pointed out, the capital's real maritime focus lay west of the Sound. The secondary role of Baltic shipping was mainly explained by the Danish agricultural production: in normal years, it was able to feed the entire country, and even its oversized capital only exceptionally had to replenish its grain stores from

133. In 1788, however, the countries were involved in a brief military conflict (so-called Theatre War), as well as twice more during the Napoleonic wars.

134. Kaukiainen 2025, 2.

135. According to a detailed survey by the Odense Sound Toll project (Johansen 1992, 489–492) the approximate sizes of the various fleets were as follows: Copenhagen: 362 ships, 27 600 Danish lasts (excluding laid-up tonnage); Danish provincial ports: 749 ships, 12,500 lasts; the Duchies: 878 ships, 29,500 lasts. Norway's merchant navy around same times consisted (according to Bugge et al. 1923, 528, 558–559) of over 800 ships of 46,000–47,000 lasts.

136. *Kjøbenhavnske Danske Post-Tidender* and *De til Forsendelse med Posten allene privilegerede Kjøbenhavnske Tidender*, both available online at *Det Kgl. Bibliotek*: <https://www2.statsbiblioteket.dk/mediestream/avis/>.

East-Baltic granaries. Nevertheless, Copenhagen was compelled to carry out some Baltic trade in order to fetch tradable goods for its French and Iberian trade. Therefore, it imported timber products from Sweden (as well as from Norway) in volumes that exceeded domestic demand. Moreover, grain was shipped to the capital from Danzig and other East Baltic ports for re-exportation – or ships bound for wine-and-salt ports were first sent east to take onboard a timber or grain cargo.¹³⁷ Knowing the trade-pattern does not, however, reveal the volume of shipping movements.

Traces of such shipping can, of course, be identified in the Sound Toll Registers. A search for Danish ships sailing from Baltic ports (other than Danish) to French, Iberian and Mediterranean destinations produced only a handful, around three or four vessels a year in the 1750s and 1760s, but multiplied in the 1780s to about twenty (see Table 22, below). On the other hand, the number of cargoes reloaded in the capital remained around six and eight. The departures from Copenhagen had regularly been preceded by arrivals from Baltic ports – and as the ships loaded in the capital were usually larger than typical Baltic vessels, a higher number of the latter were needed to fill the holds of the former.¹³⁸

Table 22. Danish shipping to French, Iberian and Mediterranean ports, 1751–1787.
Average number of voyages per annum

Types of voyages	1751–1755	1767–1771	1783–1787
Danish ships sailing from Baltic ports	3.4	4.2	19.8
Ships sailing from Copenhagen	8.0	6.2	8.4
Total	11.4	10.4	28.2

Source: STRO: all Danish ships sailing to French, Iberian and Mediterranean ports minus those departing from Denmark; ships sailing to the same destinations from Copenhagen.

Systematic data on Baltic shipping, provided through the Copenhagen ship-lists, only covers two separate series of data, one for the time just preceding the Seven Years' War and another for a period following its end (Table 23, below). Unfortunately, there are a number of gaps, especially in the 1750s. In that decade the gaps are so frequent that comprehensive annual series for arrivals can only be constructed for the years 1752 and 1753 and, even then, about ten percent of the half-weekly lists are missing. In the following decade, the situation is clearly better and a tolerably complete series of arrivals (with the rate of missing half-weekly data of below 5%) cover a period of five years, 1766–1770. On the other hand, the data for departures is so much worse that a reliable survey cannot be presented for any single year of the 1750s and, even for the 1760s, a sample of just two years (1766–1767) was possible.

137. Kaukiainen 2025, 18.

138. Reloading goods that came in Baltic vessels could be significant since transport economies could be improved by loading them on a bigger vessel before starting a long southward voyage. Moreover, stocks of fairly valuable Chinese, East and West Indian or Greenland products were steadily coming to Copenhagen, and as they usually required fairly little cargo space, it was highly reasonable to combine them with a bulk cargo.

Table 23. Copenhagen arrivals from and departures to Baltic ports, 1752–1770 according to the *Kiøbenhavnske Tidender*.

Average annual passages, excluding traffic across the Sound.

Origin/destination	Arrivals from		Departures to
	1752–1753	1765–1770	1765–1766
	Passages	Passages	Passages
Sweden and Finland	125	101	89
Russia, Courland*	31	36	53
East Prussia	10	10	29
Danzig	17	24	60
Stettin, Prussia**	3	60	71
Swedish Pomerania***	5	176	132
Rostock and Wismar	13	12	28
Lübeck	28	53	49
Kiel	4	8	4
‘The Baltic’	-	-	34
Sum total	236	480	549
Sum excl. Pomerania and Prussia	228	244	359

*Including Russian Finland **Including Prussian Pomerania ***Including Ribnitz.

Source: *Kiøbenhavnske Danske Post-Tidender* and *De til Forsendelse med Posten allene privilegerede Kiøbenhavnske Tidender*.

At first sight, the sum totals seem puzzling: those for arrivals suggest a growth of a hundred percent. Looking closer, it becomes obvious that the difference mainly depends on the figures for Prussia (with Prussian Pomerania) and Swedish Pomerania, regions which traditionally supplied Copenhagen with firewood in small open boats. In the 1750s, firewood-boats were not properly recorded in the lists,¹³⁹ but in the following decade these vessels (which became larger) were listed among others, thus producing a false impression of an increase. If they are discounted, most of the growth disappears.

On the other hand, this revision accentuates the difference between departures and arrivals in the 1760s: in the 1760s – again excluding Prussia and Pomerania – arrivals accounted for just two-thirds of departures. In fact, the imbalance only concerned Danzig and ports east and northeast of it. While over 150 ships, on average,¹⁴⁰ sailed there from Copenhagen, only 55, or a third, returned. The Sound Toll Registers indicate that such non-returners were mainly British and Norwegian vessels: the former had unloaded coal and continued in ballast to big East Baltic ports, while the latter had brought timber and sailed on further, also in ballast, in order to return home with grain (see Table 24, beside). The registers also demonstrate that this was quite a permanent pattern.

139. The boat-skippers were not identified at all but just tallied as *pommerinker and daßer*, that is: boats from Pomerania and Darß-peninsular. C. f. Kaukiainen 2025, 21.

140. The figure even includes 34 vessels which did not disclose their precise destination but reported that they were bound for ‘the Baltic’.

Table 24. Comparison of Sound Toll registered arrivals in and departures from Copenhagen, 1751–1790

Arrivals minus departures, annual averages

Period	Ships arriving from				Sum total	
	Norway	Great Britain	Netherlands*	France, Iberia, Italy	Number of ships	Percentage of arrivals
1751–1760	41	30	11	24	106	31
1761–1770	57	65	8	23	153	38
1771–1780	32	90	4	33	159	34
1781–1790	69	110	5	46	230	36

*Including the Austrian Netherlands

Source: STRO.

In summary, the ‘proper’ Baltic shipping of Copenhagen (excluding eastbound transit trips) can be divided in three main groups (with typical frequencies in the 1760s):

- A) Return voyages to the other side of the Baltic, c. 50–60 voyages a year
- B) Regular shipping trade with German ports west of Pomerania, c. 75–80 visits a year
- C) Visits of Swedish ships, c. 100–120 a year.

Ships in the first group were mainly domestic, those in the second Lübecan and Danish while the third consisted almost exclusively of Swedish tonnage.¹⁴¹ All told, these elements accounted for about 240 annual visits in Copenhagen. In the same decade, the capital received over 400 ships from the west which means that about a good third of port visits came from the Baltic. Since Baltic vessels must, on average, have been clearly smaller than those coming from the North Sea and the Atlantic, the Baltic share of tonnages seems to have been somewhere close to a quarter.

It seems that Copenhagen’s Baltic shipping did not experience any substantial growth during the following decades. According to the database of Danish ships in 1787, the capital had 47 ships (with a total lastage of almost 1900) deployed mainly in Baltic trades.¹⁴² In the late 1760s the corresponding number – supposing that ships sailing from Copenhagen to Danzig or farther afield did two return trips a year and those on short trades four or five – could have been around fifty, roughly the same number as twenty years later.

However, it seems possible that even non-Copenhagen vessels had participated in Baltic shipping. The surviving ship-lists from Kronstadt/St. Petersburg indicate that this actually did take place, albeit in very modest volumes. Thus, in 1752 they registered twelve departures to Denmark while the list for Copenhagen accounted for just ten arrivals; in 1765–1768, again, the departures from Kronstadt (71) exceeded arrivals in Copenhagen (55) by an average of four per annum.¹⁴³ On the other hand, the data collected by Anders Monrad Møller shows that very few ships from the Danish provincial ports sailed in 1769 to other Baltic destinations.¹⁴⁴ Probably the Schleswig

141. Kaukiainen 1925, 18, 24–24.

142. Johansen 1992, 489. Some of them also sailed elsewhere.

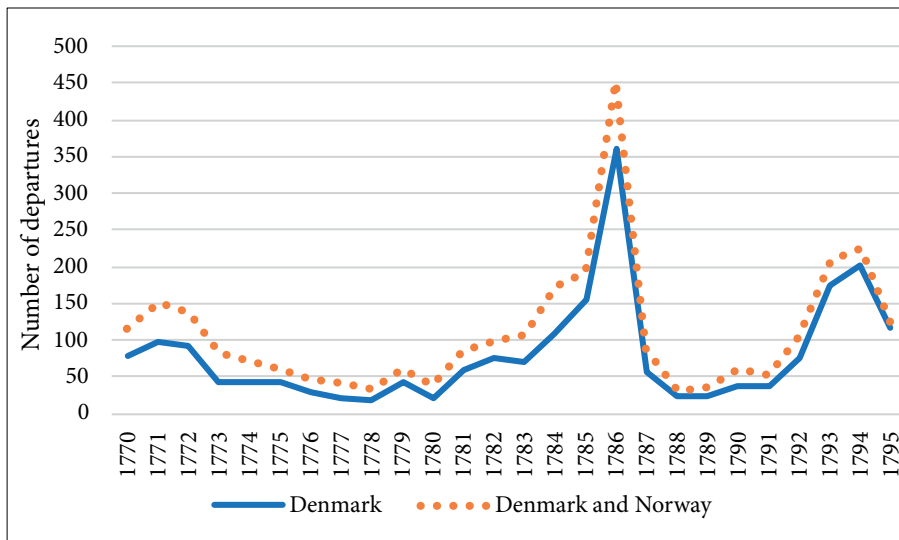
143. St. Petersburg data according to the ship-lists of *St. Petersburgische Zeitung*.

144. Monrad Møller 1981, Appendix 7.

ports Flensburg or Aabenraa were the home ports of the few non-Copenhagen ships that visited the Russian capital.

The ship-lists from Danzig reveal that that this big port was a more popular destination for Danish shipping than the eastern far end of the Baltic. Yet, the figures show wide variations from one year to another. In 1739, only 21 Danish ships visited the port, while in 1765 they amounted to 243. At the beginning of the 1770s the numbers dropped to fewer than a hundred and even halved after the First Partition of Poland. During the next 25 years, the fluctuations were even more dramatic, as Figure 3 demonstrates.¹⁴⁵

Figure 3. Departures from Danzig to Denmark and Norway, 1770–1795



Note: The incomplete data for 1774 has been replaced with the averages of 1773 and 1775.

Source: *Danziger Anzeigen* 1770–1795. Numbers for Denmark proper were calculated by subtracting ships from Danzig to Norway recorded by the STRO.

The extremely steep peak in 1786 is explained by the last real subsistence crisis in Denmark which led to massive imports of grain to Copenhagen – Danzig seems then to have been an important emergency store.¹⁴⁶ Another high jump in 1793–1794, in contrast, was triggered by systematic hoarding of grain by Copenhagen in order to help France, whose ports were blockaded by the British navy.¹⁴⁷ Excepting these abnormal years, the volume of Danish shipping seems very modest and no long-term trend can be detected.

145. According to Johansen 1992, 483 (Table 3) 445 Danish ships would have called at Danzig in 1787. As Figure 3 shows, this must actually refer to the previous year; in 1787, only 87 Danish (and Norwegian) ships visited Danzig.

146. Dribe, Olsson and Svensson 2015, 13, 16. Most of this grain went to the capital and Copenhagen ships also accounted for a high proportion of transports.

147. See Pourchasse 2018, 59–75.

In contrast, Danish shipping to Russian ports – and probably also to East Prussia and Courland – seems to have increased after 1772, something which is obviously a reflection of the decline of Danzig after the first partition. According to Russian statistics, no fewer than 177 Danish ships per annum arrived in the empire's Baltic ports in 1773–1777 and, in 1793–1795, the average had grown to 249. Moreover, when Courland was incorporated into Russia the numbers almost doubled;¹⁴⁸ obviously Danish ships had already before that been frequenting the ports of Libau and Windau. However, it is highly questionable how much can be inferred backwards from such data. Fortunately, there is other evidence of increasing Baltic shipping outside the capital. According to tonnage data for 1787, Flensburg, Aabenraa and Altona had some 140 vessels (c. 6200 Danish lasts) deployed in 'other' trades; excluding Altona, most of them were very probably sailing in the Baltic. The same data discloses that the provincial ports also deployed 5800 lasts of shipping (almost as much as the Duchies) in equally undefined other trades.¹⁴⁹

The bits and pieces presented above are not able to present a comprehensive and clear-cut picture of Danish Baltic shipping, as far as German, Prussian and Russian destinations are concerned. Fortunately, the most important sector, arrivals from Sweden, are better covered by the Swedish shipping statistics as well as the Copenhagen ship-lists. The only problem in this context is the coastal traffic across and along the Sound which seems to have been included in the Swedish figures of shipping to and from Denmark. In the 1780s, however, such small tonnage was obviously not included in the statistics (as seen in Table 16, above, the number of voyages almost halved and the average lastage grew from 12 to 25 lasts). Accordingly, the numbers now reflect longer-range Baltic trade much better than before.

13. Assembling the puzzle

The reviews of Swedish, Lübecan and Danish Baltic shipping, presented above, have identified a number of underlying elements in the region's 18th-century commodity and freight markets. They provide the necessary backdrop for the kaleidoscopic collection of traffic statistics from various ports (c.f. Table 15). The next logical step is to sketch a meaningful overall picture of these, so far inadequately known, trades.

Eighteenth-century Baltic shipping consisted mainly of return voyages, that is, most ships crossing the sea also sailed back home, or at least went back to the same side of the sea from whence they had departed; often they carried at least some cargo in both directions. This means that, in principle, the overall number of voyages can be calculated by summing up departures from (or alternatively arrivals to) all the ports in the area.

148. Storch 1803 29, 31.

149. Johansen 1992, 490–492.

Table 25. Aggregate Baltic departures from countries and ports in the Baltic Sea area. Departures per annum, various years within 1780–1787

Sweden:*	
departures to West Baltic	1108
departures to East Baltic	666
transits West to East	326**
Lübeck	613
St. Petersburg	170
Riga	320
Russian, other	300
Copenhagen	220***
Denmark, other	300***
Memel, Königsberg	590****
Danzig	351
Stettin	1080
Rostock	390
Sum total	6434

*Excluding departures from the west coast.

** Departures to the West Baltic minus arrivals from the West Baltic.

*** Minimum estimates based on the data presented in chapter 12.

**** Arrivals in Sweden from Königsberg and Memel (1783–1787).

Source: Tables 14, 15, 16, 19, 20 and 22.

Table 25 presents the calculation for the early 1780s. For Copenhagen and Denmark, which lack precise data, a fairly conservative estimate (based partly on 1787 tonnage data) has been presented. Another type of surrogate data has been used for Königsberg and Memel by applying the number of respective arrivals recorded in the Swedish shipping statistics (which are, of course, identical with departures to Sweden from these ports).¹⁵⁰ As the actual departures from Königsberg and Memel certainly included a lot of non-Swedish ships, and departures to other destinations, this is also an absolute minimum value. Moreover, there are still a number of ports or regions for which no acceptable data has been identified. This list includes the whole Swedish Pomerania and Wismar, Kolberg, Rügenwalde, Stolp, Libau and Windau. An educated guess is that most of them supported shipping of a similarly modest scale as, for example, Rostock.¹⁵¹ This means that the actual overall number of Baltic voyages very probably reached well over 7000.

Compared with the contemporary numbers of c. 4350 westward and 1650 (loaded) eastward passages through the Sound, ‘well over 7000’ seems a fairly impressive figure. Yet, it must be remembered that voyages across the Baltic were shorter than those that

150. The figure is from the Swedish shipping statistics: in them, Königsberg and Memel were added together (c.f. Table 16).

151. These ports, altogether, sent on average some 280 ships a year beyond the Sound in 1783–1787. For Libau and Windau the proportions of trans-Baltic departures may have been only c. 40% (as in 1796–1797 according to the STRO and von Storch, 31); for the others it probably was about the same as in Rostock (24%); such ratios suggest that the respective total of Baltic departures would have been around 900.

went to the North Sea and Atlantic ports and, accordingly, normal Baltic vessels were smaller than those that sailed beyond the Sound. Moreover, this data also includes voyages sailed in ballast. In this respect, however, the overall picture is fairly clear-cut. Exactly like the westward 'mainstream', Baltic departures from Danzig and the big East Prussian and Russian ports included extremely few ballasted vessels and the same was also true for Swedish ships destined for Pomeranian, Holstein and Danish ports. On the other hand, voyages in ballast were quite common when sailing from the West Baltic coasts to the eastern grain and timber ports.

Most 18th-century statistics from Baltic ports did not distinguish between loaded and ballasted voyages. The few exceptions include the Swedish tables of arrivals and the statistics of Russian ports (1802–1804) and Stettin (1798–1803) published by Oddy.¹⁵² At grassroot level such data can also be found in *Danziger Anzeigen* for the whole relevant period.¹⁵³ A sample of its ship-lists for 1782–1785¹⁵⁴ showed that, overall, about half of all arriving ships were in ballast. Such ratios, however, differed widely according to the country of departure; thus, no fewer than 75% of ships coming from Denmark and 69% of those from Pomerania had no cargo onboard. For Swedish arrivals (excluding west-coast herring boats) the ratio was 38%, while only about 8% of ships coming from Lübeck or St. Petersburg were without cargo. As these five groups accounted 98% of the total Baltic arrivals in Danzig, the numbers are very representative – at least in relation to Danzig. However, roughly similar patterns can also be found in the earlier and later Russian data.¹⁵⁵

Table 26. Estimate of ballasted voyages in Baltic shipping, early 1780s.
Voyages per annum.

Trade	Ships/voyages	Ballast, %	Ball. voyages
Sweden, eastbound	666	40	250
Sweden, transits	326	100	330
Lübeck	613	8	50
Copenhagen	220	75	165
Other Denmark	300	75	225
Stettin	1080	35	380
Rostock	390	35	140
Total	3595	(34)	1540

Note: It was presumed that in Stettin the ratios of ballasted departures were roughly similar as in 1798–1803 (Oddy, *European Commerce*, 275). The same ratio was also used for Rostock.

Sources: See preceding text and footnotes 150–155.

152. Svenska riksarkivet, Kommerskollegiet, Kammarkontoret: Handel och sjöfart, ser. 9; Oddy 1807, 109, 133.

153. *Gemeinnützige Danziger Anzeigen*, 1739–1795; *Königlich Preussische Danziger Nachrichten und Anzeigen*, 1795–. Even *St. Petersburgische Zeitung* published data on cargoes and ballasts before the 1760s.

154. Because of the Danish famine, 1786 was an exceptional boom year for Danzig exports and could not be included in the sample.

155. In 1802, for example, of all Baltic arrivals in Russian ports 52% were in ballast; two years later of all arrivals from the Baltic area in St. Petersburg, 75% were 'fully loaded' and, in addition, 12% had part cargo onboard (Oddy 1807, 109, 133).

The estimates presented in Table 24 suggest that almost half of voyages to Danzig and farther east sailed in ballast. Similar pattern may have even applied for Stettin and Rostock but as no data on destinations is available for them, their figures (which refer to both east- and westward voyages and may even include coastal shipping) were attached with a surrogate ratio of roughly equal effect.¹⁵⁶ This case is certainly a useful reminder of the margins of error which are inevitable in estimates like this. Yet, given that we are interested in actual commodity flows, it is necessary to discount voyages with no paying cargo. In this case it means that the earlier gross figure of 'well over 7000' will be reduced to 5700–5900 loaded voyages.

Reliable data on cargo volumes, or tonnages, is also in short supply. Swedish shipping statistics which group the aggregate lastages by different destinations are, in fact, the only contemporary, primary source in its kind. Thus, it is possible to find out that, in the early 1780s, the average size of Swedish Baltic traders (again excluding the west-coast herring vessels) was about 40 Swedish lasts or 80 British tons, and that their aggregate lastages to West Baltic destinations were almost 35,000 (c. 70,000 tons) and (excluding ballasted vessels) some 15,500 lasts (c. 31,000 tons) to East Baltic ports.

For all other national fleets (accumulating about 4200–4300 loaded voyages) the lastages can only be estimated by first finding out the average sizes. The data collected by the Odense Sound Toll project indicates that Danish or German Baltic traders were somewhat bigger than the Swedish and the overall Baltic averages seem to have been around 100–120 British tons. Fairly similar averages can still be computed from the later (1802–1804) Russian port statistics.¹⁵⁷ Using the Swedish figures, as above, and applying a general average of 100–120 tons for all other voyages (except a lower range, 80–100 tons, for Rostock and the 800–900 guesstimated voyages),¹⁵⁸ returns an aggregate volume of intra-Baltic cargoes of about 500,000–520,000 British tons. Even here westward passages represented the high-demand side with about two-thirds of the total. Compared with estimated contemporary traffic through the Sound – some 730,000 tons westward and 170,000 tons east – the Baltic volumes were clearly smaller, 55–58 percent of these. However, the Baltic commodity flows were more balanced: the low-demand west–east side seems to have been of almost the same volume as the eastward 'counter-current' in the Sound.

The longer-term development of Baltic shipping is set out in Table 27. It is based on smaller number of ports which, unfortunately, means that the estimate will not be fully representative. In most cases, however, the development seems fairly steady and logical; the only port with quite dramatic fluctuations was Danzig and – since it only represents some five percent of intra-Baltic shipping – it does not affect the overall picture too much. Thus, it seems fairly safe to conclude that the overall number of Baltic voyages grew in three decades by almost 60 percent (or 1.5% per annum).

156. Supposing that half of their voyages were from east with cargo, this actually implies a similar eastbound ballast ratio as that for Swedish ships.

157. Johansen 1983, 92–95. Statistics for all Russian Baltic ports in 1802 (Oddy 1807, 109) presented the lastages of almost 4000 vessels in Swedish (?) lasts. According to them the average lastage of 1285 Baltic vessels was 59.7 lasts and that of 1013 ships from western seas 100.0 lasts.

158. In 1802–1804 Rostock's average tonnages were less than 40 lasts/80 tons (Oddy 1807, 109, 133).

Table 27. Departures from selected Baltic ports or regions, c. 1750–1787.
Averages per annum

Port or region	c. 1751–1755	c. 1765–1770	c. 1780–1787
Sweden*	940	1260	1560
St. Petersburg	115	140	170
Riga	130	370	320
Danzig	220	520	350
Lübeck	370	510	590
Copenhagen	230	240	220
Sum total	2005	3040	3210
Total excl. Danzig	1785	2520	2860

* Excluding shipping to and from Denmark

Source: Table 15, above.

One-and-half percent a year is somewhat slower than the corresponding rate of westbound passages through the Sound (c.f. Table 3). As ships may even have become larger in the Baltic area – at least in Sweden the average (including herring vessels) rose from 30 to 36 lasts, or by about 20 percent (c.f. Table 16)¹⁵⁹ – actual tonnages may have almost doubled, in fact grown much like westward cargo volumes through the Sound.

To sum up, it may be concluded that the Baltic was no post-Hanseatic backwater – instead it was able to support vibrant regional shipping markets which were also, at least to some degree, integrated with the freight markets beyond the Sound.

159. On the other hand, the growth seems to have declined after the 1780s – see footnote 152 before.

Coastal Trade

14. Lines drawn in water

The hardcore of intra-Baltic shipping, described in the preceding section, usually consisted of relatively long voyages between major ports and different countries, with typical medium-sized ships. In addition to them, the Baltic Sea abounded with numerous smaller vessels, mainly plying shorter, often strictly coastal routes, and typically carrying low-value primary products. The modest status of such coastal shipping was not only because of the small scale of the business, it was further lowered by the traditional social order. Since the Middle Ages, commerce had been regarded as a privileged occupation, which was only permitted in towns that possessed official charters. In a number of countries, however, coastal peasants and fishermen were allowed to sail with their produce to nearby towns.

We have already observed that coastal and slightly longer trades were often intertwined with the same vessels that were involved in both; for example, oysters were exported in small boats from Kiel both to nearby Lübeck and as far afield as St. Petersburg. Moreover, the source situation varies from one country to another so much that systematic, Baltic-scale surveying of small-scale coastal shipping is almost impossible. Nor is it meaningful to draw strict lines between different categories of shipping – they would be like lines drawn in water.

In spite of its modest scope and scale, coastal shipping is relevant in the context of Baltic shipping. In particular, this concerns one special category: the supplying of the biggest cities. In smaller towns, burghers and other townspeople were normally able to produce their own food and many other necessities, but the bigger the urban centres grew, the more they became dependent on grain, meat, fish and building materials as well as fuel from the surrounding rural areas. In the case of great metropolises such deliveries created massive commodity flows and far-reaching chains of vital logistics. For coastal cities, the sea was the natural transport route which, before the era of railways, linked the venues of production to those of consumption more efficiently than overland roads. Thus, it is no wonder that most governments had to allow such humble trade, often termed ‘peasant shipping’.

In terms of population, the metropolises of the Baltic world, Copenhagen, Stockholm and St. Petersburg, could not compete with the largest European cities

(London, Paris or Naples) but, by around 1800, the rapidly growing St. Petersburg matched number five, Amsterdam.¹⁶⁰ At that time, the Russian capital's population (220,000) already exceeded the combined populations of the Nordic capitals (Copenhagen 101,000, Stockholm 76,000) but the latter were still totally sovereign centres in their respective countries. All three enjoyed good maritime connections with the wider world but in other respects they were quite different. First, it is obvious that they commanded different hinterlands and, accordingly, different rural resources. They also differed in terms of their historical footprints: while Copenhagen and Stockholm had already been consuming supplies from their hinterlands for centuries, St. Petersburg was a newcomer, founded in a province with only marginal urban development and, accordingly, fairly unexploited (albeit poor) rural resources. Thus, it is not surprising that the three metropolises represented quite diverse spheres of influence and logistics for supply. Moreover, their coastal trades had practically no connections with each other. Therefore, they will be described in three separate chapters.

As far as the 18th century is concerned, the data on coastal shipping is even scantier than those for Baltic trade. Coastal vessels can be found in some port-lists, e.g. those of Copenhagen and Lübeck, but existing statistics, published or manuscript, do not usually include them, particularly if they only sailed on domestic waters. However, even if the numbers or tonnages of small vessels remain vague, some reasonable quantitative data can be found for the commodities they were carrying, especially of grain and firewood. In terms of volumes, they constituted (along with construction materials) the biggest supply flows to these metropolitan destinations. They were also extremely vital commodities: grains were the staple food for the majority of the urban population and, at least in the Baltic world, survival in the winter would have been impossible without any heating. Thus, it is no wonder that there is a reasonable data on these commodities.

15. Copenhagen

The Danish capital was the oldest of the three northern metropolises and, until the 1740s (when St. Petersburg surpassed it), it even had the biggest urban population in the Baltic area. Its population also grew faster than that of its closest rival, Stockholm. Moreover, in terms of data it is number one among the Baltic capitals: it has the best 18th-century primary sources and contemporary statistics of its consumption of grain and firewood.

In the 18th century, an excise duty was levied on all consumer goods in Denmark, and the respective ledgers have been preserved. As practically no grain was grown in Copenhagen, the returns recorded in the tax ledgers for the capital actually document imports. Poul Thestrup exploited these sources in his detailed study on the standard of living in Copenhagen.¹⁶¹ His vast data on different grains is presented below (Table 28) as a condensed summary prepared by Hans Chr. Johansen.

160. In addition to sources in Table 3, see. e.g. de Vries 1984, Appendix 1; Mitchell 1980.

161. Thestrup 1971.

Table 28. Consumption of grain in Copenhagen, 1730–1799

Period	Annual average 1000 barrels
1730/1739	156
1740/1749	164
1750/1759	186
1760/1769	204
1770/1779	204
1780/1789	253
1790/1799	257

Source: Hans Chr. Johansen's review of Anders Monrad Møller's dissertation *Fra galeoth til galease*, 153.

The relevance and reliability of these Thestrup/Johansen series can be checked for one specific decade. *Kiøbenhavnske Tidender*¹⁶² published complete statistics of imported and exported goods at the port of Copenhagen in the years 1764–1768. During that period, on average c. 219,000 barrels of wheat, rye and barley was imported and c. 12,000 barrels exported, the difference thus indicating a net import of c. 207,000 barrels a year. This net value agrees well with the corresponding figure in Table 28. Of course, this does not predict that such a correspondence might be found for earlier or later decades but it certainly suggests that the data for 1730–1799 can be taken seriously. Indeed, it is worth pointing out that these figures show that Copenhagen's grain consumption grew on a par with its population: in both the 1760s and at the end of the century, the average amounted to about 2.6 barrels per head. Compared with some comparable ratios from elsewhere, this value may seem quite moderate, in particular as these consumption figures also include grain used for distilling and brewing.¹⁶³ As the figures are based on returns, potentially subject to tax evasion, they should be understood as minimum values.

Copenhagen ship-lists of the 1750s even contained ship-specific information about commodities and their origins.¹⁶⁴ They show that practically all the grain came from Denmark proper or the Duchies of Schleswig and Holstein (which were ruled as fiefs of the Danish crown). While this data, strictly speaking, only concerns one single decade, no contrary evidence can be found for the rest of the century (it must also be remembered that there was a customs barrier which helped maintain the primacy of domestic crops). The absence of foreign grain also strongly suggests that Denmark and its duchies were able to produce enough of an agricultural surplus to feed the capital. Indeed, it seems that the productivity of Danish agriculture in the

162. The statistics were printed between 11 and 27 January in the following years; *De til Forsendelse med Posten allene privilegerede Kiøbenhavnske Tidender*, Det Kgl. Bibliotek: <https://www2.statsbiblioteket.dk/mediestream/avis/>.

163. According to Heckscher 1949, 160, average grain consumption for Sweden's primary agricultural regions (*slättbygd*) was, both in 1750 and 1810, 3.2 barrels per head while the corresponding figure for more peripheral regions (*skogbygd*) was 2.4 barrels.

164. This refers to the earliest version, *Københavnske Danske Post-Tidender*, (1749–1762). Ship-lists were only published during the first half of the 1750s.

late eighteenth century improved roughly at the same tempo as the increase in the consumption demands of its capital.¹⁶⁵

On the other hand, grain exports from Copenhagen remained so small (only six percent of gross imports in the 1760s) that the capital obviously absorbed almost all of the country's surplus. This conclusion is also confirmed by the fact that, according to the Sound Toll Registers, only three percent of grain cargoes heading to Norway in the latter half of the eighteenth century came from Danish ports – thus, as we have seen before, Norway had to import the rest from the big East Baltic grain outlets, Danzig, Königsberg and Riga.¹⁶⁶ The fairly tight margins of the Danish self-sufficiency were also illustrated by the fact, that when Copenhagen trading houses did send grain to southern Europe, it normally originated from the East Baltic area (see chapter 12).

Naturally, Copenhagen also received large amounts of meat, butter, vegetables and other foodstuffs. In the port's shipping lists from the 1750s, most of them were simply titled as *feede vahre* (victuals), which does not give us any further information about the type of food or its origins. In any case, it is obvious that a fairly large proportion of them, fresh products in particular, came from regions much closer to the capital than the grain, and even overland.¹⁶⁷

In a less densely wooded country like Denmark firewood was in short supply in many regions; in particular the forest resources around the capital had already been depleted over the course of five centuries. Thus, it is no wonder that, by the eighteenth century, the availability of firewood was a major issue, and the interest in the topic is shown by a number of contemporary statistics. Table 29, below, displays this data, collected by Hans Chr. Johansen from various late nineteenth-century sources.

Table 29. Imports of firewood to Copenhagen, 1760–1795
Annual averages, cords (*favn*)

Period	Seaborne import			Over-land	Grand total
	Foreign*	Danish	Total		
1760/1764	17,459	23,011	40,470	4886	45,356
1765/1769	21,012	21,561	42,561	3222	45,795
1783/1787	30,856	29,432	60,288	1451	61,739
1788/1792	22,733	38,372	60,603	1136	63,341
1793/1795	27,187	25,354	52,541	1361	53,902

*Incl. Schleswig and Holstein

Source: Hans Chr. Johansen's review of Anders Monrad Møller's dissertation *Fra galeoth til galease*, 151.

In this case, some supporting information can be found in the port statistics of the *Københavnske Tidender*. According to these statistics, the five-year average in 1764/1768 was a fraction over 48,000 cords, which is a tenth higher than the respective figure in Table 29. Compared with the population of Copenhagen the lower value represents an average annual consumption of only 0.5 cords per head while 48,000 cords yield a more credible ratio of 0.6. Accordingly, it seems possible that the data

165. Christensen and Mikkelsen 2006, 498.

166. STRO, various years.

167. C. f. Mikkelsen 2020, 28.

for the two first periods is flawed. Conversely, the substantial rise until the early 1780s may be the result of an improvement in the data.

Interestingly, the statistics make a distinction between domestic and foreign firewood – albeit that they treat the Duchies as ‘foreign’. According to these figures, the share of firewood coming from Denmark proper (seaborne and overland) accounted, in the long run, for slightly over half of the total. Again, a bit more information can be found in the Copenhagen shipping lists from the 1750s. First, they indicate that firewood was brought to the capital from practically all the Danish islands and the coasts of eastern Jutland. On the other hand, fairly few ports in Slesvig and Holstein participated in this trade, but numerous firewood carrying vessels also came from the city’s former hinterland, Scania. Moreover (as was seen in the chapter on Baltic shipping), the lists recorded a high number ‘pommerinker’ and ‘dasser’, peasants from (Swedish) Pomerania. Obviously, they came in small undecked vessels which could only carry about ten cords of firewood, but as their annual arrivals amounted to almost a thousand, they represent a substantial share of foreign imports. Bigger firewood vessels also came from Pomeranian towns, from as far off as the coasts of Stettiner Haff. After the Seven Years War, Pomeranian firewood trade seems to have expanded, moving to local urban ports and bigger vessels.¹⁶⁸

Equally, imports from Sweden continued and even seem to have increased – the distinct drop in the import of foreign firewood in the late 1780s was, most probably, the consequence of the war with Sweden – and the Sound Toll Registers show that Copenhagen attracted such imports from the Swedish west coast, from as far north as Marstrand.¹⁶⁹ On the other hand, the domestic imports declined in the 1790s: this probably reflects the increasing use of British coal in the capital. In contrast, the volume of foreign firewood remained fairly high and Copenhagen continued to import its heating fuels from an area which was much wider than that for grain.

One further commodity is worth mentioning because it adds an interesting element to the overall picture. Bricks were the basic material for the construction industry and they were demanded in vast quantities in Copenhagen. In the 1760s, from six to ten million ordinary bricks¹⁷⁰ and over 0.4 million roofing tiles were imported annually to the capital. They mainly came from two regions, first and foremost from Schleswig (above all Flensburg) and, in smaller volumes, from South Scania (Helsingborg and Landskrona); a few cargoes even came from Amsterdam.¹⁷¹ While less vital than rye or firewood, bricks were a real bulk-commodity, requiring more transport capacity than all grain. Moreover, brick burning consumed lots of firewood (in some cases even coal) and this local demand obviously limited Schleswig’s firewood exports.

Already in the early 1750s, Copenhagen received some 1800 coastal vessels as well as 900–1000 ‘pommerinker and dassers’ and, in the late 1760s, their combined numbers

168. Wolfgang Rudolph 1961, 330–331. In spite of being foreign territory, the coast of Pomerania and even Stettiner Haff were closer to Copenhagen than Holstein’s or Schleswig’s coast; from Rügen to Copenhagen the distance was just 70 nautical miles – a day’s trip in favourable winds.

169. STRO, 1780–1806.

170. Supposing a weight of two kilos per brick, this would imply 6000–10,000 tons (plus some 400 tons of tiles).

171. Copenhagen port statistics, *De til Forsendelse med Posten allene privilegerede Kiøbenhavnske Tidender*, *Det Kgl. Bibliotek*: <https://www2.statsbiblioteket.dk/mediestream/avis/>

exceeded 3000.¹⁷² According to data presented by Anders Monrad Møller, the cargoes brought to the capital by vessels from Danish provincial ports increased from 21,000 Danish lasts in 1769 to 32,000 in 1798; as they made about 2500 voyages in the latter year, their average size would have been no more than thirteen lasts.¹⁷³ However, no Pomeranians or Swedes are included in this figure; if they were added, the number of voyages at the turn of the century would have amounted to some 3000, and the total cargoes would probably have corresponded to about 50,000 Danish lasts a year, of which firewood alone would have been over 30,000.¹⁷⁴

Similar quantities, if carried overland, would have filled forty thousand wagonloads (wagons with a team of six horses and a maximum load of two tons). Indeed, we may conclude that Denmark, with its profusion of sheltered sea routes and loading ports close to fields, forests and other places of production, enjoyed a very favourable transport geography – at least as far as preindustrial times were concerned.

16. Stockholm

The Swedish capital was about hundred years younger than Copenhagen and clearly remained smaller. It was founded at the junction of the Lake Mälaren water system and saltwater-routes leading to the Baltic Sea, thus commanding water-born connections to the interior as well towards the sea. However, the absolute primacy of Stockholm weakened during the late eighteenth century. Competition with other big seaports like Gothenburg intensified and a number of Bothnian seaports even gained foreign-trading rights. Accordingly, its economic growth was impeded, something which is also reflected in its population growth.

At least in one respect eighteenth-century Stockholm was an antithesis of Copenhagen. Instead of living on domestic produce it was heavily dependent on foreign grain and, in fact, consumed 50–70 percent of all grain imports to Sweden (Table 30). As we have already noted, they mainly originated from the Baltic's southern and eastern seaboard, Swedish Pomerania, Danzig, East Prussia, Riga and Tallinn,¹⁷⁵ thus employing Baltic shipping instead of coastal vessels. It seems obvious that Stockholm must have also received a proportion of the agricultural surplus from Central Swedish manors and farms, but no reliable data on the volumes is to be found.¹⁷⁶ Grain from the interior may have come to the capital via the inland waterways – equally as imported foreign grain was transported to the *Bergslagen* area – but in neither case did transports give rise to coastal shipping in any conventional sense.

172. Kaukiainen 2025, 22.

173. Monrad Møller 1981, Appendix 5.7 and 6.7.

174. According to an old thumb-rule, two cords of firewood could be loaded per one Danish last (Johansen 1982, 151); this ratio means that a substantial proportion of cargo had to be carried on deck. Other stowage factors according to Appendix 1.

175. *Historisk statistik för Sverige, Del 3*, Tables 1.9 and 2.3.

176. Since 1622, the commodities brought to Stockholm were recorded at domestic customs stations (*lilla tullen*); unfortunately, no accounts have been preserved from the eighteenth century.

Table 30. Grain (wheat, rye, barley and malt) imports to Sweden and Stockholm, 1751–1800
Annual averages, thousand barrels

Period	Sweden volume	Stockholm	
		volume	%
1751–1760	312.9	208.5	67
1761–1770	439.2	232.2	83
1771–1780	345.6	202.4	59
1781–1790	717.4	380.0	53
1791–1800	330.9	168.8	51

Historisk statistik för Sverige, Del 3: Utrikeshandel 1732–1970), Tables 1.1 and 1.8.

Compared to Denmark, central Sweden was a well-wooded region, quite able to supply the capital with firewood. Surprisingly, the lack of forest resources was a frequently recurring topic in Swedish public discussion in the eighteenth century. Yet such pessimistic views seem primarily to have concerned the areas of *Bergslagen* which consumed huge quantities of timber for both mining and iron production (as charcoal).¹⁷⁷ Such local shortages in the interior probably only had marginal repercussions on Stockholm imports of firewood. Carrying bulky (albeit relatively light) commodities over long distances from the interior beyond Lake Mälaren must have been both arduous and uncommon.¹⁷⁸

Firewood imports have not been recorded in Swedish eighteenth-century foreign-trade statistics which indicates that (as could be expected) the biggest cities received all of their fuel (apart from some British coal in Stockholm) from domestic sources. Although no real quantitative data has been preserved, various scattered sources suggest that firewood was brought to Stockholm at least from the nearby coastal districts south and north of the capital (Södertörn and Roslagen), as well as from the Åland Islands and southwest Finland.¹⁷⁹ Stockholm's port accounts show that Finnish coastal ships visited the capital in substantial numbers, for example in 1765, they recorded 245 arrivals from Åland and over 500 from southwest Finland.¹⁸⁰

However, no credible estimates of Stockholm's consumption of firewood are available before 1816; a governmental commission estimated then that the capital was annually importing over 86,000 cords of firewood (plus 15,000 lasts of charcoal).¹⁸¹ Divided by the respective population, this figure suggests a specific consumption of no less than 1.1 cord per head which is much higher than that of Copenhagen. Part of the difference can obviously be explained by colder climate but differences in heating technology may also have contributed. According to eighteenth-century reports, dampers in chimneys were unusual in Sweden and the more energy-efficient 'Dutch'

177. See e.g. Heckscher 1949, 297, 308–309.

178. A narrow canal was constructed between Mälaren and Hjälmaren in the 1630s but it seems that it was mainly used for the transporting of iron. Canals to *Bergslagen* were only dug in the 1795 (*Strömsholms kanal*) and the 1850s (*Bergslags kanal*).

179. Radloff 1795, 198; Kardell 2003, 237–238.

180. Wuorinen 1959, 84, 394.

181. Kardell 2003, 237.

ovens were rare. Nonetheless as late as in the 1850s, the average consumption was estimated to one cord per head.¹⁸²

Additional information for firewood imports can only be found after 1809 when Finland was incorporated into Russia and the earlier domestic trade with it became foreign trade. In the years 1813–1816 about 45,000–46,000 cords of firewood per annum were exported from Finland to Sweden, a figure which represented 53 percent of the estimated contemporary consumption in the capital – and exceeded Copenhagen's total imports in the 1760s. Unsurprisingly, the closest regions to Stockholm, the Åland islands and the southwest-Finnish archipelago, accounted for four-fifths of these.¹⁸³

Very probably this decade represented the apex of Finnish firewood exports to Stockholm, but this expansion came to an end in the 1820s. The trade between Finland and Sweden, which at first had been customs-free, became dutiable in 1828 and as the customs rates were subsequently increased, the profitability of the trade suffered. In the early 1850s, only 8000–9000 cords of firewood were exported from Finland to Sweden. This, of course, means that Stockholm was bound to become increasingly reliant on domestic forest resources. The growing imports of British coal obviously alleviated the transition.

Coastal vessels also brought lots of fish, meat, butter and other food to Stockholm, both from Swedish and Finnish coasts. Credible data on volumes can only be found for goods from the latter direction; for example, the Finnish annual deliveries of Baltic herring amounted to over 40,000 barrels and those of salt meat and butter over 800 tons each, and the vessels even carried a few thousand heads of cattle on the hoof. While these figures concerned the 1810s, they are very probably representative of a couple of earlier decades as well. Yet, in terms of cargo volumes, firewood dominated the Finnish imports; while they accounted for about 20,000 lasts a year, fish, meat and butter only were equal to one sixteenth of that figure.¹⁸⁴

According to the available data, Stockholm consumed (in actual volumes) about a third more firewood than Copenhagen. In spite of that, the maximum transport distances were fairly equal, 200–250 kilometres. In any case, supplying Stockholm with firewood required, at least around the end of the 18th century, over 40,000 lasts of shipping – clearly more than in the case of Copenhagen. On the other hand, no coastal vessels were needed to bring grain to the Swedish capital and this explains why the 'provincial' tonnage was somewhat bigger in Denmark.

17. St. Petersburg

Peter the Great's new capital started its life as an urban colony in the middle of a partly deserted rural area – seven kilometres downstream from the ruins of the former Swedish seaport *Nyenskans*. For a short initial phase, the new population was able to exploit certain natural resources like firewood or timber from the woods around

182. Heckscher 1949, 323; Kardell 2003, 236.

183. Kaukiainen 1970, 171–172, Table V:3. This figure even includes firewood which Åland ships carried from the eastern seaboard of the Bothnian Sea.

184. Kaukiainen 1970, 164, Appendix table V:3.

the Neva delta but in terms of food they depended on imports organized by the government right from the beginning. The surrounding province, Ingria, sustained a rural economy which in normal years was just able to feed its population of some 100,000 but had no potential to support thousands, soon tens of thousands of urban dwellers who neither sowed nor reaped. Quite the same also applied to the more distant provinces of Pskov, Novgorod and Tver, and even in the Muscovite heartlands the agricultural focus was on animal husbandry and the growing of a few commercial crops like hemp and flax.

Instead of relying on foreign imports, St. Petersburg was fed with domestic grain. As substantial surpluses of grain were only available in the so-called black-earth regions around the Middle Volga and its tributaries, 1900–2800 kilometres (along riverine routes) from St. Petersburg, a new interior waterway was constructed for the purpose.¹⁸⁵ This was based on an age-old water route between the rivers Neva and Volga, which had only one, a two-kilometre overland portage at the watershed on the Valdai hills. This waterway was improved by digging a canal at Vyshny Volochyok, thus negating the need for a portage. It was, however, a fairly difficult waterway: shallow and marred by rapids, and had to be improved almost continuously when the traffic increased. Big Volga barges could only advance as far as Rybinsk (still 1400 kilometres short of St. Petersburg) where their cargoes were reloaded into much smaller flat-bottomed vessels which had to be drawn with teams of horses upstream. With an overall transit time between six to twelve months, this was a strenuous route over which the price of grain normally trebled before it reached the final consumers.¹⁸⁶

Surprisingly, this long and fairly primitive waterway was able to feed the rapidly growing metropolis. According to contemporary statistics, no fewer than about 80,000–90,000 metric tons of flour and unground grain was transported to the capital in the 1760s and, until the turn of the century, the volume grew to over 200,000 tons.¹⁸⁷ Compared with the population of the capital, these were abundant amounts. In eighteenth-century Russia, 2.25 *chetverts* or 276 kilos of flour was generally regarded as the minimum rate of annual consumption per head (men, women and children).¹⁸⁸ It equates to about 2.8 barrels of unground rye, a figure which was slightly higher than the recorded consumption of grain in Copenhagen. However, if we divide the actual grain imports by the population of St. Petersburg, the resulting averages per head exceed the minimum rates by clear margins. Rye flour alone accounted for in the 1770s and 1780s equivalent of 2.8 to 3.2 barrels of grain; adding other flour, the averages rise to 3.8 and 4.0 barrels and unground grains boost them further to 4.4 and 6.9. Thus, it seems that the capital received from sixty to over hundred percent more grain than was needed for the minimum subsistence of the population. Actually, the grain transported to St. Petersburg did not just cater for the needs of the population of the metropolis: it was also needed to feed the region's garrisons and soldiers billeted in

185. The canal was first opened in 1709 but it suffered from a lack of water before it was rebuilt in the 1720s. Jones 2013, 2013, 60–79, 151–152. Later on, the Ladoga Canal (opened in the early 1730s) linked the mouth of River Volkhov with Neva, bypassing the shallow coastal waters of southern Lake Ladoga.

186. Jones 2013, 149–150, 160–179.

187. Hermann 1790, Appendix tables VII and VIII; Jones 2013, Tables 5 and 19.

188. Jones 2013, 24–25.

peasant villages. Even the rural population seem to have supplemented their produce with black-earth rye; according to government sources from the beginning of the 19th century, a third of all grain arriving in the capital was distributed to the provinces of St. Petersburg and Wiborg (southeast Finland).¹⁸⁹ On the other hand, exports of grain were a marginal factor: before the 1780s, practically no rye exports were allowed from St. Petersburg and, even later, they remained small.¹⁹⁰

Paradoxically, the biggest flows of vital commodities in northern Europe did not foster coastal (nor riverine) shipping in the conventional sense. The barges which carried grain and other goods from Rybinsk to St. Petersburg were one-way, disposable craft. The rivers from the Valdai area down to Lake Ilmen were too swift to be navigated upstream; accordingly, after the barges reached their destination, they were cut up for firewood. On the other hand, these transports permanently occupied a big workforce (in the 1780s, probably over 10,000 men and an unknown number of horses), and the bigger Volga barges carrying goods to Rybinsk obviously increased in numbers as well as carrying capacity.¹⁹¹ Moreover, while carrying grain to the capital was the *raison d'être* of the waterway, it also managed to transmit volumes of exportable goods to the port of St. Petersburg. Clear proofs of export goods being actually carried from beyond the Valdai hills to St. Petersburg can already be found in Anton Friedrich Büsching's statistics for 1749 and 1764. Thus, substantial quantities of iron, all of which must have come from the Moscow area or the Urals (at that time, Petrozavodsk iron works had already been closed) were shipped from Kronstadt in both years and 'Siberian furs' present an example of goods arriving from even farther afield. After the 1760s, the volume of exports actually increased faster than cargoes of grain.¹⁹² Thus, the necessity of feeding the capital and the infrastructure that made this possible, helped – as a byproduct – the development of St. Petersburg as a new hub of Russian foreign trade.

The picture changed profoundly during years 1809–1811 when two new waterways via Lake Onega and Lake Ladoga were opened. They were so deep that the big Volga barges could carry their cargoes directly to St. Petersburg. Accordingly, the logistical problems of feeding the capital, as well as delivering exports to its port, were drastically relieved; moreover, increasing volumes of grain and other exportable commodities could now be exported from this outlet.¹⁹³

Heating the houses of St. Petersburg did not require a similar massive infrastructure. With very modest earlier urbanization (*Nyenskans*), the region's forests had not been depleted to the same extent as around Copenhagen. As the consumption of firewood was obviously at similar levels as in Stockholm, the deforested areas inevitably grew and fresh ones had to be sought along waterways which allowed economic transport for such cheap and bulky commodities. Eastwards the natural advance was along the Neva and its small tributaries, westwards again on the nearby shores of the Gulf of

189. Jones 2013, 63; for garrisons and soldiers see Janet Hartley 2008, 5–9, 108–112.

190. Jones 2013, 181–197.

191. According to Oddy 1807, 110, Russia had in 1802 a coastal fleet of about 500 vessels with an average lastage of 50. Probably this refers to Volga barges and vessels sailing to the capital from the Lake Ladoga and Lake Ilmen water system.

192. Kaukiainen 2023, 422–423.

193. Jones 2013, 155–156, 169.

Finland. Finnish local sources indicate that, at least from the 1740s onwards, firewood had been shipped to St. Petersburg and Kronstadt. The government, however, wanted to reserve the coastal forests on the Karelian Isthmus for the fortress of Kronstad and the imperial navy and, therefore, trade to St. Petersburg was often forbidden. This, of course, limited the volume of exports from the Finnish coast but even Kronstad's annual consumption seems to have amounted to at least 10,000 cords.¹⁹⁴ Nonetheless, Finnish wood-carrying 'barks' were also seen in the capital, as pictorial evidence from around 1800 indicates. In addition to wood, they imported paving stones and hay.¹⁹⁵

In the beginning of the 1760s, St. Petersburg's firewood grounds seem to have extended eastwards to the River Volkhov and Lake Ilmen area, probably even to southeastern coasts of Lake Ladoga. In his statistical description of Russia, Benedict F. J. Herrman (a member of the Russian Academy of Sciences) published data on the transport of firewood via the Ladoga Canal to St. Petersburg (see Table 31).¹⁹⁶ These figures are particularly interesting as they happen to catch the initial growth of this trade. They also show that the growth was fast: already in the late 1770s, about two-thirds of the capital's estimated consumption arrived through the Ladoga Canal. In the next decade, however, the growth was levelling out.

Table 31. Firewood en route to St. Petersburg at the Ladoga Canal, 1763–1783
Cords, annual averages (short firewood)

Period	A. Ladoga canal	B. Estimated total demand*	A/B %
1763	29,800	c. 150,000	19
1774–1777	87,400	c. 166,000	53
1778–1780	117,600	c. 170,000	69
1781–1783	120,400	c. 186,000	65

*Estimated annual consumption of one cord per head.

Source: Hermann, *Statistische Schilderung von Russland*, Appendix tables VII and VIII.

As no reliable statics have been found for the 1790s, or the following decades, the further expansion of the firewood grounds can only be guessed. It seems clear that the opening of the Marinskii and Tikhvin Canals (1809 and 1811) also made the virgin forests of the Svir and Onega basins available for the capital's fuel markets.

194. Yrjö Kaukiainen 1993, 52.

195. The English artist John Augustus Atkinson portrayed such vessels on the Neva in two artworks from around 1800: c.f. 'Finland Wood Barks' in Atkinson and Walker, *A picturesque representation of the manners, customs, and amusements of the Russians*; John Augustus Atkinson, 'Panorama of St. Petersburg'. St. Petersburg even enjoyed an extraordinarily cost-free contribution to its firewood stocks of canal barges which were cut up into firewood. As a typical barge yielded two to three cords of reasonable fuel, the 2000–4000 vessels of the late 18th century may have added some 4000–12,000 cords, or 3–6 percent, to the capital's firewood supplies.

196. Hermann's tables actually register two different types of firewood: short, one fathom long, and long ones, of three fathoms. The latter category probably refers to stocks, floated in large rafts, and used as construction material, e.g. floor beams.

An indication of the size of that market is the fact that even imports from southeast Finland started to grow afresh in the 1830s; however, they never exceeded 15 percent of the total supply.¹⁹⁷

In one respect, the logistical pattern of St. Petersburg was unique: while even Stockholm and Madrid received some grain from a *maximum* distance of about 400 kilometres, practically all the Russian capital's flour supplies were transported from *at least* a thousand kilometres away (as the crow flies). Another unique feature was that, before 1809, there was only a single transport route – and that was just a narrow and shallow, partly artificial waterway. On the other hand, the catchment area for firewood comprised an irregular ring around the city, with its precise form determined by waterways and forest resources. In principle, it was like the one around Stockholm although much wider.

18. On the margin

Coastal shipping, implicitly, takes us to two different margins. On the one hand, we are approaching the grey area between occasional and professional, seasonal and full-time shipping. On the other, we are moving between coastal, estuarine and riverine environments.

As far as the vital supplies to the Baltic metropolises are concerned, they involved such massive amounts that regular, full-time coastal transports (or, as in the case of Stockholm's grain imports, proper Baltic shipping) were needed. In comparison, the scale of coastal shipping bound for e. g. Lübeck was much smaller. While Copenhagen demanded some 40–50 shiploads for each thousand inhabitants, the ratio in Lübeck (300 small shiploads a year for a city of 20,000 inhabitants) was just 15. The difference clearly reflects the fact that the smaller city also had fairly good overland supply routes, in particular through the Stecknitz Canal from the Elbe. It even seems probable that Lübeck's seaborne contacts with the Danish islands mainly involved seasonal imports.¹⁹⁸

The firewood trade can be regarded a kind of top layer in Baltic coastal shipping: it employed the biggest 'peasant' vessels, typically from 20 to 40 lasts, and occupied them in a regular, full-time manner. In addition to Copenhagen's, Stockholm's and St. Petersburg's spheres of influence, we can find it, albeit on more modest scales, in at least two other regions. The first is Danzig, which, in the 1760s and early 1770s, regularly received Pomeranian firewood vessels; however, this trade declined after the First Partition of Poland.¹⁹⁹ Another example with equally long traditions like the Åland Islands' contacts with the Swedish capital is the export of firewood from southern Finland (Nyland) to Reval (Tallinn).

197. For imports from Finland to St. Petersburg, see Kaukiainen 1970, 180–182; *Suomen virallinen tilasto* (Finnish official statistics), ser. I, 1860–1867.

198. During the Seven Year's War, imports of grain and other food to Lübeck from the Danish islands increased substantially. This may suggest that the fighting disrupted the city's normal landward connections.

199. *Danziger Anzeigen*, ship-lists.

While precise statistics of coastal shipping are few, it is still possible to sketch rough outlines of the main elements of the Baltic firewood trade:

- A. Copenhagen, about 1770 and 1800: 10,000 and 20,000 Danish lasts, 700 and 1300 voyages (including c. 200 voyages from Pomerania and an unknown number from Sweden) per annum.²⁰⁰
- B. Stockholm, early 1810s: from Finland 300–350 vessels, 1000–1100 voyages, at least 20,000 Swedish lasts per annum.²⁰¹ No comprehensive voyage data exists for the Swedish coast.
- C. St. Petersburg, early 1800: c. 100 vessels a year from the easternmost Finnish coast;²⁰² most of the bulk carried by interior water-routes.
- D. Danzig, early 1770s: 100–105 Pomeranian vessels per annum.²⁰³
- E. Reval, 1810s: 30 vessels, c. 60 voyages per annum.²⁰⁴

In addition, it seems possible that some fraction of Lübeck's coastal trade consisted of similar specialized firewood vessels.

Only one other coastal trade, the transport of grain (and other provisions) to Copenhagen was of similar volume. As we have previously mentioned, the city received around 1800 some 32,000 Danish lasts of shipping from the Danish provincial ports. At the same time, including firewood and building materials from Schleswig, South Sweden and Pomerania, the overall coastal transports to Copenhagen may have grown to up to 50,000 lasts. This makes the Danish capital the biggest centre of coastal trade in the Baltic waters. Overall, these visible coastal commodity flows to the big urban centres may have accounted for at least 75,000 (Danish) lasts. If we even include the Bothnian transports of tar and timber to Stockholm, the figure obviously exceeds 80,000 lasts.

The second 'layer', characterized by small vessels and modest volumes of goods, had an even wider distribution than the firewood trade: it could be found on all the coasts and islands where there were specialized fishing settlements.²⁰⁵ The active parties in this trade were the fishermen who sailed to the nearby cities or farming districts in order to exchange their catches for grain. The actual transactions could imply simple bartering of fish for corn but quite often, when bringing the fish to big cities, selling and buying for cash was also possible. Seasonality was another central feature for this trade. As the most important species, herring and its smaller variant Baltic herring (that live in the eastern and northern Baltic Sea) were fished while they were spawning, in spring and autumn; as a result, the fish-trade was concentrated in these seasons. Quite often fishermen also sold waterfowl, but as they were hunted while migrating, they fitted perfectly into the same seasonal pattern.

Fishermen's produce was imported to practically all the coastal cities in the Baltic Sea area. Direct barter seems to have been rarer in the 18th century but at least in the Gulf of Finland and the Gulf of Bothnia there is still evidence for its use. Thus,

200. Johansen 1982, 151.

201. Kaukiainen 1970, Appendix table I and II:1.

202. Kaukiainen 1970, 106.

203. *Danziger Anzeigen*, ship-lists 1770–1772.

204. Kaukiainen 1970, 75.

205. Wolfgang Rudolph called such trade 'village navigation'; see Rudolph 1980, 125.

fishermen from the Finnish side sailed twice a year over to the Estonian coast with their salted Baltic herring, where they received two barrels of rye for each barrel of fish. In the Bothnian case, the fishermen came from the Swedish side.²⁰⁶ At the moment of writing, the existing data of either vessels or their loads is so meagre and casual that it is impossible to sketch any meaningful quantitative outlines.²⁰⁷

Finally, it must be pointed out that a few important ports and urban centres don't seem to have supported any significant coastal shipping. The first of them is Danzig, for which we only have observed some modest (but fairly short-term) firewood imports. For Riga there is practically no similar documentation and for St. Petersburg the available evidence suggests that only a small proportion of its firewood imports originated from the coasts of the Gulf of Finland, while practically all the other vital and non-vital supplies were brought along the interior waterways.

These observations remind us of the importance of rivers and hinterlands. Danzig, Riga and St. Petersburg did not need similar extensive coastal shipping as many other seaports did because most of their supplies came via the rivers Vistula, (Western) Dvina and Neva (and waterways beyond). The importance of these rivers was, however, far larger in another, truly Baltic, or northern European scale: they supplied the big ports at their estuaries with grain, timber, hemp, flax and other exports – indeed, the whole mercantile existence of such ports was based on lively downstream feeder traffic.

It can be claimed that the Vistula and the Dvina made Danzig and Riga the biggest Baltic ports in the 16th and 17th centuries; in fact (as was seen in Table 3) they were still numbers one and two at the end of the 1760s. In the 18th century, however, the supremacy of Danzig and Riga started to be undermined by a couple of new artificial waterways. It has already been pointed out that the Vyshny Volochyok waterway enabled the transportation of goods from the Russian heartlands to the port of St. Petersburg. Accordingly, exports from the capital increased and, from the late 1780s, the number of ships visiting Kronstadt rose to the same level with Riga, occasionally even exceeding it.²⁰⁸ In the 1760s, another interior waterway was created when a new canal was dug between the upper courses of the Niemen and the Dnieper. It opened vast Ukrainian hinterlands for both Memel and Königsberg (the latter was already connected via a canal to the Niemen).²⁰⁹ At the same time, even more liberal attitudes towards the exploitation of East Prussian forest resources contributed to the growth of exports.²¹⁰ Quite logically, traffic in both ports increased subsequently. However, the balance between the biggest ports was, at least in one case, disturbed because of a major political change. As already stated, the First Partition of Poland led to the decline of Danzig when a Prussian zone isolated the city from its upstream hinterlands.

206. See e.g. Kaukiainen 1970, 113–114; Kaukiainen 1993, 52.

207. Just to give an example, in 1810 some 250 boats loaded with fishermen's produce sailed from western Finland and Åland to Stockholm (Kaukiainen 1970, 64).

208. Kaukiainen 2023, 422–424.

209. Oddy 1807, 228–229.

210. According to Oddy 1807, 220, the rapid increase of Memel's timber exports was the result of Prince Radzivil's decision to allow wood-cutting on his vast domains.

The Baltic Fortunes Of War

19. From the French Revolution to the Continental Blockade

As long as exceptional, bad or unseasonal, weather did not disturb the sailing season, the number of ships transiting the Danish Sound could be regarded a sort of barometer of northern European shipping cycles. In the 1780s, this barometer had already started to fall three years before the French Revolution. It reached a low point precisely in 1789 but this did not yet have anything to do with disturbances in France but had a purely local cause. The Russo-Swedish War had broken out in July 1788 and most of the decline in shipping was due to the fact that the majority of Swedish ships had returned to their home ports and stayed there until peace was declared in August 1790. Even before the hostilities had ended, the number of passages through the Sound started to rise again and a brisk growth continued for three years, in spite of alarming news from France and the break out of war between France and Austria in the spring of 1792. Indeed, a new all-time record, some 6000 passages in both directions (or a grand total of over 12,000) was recorded at Elsinore towards the end of the 1792 sailing season. It was only after Britain had joined the war (in early 1793) and started to blockade French ports that the insecurity in international trade increased enough to induce a modest decline in passages through the Sound.²¹¹

Nevertheless in 1794, warfare in Central Europe seems not to have affected shipping between the North Sea and the Baltic but the next year brought a dramatic turn of events. After invading the Austrian Netherlands, the French army advanced in the winter of 1795 to the Dutch Republic, occupied the country and made it a client state, the Batavian Republic. As a consequence, the Dutch flag vanished from the Baltic Sea – not to return before the turn of the century.²¹² However, the Netherlands did not disappear from the face of the Earth: cargoes to Amsterdam and other Dutch ports were subsequently (exactly as in 1780–1783) carried by skippers flying the neutral flags of, for example, Bremen and Emden:²¹³ some of them probably were expatriates from the Dutch Republic. Unsurprisingly, passages through the Sound sank below 8000 in the next summer. Quite unexpectedly, there was a subsequent very

211. See, for example Johansen 1983, 11, 14.

212. In the early 1790s, some 2000–2200 Dutch ships per annum had sailed through the Sound. As the total number of passages (according to STRO) sank in 1794–1795 by over 2500, it seems that almost all the decline is explained by the disappearance of Dutch ships.

213. STRO, Departures from e. g. Memel.

steep rise, but as this was only triggered by exceptional exports of grain to the Great Britain, it was soon followed by an equally deep decline.²¹⁴

With the big maritime powers, Britain and France, fighting each other, the neutral Nordic monarchies and Russia tried to exploit the situation by reviving the old League of Armed Neutrality in 1800. The new Russian tsar Pavel I was the key person in this enterprise; in addition to the Russian Empire, it was joined by Sweden, Denmark and Prussia. In the spring of 1801 two of its members actually took up arms: Prussia occupied Hanover and Danish troops invaded Hamburg and Lübeck for a short time. The League, however, was already tottering: tsar Pavel had been murdered a few days before Prussians crossed the Hanoverian border (although that was not known then) and Danes occupied Lübeck in the same week when a strong British fleet crushed the Danish navy.²¹⁵

During these difficult times passages through the Sound fluctuated sharply and predominantly with a downward trend (see Figure 2 B, above). A distinct change, of course, took place in 1802, after the peace treaty of Amiens (March 27). However, in May 1803, Britain again declared war on France and the new conflict affected the northern seas a month later when the French army occupied Hanover, and soon afterwards the ports of Hamburg, Bremen and Emden were closed to British ships. However, these closures actually gave a moderate boost to Baltic trade as Lübeck and some other German Baltic ports became the principal gateways for British products to reach Germany.

In the following years, Napoleon's victories in Central Europe brought his armies closer to the Baltic coast. In the autumn of 1806, they crushed the Prussian army and conquered Lübeck in November. Just two weeks later, Napoleon issued his famous decree on the continental blockade. In the following summer, Russia was forced to withdraw from the war. At this stage, fearing that even Denmark would be forced to accept French occupation, Britain decided to prevent its navy from falling into French hands. After a savage bombardment of Copenhagen in September 1807, the British captured the remaining Danish warships. Not surprisingly, the inevitable aftermath of the British attack was that Denmark accepted an alliance with Napoleon and even joined the continental blockade. For shipping through the Sound this was a fatal act which, for a number of years, drastically cut the shipping between the North Sea and the Baltic. In 1808, just 134 passages were registered at Elsinore.²¹⁶

20. The Sound in the shadow of war

After 1790, the development of passages through the Sound was dramatic and irregular to an extreme. On three separate occasions the overall numbers (exceeding

214. Britain had experienced harvest failures in 1795 but imports of grain, mainly wheat, from the Baltic granaries only started in the spring of 1796 when unusual numbers of eastbound British ships sailed in ballast through the Sound. Stern 1964, 168–187; STRO 1795–1796.

215. The Prussian and Danish occupations temporarily blocked the ports of Bremen, Emden, Hamburg and Lübeck. The occupation of Hamburg started on 29 March and that of Lübeck on 5 April. The Danes left Lübeck on 22 May; Hamburg and Hanover were liberated roughly at the same time. Wilmans 1912, 277–288; Dwyer 1992, 162–170.

216. STRO 1808.

12000) rose higher than ever before, and twice they plummeted below the levels of the late 1770s – before the epochal dive in 1806–1807. These powerful fluctuations trigger the intriguing question of whether such unsettled pattern implied any major changes in the earlier, more or less established structures of Baltic trade. In fact, at least one important change – which certainly can be called structural – has been identified in the 1770s: the growth of East Prussian exports and the decline of Danzig's trade. Danzig's setback was an example of pure power politics, territorial seizure and customs discrimination. It certainly may be expected that similar or even stronger political pressures could have been activated by the expanding European war.

Against this background it seems almost surprising that the first decade of the French Revolutionary Wars seems not to have affected Baltic trade in any fatal way. As Table 32 shows, the westward mainstream through the Danish Sound was, in 1801–1805, actually slightly brisker than two decades earlier. The first years of the 1800s, of course, include the brief boom following the Treaty of Amiens, but it should be remembered that even the years 1783–1787 were, by including the last years of the 'American-War boom', quite good. While many years in between accounted for far worse times, the quick recovery of shipping during the short period of peace suggests that, so far, war had not caused any permanent damage to the basic economic structures of northern European shipping. This recovery, however, was aided by harvest failures in a few countries (Britain, Sweden)²¹⁷ which clearly increased grain exports from the big East Baltic ports.

One specific feature of the 'peace boom' was the recovery of Dutch shipping. In 1801, cargoes to the Netherlands remained at typical war-time levels, just a bit over 300, but in the following year the figure was boosted to almost 1300. A visible sign was the reappearance of the Dutch (Batavian) flag: in 1802, some 250 return voyages through the Sound sailed under these colours. Not surprisingly, the British declaration of war swept it away again from the North Sea and the Baltic; however, with 800–600 cargoes to Dutch ports, Batavian maritime trade remained at a higher level than before the peace. As flashy as the short Batavian boom was, it did not explain the overall increase in passages through the Sound. If the Dutch and Batavian shipping are discounted from the figures of 1783–1787 and 1801–1805, the modest growth of west–east passages actually increases from three to nine percent.

A really distinct structural change can be observed in the east–west passages. Compared with the 1780s, departures from East Prussian ports had declined drastically while, at the same time, departures from Danzig had almost doubled. This was a complete turnaround from what happened in the 1770s, after the First Partition of Poland and the opening of the Niemen basin for the timber trade. Even now, power politics were involved. In the Second (1793) and Third (1795) Partitions of Poland, Danzig was incorporated into Prussia, thus removing the earlier customs barrier and subsequently widening the Prussian territory southwards into the Vistula basin. As the River Vistula was now 're-opened', new prosperous times started to dawn for Danzig. Losing the earlier relative advantage in customs, Königsberg and Memel, with their shallower ports and mediocre connections with hinterlands, were bound to suffer.²¹⁸ In other respects, the geographic distribution of departures were remarkably

217. See e. g. Edvinsson 2008, 46, 58; Neumann and Kington 1992, 187–188.

218. See e.g. Scheltjens 2022, 139–140.

similar for 1783–1787 and 1801–1805 – the combined share of the five biggest ports dominated the westward passages, and they even increased a bit.

Table 32. Westward traffic through the Sound, 1783–1805.

A: Ports of departure.

Annual averages of passages

Regions and ports	1783–1787	1801–1805
East coast Sweden and Finland <i>thereof Stockholm</i>	373 222	391 250
Russia around St. Petersburg <i>thereof St. Petersburg</i>	800 539	801 675
Estonia, Livonia and Courland <i>thereof Riga</i>	800 574	965 789
East Prussia <i>thereof Memel</i> <i>thereof Königsberg/Pillau</i>	1611 755 856	1129 681 448
Poland <i>thereof Danzig</i>	477 477	850 849
Prussia <i>thereof Stettin</i>	154 117	182 134
Swedish Pomerania, Wismar	151	111
Rostock, Lübeck, Kiel	98	152
Sum total	4464	4581
<i>Percentage of five biggest ports</i>	72	75

Note: Only ports east of Copenhagen-Malmö line have been included. Departures to Danish destinations excluded.

Source: STRO.

B: Regions of destination

Annual averages of passages

Regions	1783–1787	%	1801–1805	%
West coast of Sweden	395	11.0	426	10.6
Norway	102	2.8	173	4.3
Great Britain	1266	35.4	1968	49.0
Dutch/Batavian Republic	961	26.9	746	18.6
German North Sea ports	174	4.9	186	4.6
Atlantic France	316	8.8	166	4.1
Spain and Portugal	169	4.7	150	3.8
Mediterranean France and Italy	135	3.8	99	2.5
West Indies and South Atlantic	42	1.2	47	1.2
North America	17	0.5	54	1.3
Sum total	3577	100.0	4015	100.0

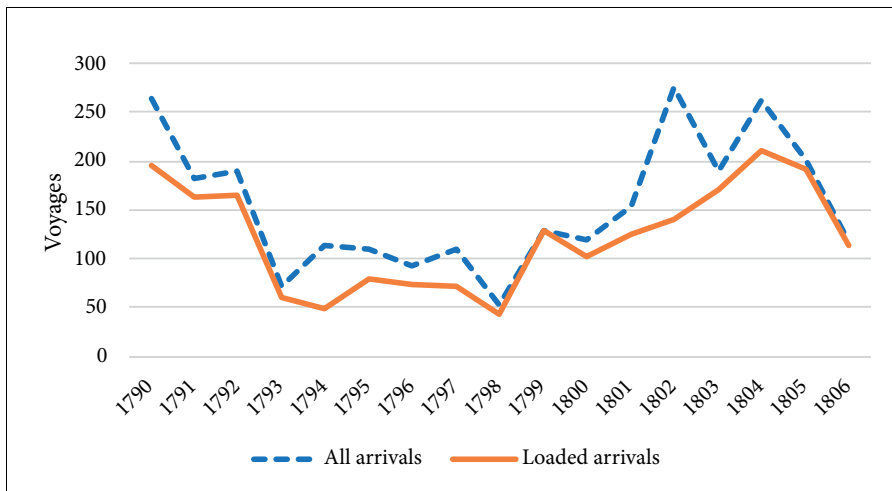
Note: Only regions west of Denmark have been included; departures from Denmark excluded. In 1783–1787, c. 22% of ships registered with no precise destination; in 1801–1805, they accounted for c. 12%, respectively.

Source: STRO

Neither are there any major changes in the distribution of destinations. Lands around the North Sea (excluding Norway) still dominated, even increasing their share from 68 to 72 percent. Unsurprisingly, the domination of the Great Britain increased further, almost attaining half of all westbound passages. However, Netherlands (now known as the Batavian Republic) still remained the next most popular destination.²¹⁹

An expected change was the decline in departures to French ports. All told, the share of France, Iberia and Mediterranean ports sank from seventeen to ten percent. This was, indeed, the direction which suffered most from the Revolutionary Wars. The mirror image of this development can be seen in Table 33 (below). As the attached Figure 4 demonstrates, shipping from the traditional French wine ports fell to a very low level in the 1790s.

Figure 4. Arrivals to the Sound from the French Atlantic coast, 1790–1806



Source: STRO. For the method of estimating the number of loaded voyages, see note to Figure 2B.

The data in Table 33 demonstrates that the proportion of ballasted arrivals did not decline at all during the war. Quite to the contrary, over the course of less than twenty years, these proportions rose from 55 to 64 percent, which means that, at the beginning of the 19th century, only 36 percent of all ships sailing to the Baltic were carrying a paying cargo. As can be seen in Table 32, this proportion was slightly smaller, about 34 percent, among British ships, but much lower for ships arriving from the Batavian Republic or German North Sea ports (17 respectively 8%). On the other hand, the actual numbers of British vessels arriving with cargo had increased by about fifteen percent.

219. STRO. Of all ships departing in 1801–1805 from Batavian ports some 45% had their home ports on the German North Sea coasts and 19% on the German southwest Baltic coast and Swedish Pomerania.

Table 33. Eastward traffic through the Sound by ports of departure, 1784–1805
Five-year averages of passages

Regions of departure	1784–1787		1801–1805	
	All vessels	Loaded	All vessels	Loaded
Great Britain	1535	509	1747	588
Dutch (Batavian) Republic	994	383	815	137
German North Sea coast	294	76	322	25
Austrian Netherlands	77	3	39	3
Atlantic France	375	301	217	178
Spain and Portugal	208	203	208	207
Mediterranean France and Italy	119	118	42	42
West Indies and America	47	45	82	76
Africa and Asia	14	14	10	10
Sum total	3663	1652	3482	1266

Source: 1784–1787: Johansen 1983, Microfiche appendix table 9; 1801–1805: STRO.

Note: Not including Danish, Norwegian and Swedish west-coast ports, as well as regions with less than one departure a year. ‘Ballasted’ also include ships with some cargo and ballast. For the method of estimating the number of loaded voyages, see Note to Figure 2B.

Overall, the number of loaded eastbound arrivals sank by almost a quarter from the levels of the early 1780s. The collapse of the Dutch shipping, a clear example of power politics, accounted for two-thirds of the decline but even cargoes from the southern wine-and-salt ports decreased by a third. Even the latter fall-off must have been a result of the war rather than changes in demand. On the other hand, looking at the curves of west-to-east voyages (Figure 2 B), it seems that the highs and lows of loaded voyages remained at fairly static levels since the early 1780s. Overall, this development implies that the imbalance between eastward and westward voyages through the Sound increased: while the former in the 1780s exceeded the latter by a ratio of 2.6: 1, the proportion swelled to 3.6: 1 in 1801–1805.²²⁰

Following the development of commodity flows becomes complicated with the data from 1796 onwards. Before that, reasonable statistics can be compiled from the Sound Toll Tables and the tables published by the Odense Sound Toll project.²²¹ The STRO database, in contrast, offers no such pre-processed data. Retrieving proper summaries of different commodities would therefore involve lots of data retrieval and computing. Fortunately, there is a reasonable shortcut. A few years ago, as noted before, Werner Scheltjens estimated the overall volumes of commodity flows through the Sound in metric tons.²²² His data sets, available online, make it possible

220. Of course, as presented earlier, the imbalance would have been even greater in terms of cargo volumes; however, they have not been estimated for 1801–1805.

221. Johansen 1983, microfiche appendices.

222. Werner Scheltjens, *Tetradas*: tonnage estimates of trade through the Danish sound, 1670–1856 (replication data and selected statistics), <https://journaldata.zbw.eu>. There could

to find the ton equivalents of each single commodity for each year in the history of the Sound Toll. They would even allow, given a good amount of additional work, to compute similar estimates of cargo space as presented above in Table 5. For the present purpose, however, this is not needed. An acceptable review of the eventual changes in the composition of transported goods can be sketched simply by choosing a number of the most typical goods, ‘markers’, for the major commodity groups. In such a comparison, no stowage factors are needed; instead, changes can be expressed as indices, based directly on the metric tons recorded in the *Tetradas* tables.

Table 34. Volumes of selected ‘marker’ commodities, 1783–1787 and 1801–1805
Periodical averages

Commodities	1783–1787	1801–1805	Index 1783–1787 = 100
	Tons	Tons	
Balks	92,267	68,434	74
Deals	53,004	21,252	40
Boards	16,865	18,483	109
Rye	117,025	121,296	104
Hemp and flax	61,585	65,733	105
Tallow	11,431	22,857	200
Tar	16,003	18,016	113
Bar iron	27,820	47,093	169
Salt	136,536	147,229	108
Wine	25,060*	25,500*	102

*Corrected tonnages.

Source: *Tetradas*, cbex commodities, cwim commodities; Appendix table 2; STRO 1801–1805.

Most markers – eight out of ten – presented in Table 34 record at least some growth. The westward exports of traditional primary products, rye, hemp and flax, only increased a little, while tallow recorded a hundred-percent boost. The substantial growth of iron exports, as well as a more moderate rise for tar, are certainly no surprise in a war-striven time. So far, the numbers tally quite well with the respective passage rates (Table 32 A). The development of timber exports, however, presents a different and fairly inconsistent picture: ordinary boards seem to have sold well while the exports of heavier sorts, balks and deals, more or less collapsed. In the latter case a single important incident explains the sudden change: in 1797, a new Russian tariff doubled the export duties on timber products and, in the following year, tsar Pavel I prohibited all exports of timber.²²³ Balks and deals were typical Russian products while ordinary boards were mainly produced elsewhere, for example in Sweden. In practice, the act mainly affected trade between Russia and Great Britain; for a while, Britain

be discussion about some of his conversion factors but even in most such cases the *relative* amounts should be correct.

223. Scheltjens 2022, 140–141; Oddy 1807, 76–80, 379; Ahvenainen 1984, 55–57. According to a common view, the export ban was masterminded by Russian ironmakers who needed huge amounts of charcoal, and claimed that their industry was suffering from a lack of wood.

filled the deficit by increasing imports from Norway.²²⁴ However, the prohibition was annulled soon after Pavel's murder.

Unfortunately, systematic data for coal cargoes can only be found until 1796. It seems that, subsequently, the toll officials were not required to verify the actual amounts – instead, like decades earlier, it became sufficient to just note that a ship had a *lading kull* (shipload of coal).²²⁵ Obviously this had nothing to do with the volume of actual trade: according to British statistics, coal exports (of which the Baltic area attracted a hefty slice) stayed at a fairly steady level in the 1790s and the beginning of the 19th century.²²⁶ Accordingly, it seems very probable that coal cargoes retained their important role in the British Baltic-bound shipping but nothing, on the other hand, suggests that their volume would have grown any more. However, the other traditional ballast-cargo of salt (which was still registered properly in the STRO) had a moderate rise in comparison to the 1780s. Indeed, it seems obvious that the increasing numbers of British arrivals with cargo were mainly connected with the growing imports of Liverpool rock salt – war had actually overturned the markets. Almost sixty percent of ships loaded with salt came in 1801–1805 from Great Britain and, as these ships were bigger than most others, the market share of Liverpool salt must have been even higher. Traditional Iberian and Italian salt probably accounted for a good third while the number of such cargoes from France sank to mere two percent.²²⁷

Tetradas-data on wine imports contains a critical mistake: they rate the most important measure of French wine, tun (*fad*), for just a quarter of its real volume or weight.²²⁸ This means that the overall wine imports are devalued by something like fifty percent, and French imports even more. As other important measures of liquids (pipe, hogshead, ahm etc.) are rated correctly, the series can be patched up with quite moderate manipulations, by scanning the respective STRO data of wine imports from France and, after selecting such volumes which were expressed in tuns, by replacing the faulty conversion rate with the correct one. The corrected volumes are shown in Table 34, above, and they demonstrate that the average Baltic-bound imports of wine in 1801–1805 only marginally exceeded those recorded in the 1780s. On the other

224. Oddy 1807, 379.

225. Such slackness is explained by fact that coal remained customs-free in Elsinore. Precise amounts can only be found for a small fraction of coal cargoes. The data on coal seems to be problematic in other respects too. A search in 1801–1805 with the wildcard filter 'ste*ku*' (for ste(e)nkul(l) retrieved 94 hits for departures from Newcastle but only 21 hits for departures from the big region of Great Britain.

226. Mitchell 1988, 470. It should even be remembered that, in Britain, iron production using 'charred pit-coal' (coke) as fuel instead of charcoal began in the 1790s. This gradually increased the domestic demand for coal. This innovation was also described by Oddy 1807, 552.

227. STRO 1801–1805. Proportions do not include re-exports of salt (from e. g. Sweden, Denmark and the Netherlands).

228. According to *Tetradas*, aux conversions, the conversion rate for the *tun* would be 226 kilograms. According to Johansen 1983, 126, the capacity of tun/fad was 904 litres (or 904 kilograms) and a roughly similar rate can also be found in Doursther 1840, 539–540. According to the Odense data (Johansen 1983, microfiche tables) the average import of wine in 1784–1787 was c. 23,800 litres a year, while the corresponding volume according to *Tetradas* was only 10,970 litres. Replacing the conversion rate of 226 litres by 904 litres brings the *Tetradas* average quite close to that of the Odense data.

hand, the fluctuations were quite violent. In the mid-1790s, the lowest levels hardly exceeded 10,000 cubic metres (or tons) but, after the Treaty of Amiens, they rose very quickly; the rise continued irrespective of the new war with Britain and peaked at over 36,000 tons in 1804.

Wine imports, in fact, embody the dilemma of the northern European trade across the various phases of the French wars. The neutral Baltic states had a strong interest in maintaining trade with France while Great Britain wanted to limit it as much as possible. After 1793, the narrowing latitude of neutral trade was clearly reflected in the small numbers of southward voyages from the Baltic area. After the Treaty of Amiens, the trade was restored for a few years and when the French even occupied Hanover, and Britain alone broke the peace, it was easier for the Baltic neutrals to maintain trade with southwest Europe.

To sum up, it may be claimed that the shipping between western Europe and the Baltic area was restored tolerably well when the turmoil of war subsided for a while. Not surprisingly, the compound growth rate was very modest, 0.1 percent on average but, at least on the Baltic side, the basic pattern of trade was quite well preserved. On the other hand, the western end of shipping chains had experienced a major change with Great Britain rising to absolute dominion: its ports accounted for an overall increase of arriving cargoes of about 55 percent, implying an average growth of 2.5 percent per annum. In an industry with just marginal overall growth this means that the proportion of all the other actors had suffered.

21. *The Nordic boom in Mediterranean trades*

Above, it has been seen how ships from France and its allies, or client states, still continued to transit the Sound, and that grain and timber products were shipped to these countries from, for example, Sweden and Swedish Pomerania. Overall, however, the traditional trade with France and Iberia suffered heavily. As a compensation, shipowners in neutral countries tried to profit from rising prices for northern products and booming freights by challenging the limitations posed by the belligerents.

When the Royal Navy blockaded French ports in 1793, it even tried to prevent the grain trade. This revived the old dispute about neutral states' rights of navigation in international waters and belligerents' rights to search vessels for so-called contraband (war materials). In this situation, Britain was in a position to control and restrict the commodity flows along the western seaboard of Europe. Both Denmark and Sweden tried, more or less in unison, to protect their shipping beyond the Sound by organizing convoy services, but their effect was marginal. Yet, in spite of the increasing risks, Nordic shipowners continued to deploy ships to trade in Iberia and the Mediterranean. In many ways, this was a repetition of the risks and rewards of shipping during the American Revolutionary War.²²⁹

The same year when Great Britain joined the war, France started to buy provisions from North America and the neutral northern European states, in particular Denmark. The first shipments of grain were sent from Copenhagen in August 1793.

229. See the articles published in the Forum on neutral shipping during the French Revolutionary and Napoleonic wars, *International Journal of Maritime History*, Vol. 28, No. 1 (2016).

Much bigger volumes, mainly consisting of Baltic wheat and rye, were imported and re-exported until the end of 1795; during this time, over 300 shiploads were sent to France, practically all of them loaded in Copenhagen.²³⁰ It is obvious that these transactions were organized and coordinated in Copenhagen, but they developed into a joint venture involving a number of neutral states. In addition to Copenhagen tonnage (over one-third of the total) the fleet also included many ships from Norway, the Danish provinces and Sweden (including Swedish Pomerania), a few from Holstein and even five Americans and one from Emden. All these ships were flying neutral flags, thus trying to avoid interventions by the British navy. At first, the transports were even camouflaged with papers indicating false destinations in Portugal and Spain (and such destinations were also registered in the Sound Toll). Some fifty ships were seized by the British but, at least in 1795 when Britain suffered from bad harvests, they were only taken to British ports where the cargo was bought and unloaded and the freight was even paid for.²³¹ It seems obvious that for most shipowners this was not a bad business.

This collective action was followed by a continuous chain of private blockade runners, mainly from Denmark and Sweden. Their numbers have been estimated using the catalogues of the so-called Algerian sea-passes, which were issued in both Denmark and Sweden.²³² According to this data, over 300 Algerian passes had been issued in Denmark annually during the boom years of the American War, but their numbers really skyrocketed after 1793 and exceeded 700 each year in 1795–1798. The numbers, however, decreased quickly to about 400 until 1801 (the year of the Battle of Copenhagen) but experienced a new moderate growth during the next few years.²³³ In Sweden, the respective numbers fluctuated around 400 in 1795–1797 and rose to over 600 until 1800; the Treaty of Amiens dropped them slightly below 400 but, unlike in Denmark, a new very brisk rise followed, topping around 700 passes in 1804.²³⁴

For Sweden, a more precise picture can be gained from the contemporary statistics of the country's merchant tonnage. At the end of each year, all the seaports (*stapelstäder*) had to report the numbers and lastages of their ships, divided in two categories: those passing the winter at home and those still on voyages. The latter group may, of course, include sundry vessels frozen in non-domestic Baltic ports, but it is fairly certain that the bulk of them were still actively sailing on more southern, ice-free waters, like the Mediterranean.

230. STRO. France also received much grain from the United States. The naval battle of 'the Glorious First of June' was fought between a British Fleet and French naval forces protecting a convoy of American grain ships.

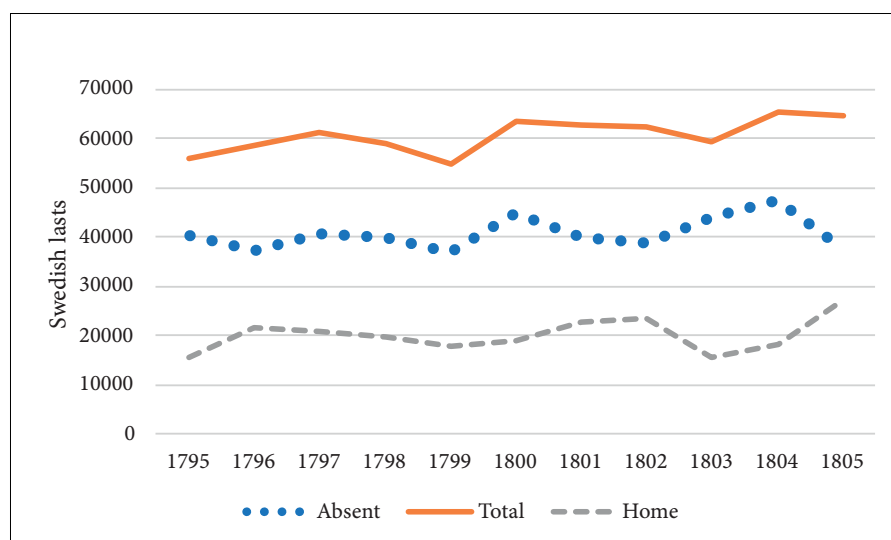
231. In 1795, 102 departures to France were recorded in Elsinore. For these grain exports, see Pourchasse 2018, 59–75.

232. Both Denmark and Sweden (as well as the Netherlands) had concluded treaties with the so-called Barbary states which – in return for annual tributes – guaranteed the safety of their ships against Barbarian corsairs. Such passes became obligatory for ships sailing south of Cape Finisterre (at the northwest corner of Spain). C. f. Göbel 2010a, 170–182.

233. Göbel 2010a, 183.

234. Müller 2016, 150.

Figure 5. Swedish merchant tonnage: wintering (home) and voyaging (absent) ships at the end of each year, 1795–1805.



Source: Svenska riksarkivet, Kommerskollegium, Kammarkontoret: Handelsflottan och dess bemanning, ser. 1. 1769–1805.

The data presented in Figure 5 shows that after 1795, Swedish shipowners deployed fleets of about 40,000 lasts on southern long-trades. In the former boom period (1778–1783) they had represented slightly over 60 percent of the kingdom's total merchant navy while, after 1795, the proportion occasionally (1800, 1803 and 1804) even exceeded 70 percent. Such high shares indicate that the actual focus of Swedish shipping lay in these times quite far from the domestic Baltic waters. In the Danish monarchy, the same seems to have applied to Norway and the duchies of Schleswig and Holstein.²³⁵

Some 60 percent of Swedish and Danish Algerian sea-passes were issued for Mediterranean voyages, and even other sources demonstrate that this was the most important area for Nordic tramp-traders. A particularly busy trade seems to have developed in the transport of grain from North Africa or Sicily to French ports (or to Genoa and Livorno for further overland transport to France).²³⁶ Other frequently visited ports were Barcelona, Malaga, Naples and Messina, as well as western European Atlantic ports, but voyages to the eastern Mediterranean were rare. Swedish shipping statistics reveal that, in the period 1796–1799, the number of ships spending winters in these ice-free waters fluctuated between 435 and 502. As on average 230 ships a

235. In 1794–1806, both Norway and Schleswig-Holstein accounted for about 40% of sea-passes, while the share of Denmark proper was only 20%. In a longer run, the share of Schleswig-Holstein had declined from half (1778–1793) and that of Norway improved from about a third. Andersen and Voth 1997, 19.

236. Pourchasse 2016, 173–176.

year left for such destinations and almost 200 returned, it can be concluded that the average time away from home was over two years.²³⁷

The risks of shipowners were diminished when Britain, already in the summer of 1793, announced that seized neutral ships would be compensated for their cargo and even freight.²³⁸ However, Swedish and Danish ships were also detained by French men-of-war and privateers and a few were actually condemned.²³⁹ Nonetheless, such unhappy histories seem to have been exceptional – the permanently high popularity of Mediterranean voyages, as shown by the Swedish statistics, would not have been possible if such actions had been common.

22. What happened within the Baltic?

Before 1806, real war had not yet disturbed the old order in the countries bordering the Baltic Sea. Therefore, the general frameworks of intra-Baltic shipping should have remained as usual. The French occupation of Hanover (1803) and the closure of Hamburg, Bremen and Emden, however, introduced a new temporary element by redirecting British shipping from the North Sea to German Baltic ports.

Crude mapping of intra-Baltic shipping can again be achieved by collecting the total numbers of visiting ships from as many ports as possible and subtracting the respective passages through the Sound from them. Table 35, below, presents such departure statistics for seven major ports.

Table 35. Baltic departures from major Baltic ports, 1780–1804

Annual averages of ships

Port	1780–1787	1793–1796	1797–1799	1801–1804
St. Petersburg	170	255	262	316
Riga	320	265	366	376
Memel	90	155	169	166
Königsberg	500	263	682	708
Danzig	230	312	337	734
Stettin	1080	827	750	767
Lübeck	590	618	618	794
Total	2980	2695	3184	3861

Source: Appendix table 3: A–H.

237. Svenska riksarkivet, Kommerskollegiet, Kammarkontoret: Handel och sjöfart, ser. 9: ships arriving from and departing for France, Spain, Portugal and the Mediterranean. That the number of returns was lower than that of departures, may suggest that a few ships were lost – in shipwrecks or through being seized by the belligerents. A rather typical pattern was to sail south late in the autumn, spend two winters in southern waters and return early in the second spring.

238. Pourchasse 2016, 177.

239. See e. g. Schnakenbourg 2016, 133–146.

From the mid-1780s to the mid-1790s, this sample presents a mix of moderate rises (St. Petersburg, Memel, Danzig and Lübeck) and moderate falls (Riga, Stettin) as well as one dramatic drop (Königsberg); overall, they resulted in a ten-percent decline. The figures for 1801–1804, in contrast, suggest a surprisingly steep rise to a level which exceeded the total numbers for the 1780s by almost a third. The figures for intervening years (1797–1799) show that, excluding Königsberg, the bulk of this rise took place after the turn of the century.

The data in Table 35 is almost exclusively based on statistics presented by J. Oddy. As he did not specify his sources, it must be asked how reliable it is. As regards Russian ports, his figures (as mentioned earlier) fit perfectly with those which von Storch published up to 1797, and it seems quite probable that he had access to similar official data for subsequent years. Oddy's data for Danzig can also be checked against the ship-lists published by the (Prussian) *Danziger Anzeigen*. At least for 1801–1804 they tally fairly well (within 2–3%) with the latter;²⁴⁰ small differences between the two series probably reflect variations in the methods of counting, for example, overwintering ships. To sum up, it seems that Oddy's statistics are reasonably correct. Indeed, the numbers of ships were something which most major ports compiled and which were also easily available. The downside of this data is, of course, the lack of tonnages, but it seems that the average sizes of Baltic vessels remained around the same levels as in the 1780s.

The Baltic collection of port statistics can again be backed up with Swedish shipping statistics. Unfortunately, there are no tables showing the shipping volumes by main destinations after 1799. In any case, the data for the last four years (presented in Table 36) provides an interesting comparison with the development of shipping in the big Baltic ports.

Table 36. Loaded departures and arrivals in Swedish Baltic shipping, 1783–1799. Including both Swedish and foreign vessels, annual averages.

A: Departures to				
Region	1783–1787		1796–1799	
	Ships	Swe. lasts	Ships	Swe. lasts
Russia	330	14,881	270	10,800
Königsberg	368	13,231	170	5553
Danzig	128	2966	49	1394
Pomerania	152	6037	221	7979
German places	578	19,055	1058	34,274
Denmark	378	9460	730	13,350
Total, excl. Denmark	1556	56,170	1768	60,000
Total, incl. Denmark	1934	65,630	2498	70,350

240. *Königlich Preussische Danziger Nachrichten und Anzeigen*, 1801–1804, ship-lists.

B: Arrivals from				
Region	1783–1787		1796–1799	
	Ships	Swe. lasts	Ships	Swe. lasts
Russia	410	17,989	305	10,447
Königsberg	588	18,316	227	6518
Danzig	247	5608	107	2303
Pomerania	222	8340	301	10,725
German places	252	7397	508	17,456
Denmark	270	9620	714	13,826
Total, excl. Denmark	1719	59,673	1454	47,449
Total, incl. Denmark	2061	67,319	2168	61,275

Source: Svenska riksarkivet, Kommerskollegiet, Kammarkontoret: Handel och sjöfart, ser. 9.

In terms of departures, the Swedish data matches quite well with the others: it also indicates a fairly modest growth from the mid-1780s levels. Arrivals, however, present a different picture with the total voyages (excluding Denmark) trailing up to 20 percent lower than ten years earlier. Moreover, in terms of regional trends Sweden is the direct antithesis of the development in big East Baltic ports from Danzig to St. Petersburg. While the latter's Baltic shipping had expanded by 40 percent between the mid-1780s and late 1790s, Swedish shipping to these ports had simultaneously declined by the same 40 percent. On the other hand, Swedish shipping to Holstein, Lübeck, Mecklenburg and Pomerania (Swedish and Prussian) had expanded by as much as 70 percent.

The figures also demonstrate another structural change. Earlier, Swedish departures and arrivals had roughly equal lastages, at least when grain imports had fluctuated within normal levels. The data for the late 1790s gives us a very different picture with departures, or export lastages, attaining a clear edge over arrivals. Swedish foreign-trade statistics (see Table 37) confirm this change and show that it actually consisted of two equally important parts. First, the export of timber products, above all sawn boards, to Baltic destinations expanded so much that their cargo volumes doubled (which very probably was aided by the sudden decline of Russian exports). Even the exports of tar and pitch as well as iron grew substantially, while the volumes of other traditional commodities, in particular herring, fell. On the other hand, grain imports sank dramatically after the Russo-Swedish War (which may reflect a gradual improvement in domestic production), and the volumes of hemp and linen also declined. The net result was that the exports now demanded a third more cargo space than in the mid-1780s, and the respective demand for imports sank by two-thirds. Since the exports were primarily destined for Denmark, Schleswig-Holstein and the westernmost German seaboard and the imports originated in Russian and other East Baltic ports, this big structural change also explains the drastic switch of Swedish Baltic shipping from east to west.

Table 37. Swedish exports and imports within the Baltic: Estimated cargo space required by the main commodities, 1783–1805, annual averages.

A: Exports				
Commodity group	1783–1787		1801–1805	
	Danish lasts	British tons	Danish lasts	British tons
Timber	10.6	25.3	20.6	49.4
Tar, pitch	2.0	4.9	3.2	7.3
Lime*	3.3	7.9	2.6	6.3
Iron	0.8	1.9	1.2	2.8
Salt**	1.9	4.6	1.2	2.8
Herring	7.2	17.3	5.7	13.4
Total	25.8	61.9	34.5	82.8
Total in Swe. lasts	30.4	.	40.5	.

Thousand lasts and tons, sums computed from unrounded numbers

* lime and limestone** re-exports

B: Imports				
Commodity group	1783–1787		1801–1805	
	Danish lasts	British tons	Danish lasts	British tons
Grain	43.6	104.7	13.1	31.4
Hemp etc.	2.6	6.2	1.9	4.6
Other	0.1	0.3	0.1	0.2
Total	46.3	110.9	15.1	36.2
Total in Swe. lasts	54.5	.	17.8	.

Source: *Historisk statistik för Sverige, Del 3. Utrikeshandel 1732–1970*, Tables 1.1–1.21. Contemporary measures converted to lasts according to stowage factors presented in Appendix 1. For more details, see Appendix Table 3

When drawing conclusions, it must be remembered that the Swedish shipping statistics date from the years before the ‘peace boom’ of the early 1800s. Some other statistics published by Oddy in fact suggest that Sweden’s trade with the East Baltic ports subsequently improved. Thus, in 1802, the number of Swedish vessels visiting Russia’s Baltic ports amounted to 424, with a total lastage of 20,600,²⁴¹ which means that the country’s Russian trade had doubled since the late 1790s. On the other hand, Sweden’s West Baltic exports obviously did not increase in proportion.²⁴²

The combined evidence of the East Baltic and Swedish data sets points to a substantial growth in the East Baltic shipping, in particular after the turn of the century. Explaining this growth is not too difficult. Distinct clues can be seen in the ship-lists of Danzig: the rapidly growing numbers of arrivals consisted predominantly

241. Oddy 1807, 109.

242. According to the Swedish foreign-trade statistics, the exports of sawn wood only grew moderately from the late 1790s to the early 1800s.

of ballasted ships,²⁴³ a typical symptom of a rapidly increasing demand for grain. As was mentioned above, both Britain and Sweden, and probably elsewhere in northern Europe, had experienced crop failures in 1799–1800.²⁴⁴ Thus, the higher numbers of voyages were connected to a relatively short-term fluctuation rather than any long-term economic trend.

To sum up, there is no doubt that Baltic shipping fared tolerably well, at least compared with the contemporary developments of traffic through the Sound. Even if we regard the traffic growth after 1800 as a kind of windfall, generated by harvest failures, even the levels of the late 1790s exceeded those of the mid-1780s by some seven percent, which was definitely better than the average growth (2.6% from 1783/1787 to 1801/1805) at the Sound. While the trading patterns in general remained quite stable, one structural change stands out: Sweden radically reduced its grain imports and simultaneously increased its exports of sawn wood to West Baltic ports.

243. *Königlich Preussische Danziger Nachrichten und Anzeigen*, 1801–.

244. See footnote 217, above.

Drawing Conclusions

23. *The Northern Mediterranean in the 18th century – a longer view*

The two Mediterranean seas bordering Europe differed in several (well-known) respects from each other. The Mediterranean proper is larger by far; moreover, its coasts have always represented a wide cultural diversity. In the 18th century, only the western half of its northern seaboard could be called European: the Ottoman Empire still ruled – at least formally – the rest of the area. In contrast, the Baltic world was more homogenous: at least as far as economic connections were concerned, the political, religious and linguistic borders were effectively bridged by a common mercantile culture: in the 18th century, German (or Low-German) remained the *lingua franca* of the area. The economic geography also contributed to the structures of Baltic trade. Unlike the fairly mountainous northern coasts of the Mediterranean, the Baltic Sea is surrounded by widespread lowlands. While only two big rivers flow into the Mediterranean Sea, the shores and ports of the Baltic Sea are connected with the vast agricultural and forest areas of central and eastern Europe by no fewer than six navigable river-systems which, partly already in the Middle Ages and partly in the 17th and 18th centuries, were supplemented with a number of man-made waterways, canals. In the early modern period, such all-water transport chains were the optimal way to transport bulk goods like grain and timber.

The ability to transport bulk cargo was, of course, of little consequence in the Middle Ages – it only became important in the 16th century, when economic development and urbanization in the Low Countries led to the weakening of autarchy – at least in relation to everyday provisions. The more or less parallel development of sea transport meant it was easier to carry bulky goods from farther afield, thus creating opportunities for the growth in maritime trade. In the course of the late 16th century, at same time as the War of Independence with the Habsburg Empire the merchants of the northern Netherlands created trading networks that stretched from Iberia to the eastern Baltic. In the *Westvaart* leg they carried northwards products like salt and wine, while in the *Oostvaart* trade they imported grain and other Baltic products. The movements of cargoes were coordinated in Amsterdam, which developed into the most important West-European entrepôt, a transport and redistribution centre. For most of the 17th century, this network, the *moedernegotie* ('mother of all trade') as it was dubbed, controlled the commodity flows between the south (Iberia and Atlantic France) and the north (Scandinavian and the Baltic area).²⁴⁵ However, the Dutch

245. See e.g. de Vries and van der Woude 1997, 368–376, 414–419.

mercantile supremacy already was being seriously challenged in the late 17th century by the British Navigation Acts and Anglo-Dutch naval wars.

As was seen before, the hegemony of the Netherlands faded further in the 18th century as British shipping gradually gained the upper hand in the Baltic. Even the Nordic monarchies of Denmark and Sweden tried to limit the Dutch trade with their own navigation acts. In spite of the slow relative decline, the old *moedernegotie* was still going moderately strong in the 1760s. Thus, in 1766, no fewer than 106 ships from Bordeaux alone arrived in Amsterdam²⁴⁶ – it was a figure three times higher than contemporary arrivals in Copenhagen from all the French Atlantic ports.

An interesting thing is that while the British gradually displaced the Dutch from their traditional *Oostvaart* trade, they did not replace them on the *Westvaart* leg. This opened up the trade between the Baltic and southwestern Europe for Danish, Swedish and other Baltic carriers. Neither were the French, Spanish and Portuguese shipping enterprises able to challenge this new 'Nordic' primacy. During the 18th century, and before the French Revolutionary Wars, only limited numbers of southern European ships visited the Baltic waters.

Table 38. Estimate of commodity flows through the Sound and within the Baltic Sea, 1751–1787.

Annual averages, thousand British tons

Type of trade	1751–1755	1783–1787	Index*
Sound, westward	362	733	203
Sound, eastward**	85	190	224
Baltic trade	260–270	500–520	190
Coastal trade	50+	80+	160
Sum total	760–770+	1500–1520+	≈200

* 1751–1755=100

** Including British coal and salt and West-Swedish herring.

Source: Tables 3, 8, 10 and chapters 13 and 18.

Table 38 endeavours to present a plausible estimate of the overall commodity flows to, from and in the Baltic. While the data for more marginal sectors is far from complete, the better-known trades dominate the picture to such an extent that errors in the former are not crucial. As was already noted, the minor eastward flows in the Sound grew faster overall than the westward 'main stream', but this was the result of the fast-growing cargoes of coal, rock salt and Swedish west-coast herring, while the classical *Westvaart* trade grew clearly more slowly.

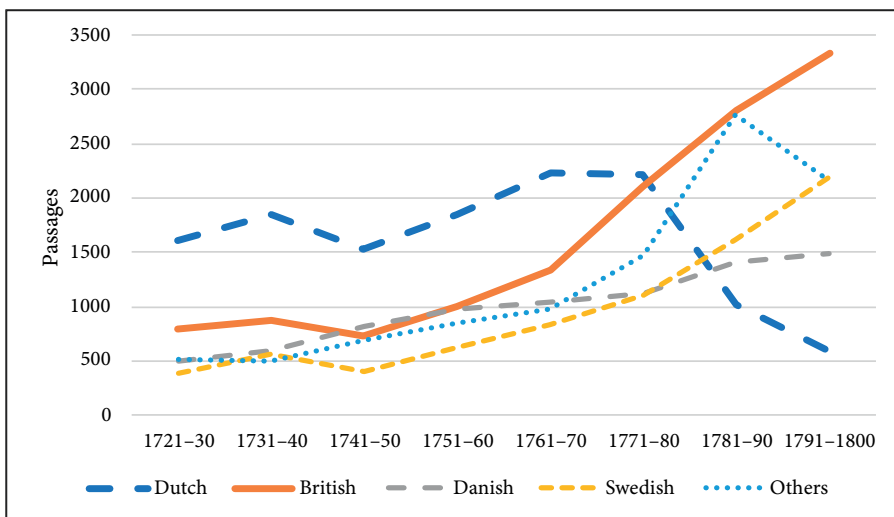
The estimate of commodity flows demonstrates that the growth of Baltic shipping, both beyond and inside the Sound, was faster than the numbers of passages through the *Øresund* suggested. While the 'raw' data on passages increased by 73 percent in the period 1751/1755 – 1783/1787 (see Table 3), the overall *cargo volumes* of all trades in the Baltic area seem to have simultaneously grown by almost hundred percent (or 2.2 % a year on average). In a period when economic growth was still fairly slow, a

246. *De til Forsendelse med Posten allene privilegerede Kiøbenhavnske Tidender*, no.6 (Jan. 19) 1767.

growth rate of two percent a year was unusual. It was even unusual in another sense: nothing similar was experienced in Baltic shipping during the preceding three or the subsequent two decades.²⁴⁷

This exceptional development seems to have resulted from both a fairly consistent demand-driven growth in trade and a parallel improvement in the productivity of shipping. The latter was expressed by the gradual growth in ship sizes: between the early 1750s and mid-1780s the increase in average tonnages was almost 20% for ships passing through the Sound and probably slightly less in intra-Baltic trades. The shallowness of many East Baltic ports, however, seems to have checked this growth; in 1787, the average size of westbound ships in the Sound was no more than 175 British tons (73 Danish lasts). The only big exception from such ‘handy-sizes’ were the Dutch vessels that traded at Narva: as they were loaded at the deep anchorage, real economies of scale could be applied. These ships included a few that were as big as 1000 British tons; the average of Dutch ships loaded at Narva was in 1787 635 tons.²⁴⁸ Bigger ships naturally improved man/ton ratios but, unfortunately, such effects cannot be measured as crew-sizes were not registered at Elsinore. However, since the growth in average sizes did not exceed 20 percent, the changes were probably quite moderate.²⁴⁹

Figure 6. Nationalities of ships passing the Sound
A: Ten-year averages, 1721–1800

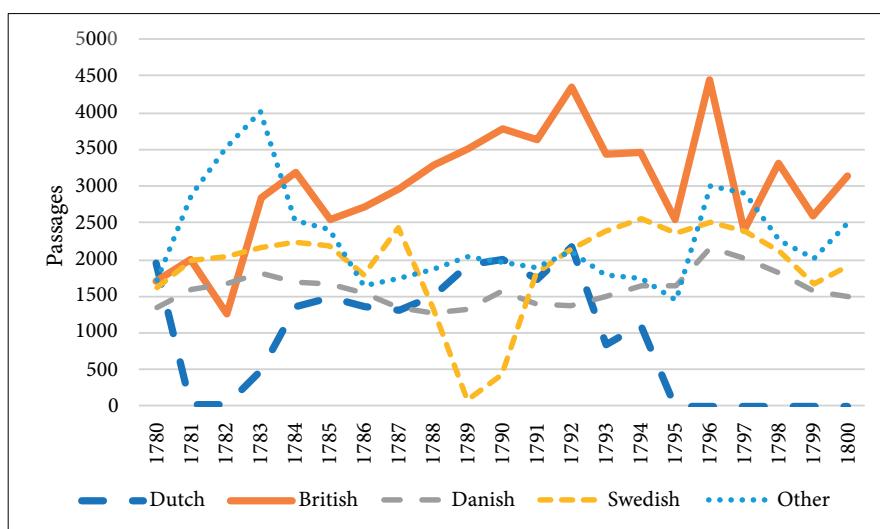


247. As was seen before (Fig. 2) the growth rate in passages was only 0.7% in 1721–1750, and slightly negative in 1788–1805 (Tables 32–33).

248. For big ships see e.g. STRO ids 89230, 105145, 106140; for averages Johansen, *Shipping and Trade*, 92–95. The tonnages of these Dutch bulk-carriers matched those of Far East ships, and since they did not carry many cannons their actual cargo capacities could have been higher.

249. For research on man/ton ratios, see North 1968, 960–962; Unger 1980, 227, 260, 269; Kaukiainen 1997, 7–9; Ojala 199, 164–165; Williams 1980, 111. Among others, the shortening of times in ports and other passive periods between voyages has been mentioned as factors that improved profitability.

B: Annual fluctuations, 1780–1800



Source: Bang og Korst, *Tabeller*, xviii; Johansen, *Shipping and Trade*, 18 (Table 2.1), STRO; After 1795, a regional search for skippers' home ports in the STRO yields unrealistically low national figures; therefore, the data for 1796–1800 are based on Oddy, *European Commerce*, 369.

The traditional approach of interpreting the economics of shipping as a competitive arena between maritime nations can still be regarded valid to some extent.²⁵⁰ As can be seen in Figure 6A, the rise of British shipping had been quite rapid and systematic since the 1740s, over three percent a year until the turn of the century. However, Swedish passages increased even faster across the same time and, even excluding British vessels, all passages through the Sound grew by over 76 percent (1.7% per annum): thus, it seems obvious that the British ascendancy does not explain everything.

Moreover, it should be noted that ten-year averages tend to present the development in a more logical and 'smoother' fashion than was actually the case. This particularly concerns the period after 1780: the annual data displayed in Figure 6 B shows a number of sharp turns, really turbulent times. However, these turbulent periods were not as violent as the fluctuations in nationalities, or flags, recorded at Elsinore would suggest. It should be remembered that flags of convenience were already common in the early modern period (as shown by Dutch or German ships flying Russian flags in order to lower their customs or port dues in Riga or Kronstadt),²⁵¹ and they were particularly common during wars. This fact is clearly illustrated by the role of 'other' flags during the three major disturbances of the 1780s and 1790s: Dutch ships were expelled from the Sound twice (1781 and 1795) and Swedish ships once (during the Russo-Swedish War 1788–1790). In the last case, this resulted in a substantial amount of tonnage being removed from shipping for two years, whereas this did not happen

250. The political aspects of the Baltic trade have recently been emphasized by Werner Scheltjens 2022.

251. See e.g. Johansen 1983, 17; Kaukiainen 2021, 503–504; Kaukiainen 2022, 380–381.

in two instances when Dutch ships were excluded. As has already been suggested, the disappearance of Dutch shipping after 1781 was more apparent than real, causing only a short break before a return to business almost as usual under other more convenient flags. After 1795, the crisis was again followed by a fairly rapid, reciprocal boost of ships flying the flags of Bremen, Emden and a few Ostfriesland ports.²⁵² Such flag changes had been quite common even outside the Baltic. In the late 1770s, the bulk of the trade between the West Indies and Europe had taken place under the umbrella of false Danish papers, and with the expansion of the French Revolutionary Wars, such camouflage procedures even became common in other European long-trades.²⁵³

In an era of the Navigation Acts, the competition between different national fleets not only reflected differences in technical or economic efficiency, institutional and political factors could also be important. Among the political factors, wars were the frequent source of insecurity in the 18th century. In this sense the period between 1751 and 1787 was relatively fortunate. While the Baltic world had been involved, to varying degrees, in the earlier Wars of the Polish and Austrian Successions, the next decades saw only a single major military conflict in this area, the Seven Years' War (1756–1763). After that there was a period of almost two decades during which the variations of Sound passages could rather be interpreted as business cycles. Probably they were amplified by imperfect and slow information transmission – and even climatic variations, particularly the length of the winter, could affect shipping volumes. Even the effects of the American Revolutionary War can be regarded as a hybrid phenomenon: on the one hand, it did not directly affect the Baltic area but, on the other, by inflating freight rates it created an unusually powerful business cycle, during which neutrals, like Sweden and Denmark, harvested the windfalls. The contrast with the following period of almost endemic warfare is striking. While the basic economic structures withstood tolerably well the ups and downs of the military disturbances there is no doubt that the earlier period of systematic growth had ended.

Another irregular but fairly common disruption was harvest failures. However, there were relatively few such failures after 1750: they have only been recorded for 1771–1773 in Sweden and Finland, for 1785–1786 in Denmark and for 1795 in Britain. In terms of international trade, they could be called mixed blessings: while they naturally had a negative impact in the affected regions, they, at the same time, might generate booms for the grain-exporting ports. The slightly declining role of grain in the Baltic commodity flows probably reflects positive developments in West-European agriculture.

24. *The economic impacts of shipping*

Maritime transport has been characterized as 'the world's key industry' and 'the main driver of trade growth – and the emergence and expansion of a global economy'.²⁵⁴ Several authors have proposed that maritime transport had played a key role long

252. STRO. In both cases, the lastages from the small region of 'Hamburg, Bremen, Kleine Oost' increased suddenly from about 400 to 1500–1700. Hardly any Hamburg ships were involved.

253. Feldbæk 1997, 94; see also Kaukiainen 2025, 30–32.

254. Harlaftis, Tenold and Valdaliso (eds.) 2012, 1.

before the present phase of globalization. Thus, Richard W. Unger (2006) claimed that shipping was ‘the engine or a principal engine of growth – in the European economy in the sixteenth and seventeenth centuries.’²⁵⁵ Ten years later, Silvia Marzagalli and Leos Müller attested that ‘[t]he eighteenth century was marked by the globalization of commerce, colonial development, consumer revolutions and the consequent increase of volumes and values of trade and shipping – in short, by a commercial expansion that transformed the world and paved the way for nineteenth-century industrialization.’²⁵⁶

The conclusions above may be characterized as being, more or less intuitively, based on conventional inductive analyses of historical phenomena. In the spirit of cliometrics, such conjectures have also been revisited by applying econometric methods with harder evidence – as far as they can be found. Thus, the idea of shipping as an engine of economic growth was recently overhauled by Alexandra M. de Pleijt and Jan Luiten van Zanden. Their article sought to explain the so-called ‘Little Divergence’, the early modern, above-average economic growth in the UK and the Low Countries, by utilizing a sophisticated regression analysis of GDP growth in England, Netherlands, Belgium, Italy, Spain and Poland across a period from 1300 to 1800, with international trade, land–labour ratio and political economy as independent variables. As there is no reliable data on the growth of international trade for such a long period, the size of merchant fleets (1500–1800) in tons per capita was used as a proxy. Surprisingly, the analysis suggested that ‘there is no significant relationship between international trade and economic development.’²⁵⁷

The study did not discuss the problems of comparability which are inevitable when applying tonnages from different countries and different centuries. An even more serious problem, however, arises from the use of tonnages of merchant navies as surrogates for the volume of foreign trade: this means that the latter is supposed to have developed in harmony with the former. That, again, would imply that an equal volume of international trade (or at least transport services) would always have been produced for one ton – in other words, that there had been no improvement of productivity in shipping between 1500 and 1800. This, however, is far from an established truth. Let us just take one example which refers to a single element of productivity: the ratios between crew size and paying cargo improved substantially across the time, from three or four tons per man in Genoese 15th-century carracks to over twenty in 18th-century northern European merchant ships; moreover, the ratios could vary substantially between different countries.²⁵⁸ On second thoughts, the lack of correlation between tonnages and international trade was in this case completely logical. In actual fact, the regression analysis answered the following contrafactual question: what would the relationship between economic development and shipping have been, if the latter’s productivity had not improved at all since the Middle Ages?²⁵⁹

255. Unger 2006, 104.

256. Marzagalli and Müller 2016, 108.

257. de Pleijt and van Zanden 2016, 391–392, 398, 401–402.

258. For discussion on man/ton ratios and the profitability of shipping see footnote 250, above.

259. It is also worth pointing out that the yield ratio, the proxy for land/labour ratio, is, in essence, a measure of productivity.

Unfortunately, it seems impossible to produce such revised tonnages which would satisfactorily simulate the development of international trade; representative long-term data of, for example, man/ton ratios (or other indicators of productivity) cannot be reconstructed with the sources which are presently available. A more feasible strategy could be to look closer at various economic indicators of shipping in a period of better sources, in order to discern how shipping was connected with other sectors of the economy and identify which kind of impact it may have had on those sectors and the surrounding economy in general.

As was seen above, in 1751–1787, the commodity flows grew in all categories of Baltic trades at good rates. The traffic through the Sound accounted for the highest levels, on average 2.2–2.3 percent per annum.²⁶⁰ While the corresponding overall monetary value of trade obviously increased at a slower rate, even that seems to have approached two percent a year (see chapter 8). These were unusual rates in the 18th century. In western and northern Europe typical GDP growth varied in this period (1700–1820) around 0.5–0.6 per annum – only Sweden was nearing 0.8 and Great Britain (or rather the UK) clearly topped the list with 1.1 percent. In spite of the modest population growth, typically 0.4–0.6 percent a year, the average GDP growth per capita only exceeded 0.2 percent in the UK.²⁶¹ Compared with such economic environment, the development of maritime trade was exceptionally dynamic. An interesting question now is: how dynamic was its impact on different regions and industries?

From the latter half of the 18th century, we already have sources which make it possible to outline, however crudely, a few fundamental features of the direct income generated by shipping. The bulk of shipping income naturally consisted of freights which, basically, were related to lasts or tons or other measures of cargo-hold space. Thus, for example, typical freight rate for a last of rye transported from East Baltic ports to Amsterdam fluctuated in the 1770s and 1780s (excluding boom periods in 1778–1783) between 21 and 25 *gulden* (1.9–2.2 pounds sterling²⁶² - see Figure 6 A, below). As the price of one last rye in Danzig was about 100 *gulden*,²⁶³ the freight amounted to just over twenty percent of the value of goods at the port of loading (f.o.b. price).²⁶⁴ With cheaper products, such *ad valorem* freights might count much higher: according to Oddy, at around 1803, the costs of transporting a load of timber from the Baltic to Great Britain accumulated as follows:²⁶⁵

260. The overall rate has been computed from the estimated east- and westbound volumes in British tons.

261. Population and GDP data according to Maddison 2003.

262. Exchange rates according to McCusker 1978, Tables 1.1, 2.5.

263. De Vries 2019, 386 (referring to an average price 1765–1787).

264. It should be noted that D. C. North, in his well-known article on freight rates and economic development (1958, 538), applied a ‘freight factor’ in which the freight was compared with c.i.f. prices (cost, insurance, freight, that is: import prices incl. transport costs). As in this study systematic values of goods can only be found for ports of loading (as they were recorded in Elsinore), the *ad valorem* freight ratios necessarily refer to f.o.b. prices (free on board or exports prices excl. subsequent transport costs) which produce higher percentages than North’s freight factors.

265. Oddy 1807, 545. Load = usually 50 cubic feet.

'First cost price' (f.o.b. price)	£1:15:6
Freight	£1:15:0
Insurance	£0:0:8
Customs, fees, and Sound dues	£1:10:4.

Oddy's example is interesting as it also shows the size of the other overheads. In this case the freight cost, quite dramatically, almost equalled the initial price of the timber (and even customs dues and other minor costs amounted to almost as high). However, timber freights fluctuated a lot: in the mid-1780s, the freight rates were clearly lower, about £0.8–0.9 per load and, in the late 1750s, as high as £1.5–1.6.²⁶⁶ On the other hand, for really valuable goods, such as wine and colonial goods, the freight ratios were much lower, even sinking below ten percent (but then the insurance costs increased substantially).²⁶⁷

Unfortunately, reliable data for freight costs in the late 18th century is in really short supply – unsurprisingly, most of the discussion on the long-term development of transport costs (such as by North and Harley) has been based on 19th-century data. However, a very rough idea of the overall freight costs can be sketched by grouping the late 18th-century *ad valorem* freight ratios, presented above, into three broad classes: timber products (with a freight ratio of 80%), ordinary goods like grain, salt and vegetable fibres (ratio 20%) and valuable goods like wine and colonial goods (ratio 6%), and computing a weighted average by using the respective volumes of principal westward and eastward commodity groups (as presented in Tables 5 and 10) as weights.²⁶⁸ The resulting overall freight ratios will then be outlined at about 40 percent in 1751–1755 and 45 percent in 1783–1787. As can be seen, the selected specific ratios were fairly conservative; since the estimate is based on very limited evidence, it seemed important to avoid overestimating.

Occasionally, the revenue accumulated from the Sound Toll has been used as a proxy for the overall value of goods carried through the Øresund (as also was done in chapter 8, before). While the general presumption is that the toll charge approximated one percent of the Baltic (f.o.b.) prices, this just requires multiplication by a hundred. However, the revenues did not replicate precise totals of all the commodities that passed through the toll station: the ships were charged, in addition to cargo dues, small additional duties. Moreover, on the other hand, domestic vessels were not liable to pay the cargo toll and there were also some 'free' goods like coal and grinding stones. Wine was charged an exceptional toll of three percent, but all goods not mentioned in the

266. Harley 1988, 873 (table 9, rates expressed as pounds sterling per Petersburg standard à 3.3 loads). Even higher *ad valorem* freights (130–160%) were paid by the timber trade from Wiborg to Cadiz; see Tigerstedt 1940, 117–125. On the other hand, it should be remembered that British consumer prices increased by about at least 2% a year on average during the 1760s through 1790s.

267. It must be pointed out that the big differences in these ratios mainly depended on the price differences of the commodities; freight rates for a specific cargo space, whether accounted per last or British ton, did not vary that much.

268. As wine was charged a toll of three percent, its volume was reduced by 2/3 when computing the weight for eastbound valuable goods.

tariff paid precisely one percent *ad valorem*.²⁶⁹ Unfortunately, no serious research on the actual duty-per-price rates has been undertaken; an open question is, for example, how much the increase in current prices (which was of some importance from the 1750s onwards)²⁷⁰ affected the relative values of the tariff rates. Yet a few examples seem to suggest that one percent is actually a fairly good approximation. According to Hans Chr. Johansen, a representative selection of different types of timber around 1787 indicated average toll rates of about 0.9 percent of the respective Baltic f.o.b. prices. Moreover, Copenhagen price currents also show that grain tolls fell just a little short of one percent of grain prices.²⁷¹ Indeed, it seems that the Sound revenues, multiplied by 100, may slightly underestimate the actual trade values.

In the 1750s, the average annual toll revenue was 240,197 *rigsdaler* and simple multiplication would thus suggest an accumulated trade value of over 24 million. With the estimated freight ratio of forty percent, the compound freight revenue generated by shipping through the Sound would, accordingly, amount to almost ten million a year. For the 1780s, the respective value of trade very probably exceeded 46 million and the freight revenue may have reached almost twenty million *rigsdaler*. The estimates are rough but they must represent minimum values. In any case, these were impressive sums: converted to British pounds sterling those for the 1780s would represent £10.6 and £4.6 million. According to revised official values, England's and Scotland's imports from northern Europe at around 1785 amounted to about £3.8 million – accordingly, the estimated overall freight revenue exceeded it by a clear margin. In fact, it was of the same order as the values of British imports from the Far East or East Indies.²⁷²

An interesting question is, how was this freight income distributed. In the 18th century – and in fact up to the 1930s – the freight agreements were normally concluded on so-called gross terms (later called *liner terms*) which signified that the ship, against receiving the payment for transportation, was liable for all the transport costs, not just the direct voyage costs but as well those for loading and unloading the cargo.²⁷³ This meant that substantial sums had to be paid for port services and labour. How high these costs rose can be surmised from the actual freight rates by relating them to the length of transport. Figure 7 A shows that the trend-line that emulates the accumulation of freight costs by the length of the voyage meets the vertical left line of zero distance far above the zero on the freight scale. This suggests that there were substantial expenses embedded in freight costs which had nothing to do with the length of the voyage. They included various overheads like capital costs, agents' fees and commissions, port fees and probably even the Sound Toll; yet it is obvious

269. All ships, even domestic, were charged a light duty (*fyrpenge*) but for payment in cash they were credited a discount (*føring*) of 4%. Johansen 1983, 116–117; Scherer 1875, 193–205.

270. Abildgren 2009, 285–286.

271. Johansen 1989, 21 (Table 1); the error of estimate was only 4%. Copenhagen price currents were in the mid-1780s published by *Kjøbenhavnske Tidender* in the first issue of each month. According to them the toll tariff for wheat was c. 0.9% of the price, for rye c. 0.7% and for barley c. 0.8%. However, it is possible that Copenhagen-prices were slightly higher than those in East Baltic grain outlets.

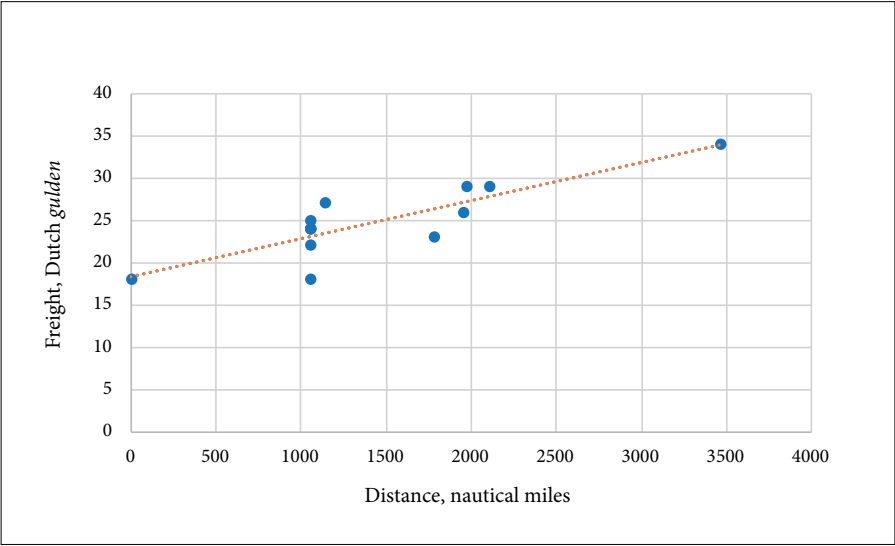
272. Davis 1979, 93–111. The figures for northern Europe include Denmark, Norway and the whole Baltic area.

273. Kaukiainen 2006, 62.

that the costs for actual loading and unloading accounted for an even larger amount among the so-called terminal costs. On the other hand, sailors' wages and the cost of provisions for the next voyage were typical voyage costs – but these were, of course, paid in ports, as well.

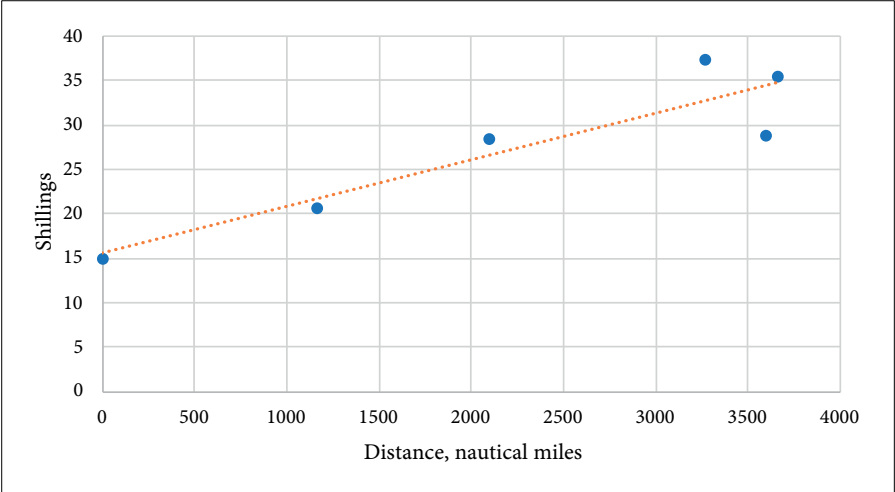
Figure 7. Accumulation of freight costs by the length of the voyage.

A: Freight per last (mainly rye) from the Baltic to Amsterdam, Iberia and the Mediterranean, mid-18th century.



Source: Knoppers, *Dutch Trade*, 172, 202–219. Freight costs of the boom period (1778–1783) excluded.

B: Average grain freight costs per ton, 1872–1874



Source: Kaukiainen 2006, 20–22, 53.

As the 18th-century freight data on which Figure 7 A is based was very small, it is backed up with Figure 7 B, which shows freight costs a hundred years later. In the early 1870s, sail was still in majority on the world's oceans; thus, it is no wonder that the figures look very similar. According to both, the proportions of 'terminal' costs (that is: other than proper voyage costs) was quite high: in the mid-18th century they amounted to no less than 65 percent of the total freight at 2000 miles and in the early 1870s the proportion was almost sixty. On shorter distances the 'terminal' share was naturally even higher: in the mid-18th century, on voyages of around 1000 miles (for example, from Riga to Amsterdam) it amounted to almost eighty percent. Conversely, it meant that increases in voyage lengths added much less to the freight bill than the mileages would suggest: thus, if a ship from Riga sailed to Lisbon instead of Amsterdam (thus doubling the distance), the freight cost only increased by some twenty percent.

The high proportion of terminal costs means that ports derived a substantial income from shipping, both to the public sector and private enterprises and workers. These costs were naturally split between the ports of loading and discharge; as labour was cheaper in the east, it is possible that bills were higher in western ports; on the other hand, stowing the cargo involved more work than unloading. At this point reasonable estimates are not possible anymore. In spite of the recent profusion of port history, actual stevedoring costs remain almost unknown, at least with respect to the 18th century.²⁷⁴ What we do know is that port workers on the Baltic as well as in most of Europe still worked within a guild system.²⁷⁵ Loading and unloading were regarded as a highly specialized art for which only guild members could be used; only such simple tasks as the dumping of ballast could be entrusted to sailors. In any case, if shipping to and from the Baltic amassed almost £5 million a year in freight costs, they spent up to £3 million in 'terminal' costs; whether split evenly or unevenly between east and west, they must have had a substantial economic impact in port cities. In addition, they also ensured at least tolerable living for a large number (maybe some 30,000) of sailors,²⁷⁶ plus even better fortunes for a much smaller number of shipowners.

Similar analysis cannot be done for intra-Baltic shipping: we lack realistic data for both trade values and freight ratios. By analogy, it may be guessed that the exchange of goods, accounting about half of the tonnages recorded in the Sound, generated half as much trade value. Equally, analogous freight regimes can be expected within the Baltic: low-value south-westward trade in timber products very probably accounted for the highest freight factors, while highly priced wine and colonial trade (like that of Lübeck) was the lowest, with grain cargo in between. Because of the shorter distances, freight *rates* were probably some 20% lower than between the Baltic and the North Sea, but that is ultimately no more than a guess.

274. For an overview of recent port history, see Palmer 2020.

275. For a good overview, see Davis 2007.

276. It was estimated that, in the late 18th century, ton/man ratio was about 12 and that individual ships made 1.1 Baltic roundtrips a year (c.f. Johansen 1983, 11–15), thus accounting an aggregate tonnage of c. 700,000. As many ships also sailed on other waters, Baltic voyages typically occupied ships for just half the year or less.

25. Foreign trade, shipping and economic development

Demand for shipping was essentially derived demand and it was tightly connected with the development of foreign trade. What kind of goods, and in which volumes, were carried from A to B was not decided by shipowners but by the merchants and companies which were engaged in overseas trade. However, there was also a backward linkage: the cost efficiency of maritime transport was a very relevant factor when deciding, for example, how rational it was to carry different goods.

While the unequal geographical division of natural resources was a fundamental driving force behind long-range foreign trade, there was also a social dimension, or dimensions, like the price and quality of labour, standards of living and changing consumption fashions. How such elements were manifested in the Baltic trade can be illuminated by re-classifying the respective commodity flows by their primary use.

Table 39. Commodity flows through the Sound, classified by primary use at destination
A: Westward B: Eastward

Commodity group	1751–1755 (%)	1783–1787 (%)	Index*
A: Basic provisions	95 (21)	162 (18)	170
A: Raw materials: timber	157 (35)	399 (44)	254
A: Raw materials: hemp etc.	92 (20)	134 (15)	146
A: Raw materials: other	3 (1)	13 (1)	433
A: Raw materials: all	252 (56)	546 (60)	217
A: Finished and semi-finished**	15 (3)	25 (3)	167
B: Basic provisions (salt)	55 (12)	87 (10)	157
B: Fuels	7 (2)	36 (4)	514
B: Urban luxuries	23 (5)	51 (6)	220

*1751–1755 = 100.

** incl. iron, tar and pitch.

Source: Appendix tables 1 and 2.

Table 39 is in line with the traditional image of the premodern Baltic as a source of raw materials: with their combined share of about sixty percent, they clearly surpass basic foodstuffs (including salt) and urban luxuries, which account at best for a third; thus, the social dimensions do not loom very large. However, it should be remembered that these figures only concern the latter half of the 18th century; before 1700 foodstuffs (grain) dominated the Baltic exports. Timber products, which accounted for the highest share from the 1750s, only started to grow in importance in the 1720s.²⁷⁷ This change mainly depended on the demands for timber from two countries, the Dutch Republic and Great Britain. As far as can be concluded from the *varetransport* tables of the STT, the Netherlands systematically imported more timber than England and Scotland until the beginning of the 1780s. The tables clearly turned during the Anglo-Dutch Naval War and, in the years 1784–1788, the British imports exceeded those of

277. Scheltjens 2022, 13–15; see also Tetradas, cbexcommodities, in particular ‘bjaelker’ and ‘dehler’.

the Dutch by about 50 percent.²⁷⁸ Almost 70 percent of Dutch imports consisted of heavy balks which were sawn at home in windmills to the final dimensions, whereas two-thirds of British imports consisted of finer planks and deals. In both cases these products generated new value-added in construction industry, but it is obvious that the Dutch, thanks to their sawmilling, were able to produce slightly better multiplier effects.

The British and Dutch demand also dominated the exports of vegetable fibres, hemp and flax. In this category, Britain already was the bigger player around the middle of the 18th century: in the early 1760s, it imported twice as much of these raw materials as the Dutch and, in 1784–1788, it had an edge of four to one.²⁷⁹ Before the ‘cotton age’ these were indispensable raw materials in textile industries and handicrafts as well as for ropemaking (hemp). However, since it grew more slowly than timber cargoes, this trade seems not to have been a top-rate engine of growth.

The role of finished and semi-finished goods seems low simply because they were measured according to the cargo volume; value-wise they would have clearly been rated higher.²⁸⁰ The same also applies to the urban luxuries, such as wine and colonial products. Being perhaps ten times more expensive than timber products or six times more expensive than grain (c.f. chapter 8), their aggregate value might not have fallen much below that of the raw materials. On the other hand, the growth rate of luxuries clearly exceeds the population growth of, e.g. Copenhagen and Stockholm which may suggest that the upper classes in urban centres were profiting from thriving trade. That even exports of basic food grew in excess of the normal increase in population can probably be explained by the widening markets for Baltic corn.

For intra-Baltic trade a separate, comprehensive use-specific classification of goods cannot be sketched, but a number of interesting features can be added to the bigger picture. In the Baltic area, Swedish timber exports to Denmark, Holstein and the westernmost German seaboard, as well as fairly modest Danish timber imports from East Baltic ports, represented trades with low-value bulk goods. Another example of cheap bulk goods was Swedish limestone which was carried in small – and declining – quantities around the Baltic.²⁸¹ Their volumes, however, were limited: typically, Swedish timber amounted to only six, at best ten percent of the respective volumes registered in the Sound and limestone would increase the rate to about 15%. Sweden also was the main Baltic importer of grain and these volumes were more impressive: in the 1750s and 1760s, they fluctuated between thirty and forty percent compared to those carried westward through the Sound and, in the mid-1780s, the percentage exceeded sixty.²⁸² It may be said that in these respects, with high proportion for grain

278. Bang-Korst, *Tabeller II:2*; Johansen 1983, 109–111. The estimate for 1784–1788 is based on the specific volumes of different timber products as presented in Appendix 1.

279. Bang-Korst, *Tabeller II:2*; Johansen 1983, 113.

280. For example, value-wise the British imports of iron from northern Europe in the mid-1780s slightly exceeded the respective imports of timber (Davis 1979, 111) while the contemporary shipping volumes of iron only amounted to three percent of timber volumes.

281. Their low value is demonstrated by the fact they only represented some 6% percent of the total value of Swedish exports around 1770 while herring's share was c. 9%. However, it must be remembered that, value-wise, iron products generated two-thirds of Swedish exports.

282. Tables 5 and 17, above. Swedish grain imports also include the west coast.

and low for cheap bulk, Sweden represented a more traditional pattern than the contemporary westward commodity flows in general.

Another, quite different pattern of trade can be found in the West-German seaboard, above all in Lübeck. As we have seen, urban luxuries as well as industrial and handicraft products played an important role in Lübeck's exports to Russia. The respective return cargoes mainly consisted of raw materials albeit fairly valuable ones, such as tallow, wax and leather. Very probably most of it was sent on to industrial and handicraft centres in the interior (see chapter 11). It seems that, in addition to Britain and the Dutch Republic, even certain German proto-industrial regions like Saxony and Rhineland were increasingly importing East Baltic raw materials.²⁸³

* * * *

As seen above, high proportions of cheap and bulky raw materials were the specific feature of Baltic exports. British import statistics tell that in this respect northern Europe (i.e. Baltic and Norway) was number one origin for trade until the 1820s.²⁸⁴ It should, however, be noted that iron was included among raw materials while it was classified as semi-finished product in Table 39. In a sense the British classification implies a relevant point: Swedish iron bars were almost exclusively used as material for further manufacturing. Thus, in Britain they contributed to industrial value-added exactly as conventional raw materials did.

In contrast, imports from a few trans-ocean regions, in particular the Far East and the West Indies, consisted of more valuable products, above all of various luxuries for the urban middle and upper classes. True, even these cargoes could include items which were regarded as raw materials, such as silk and raw sugar but, typically, their prices were much higher than those of Baltic timber or hemp. Most, however, were finished consumer goods, the end results of production unlike raw materials which were refined further in a value-adding process. As was already seen in Table 2, in terms of value, goods from these two regions topped the statistics of British imports.

Volume-wise, however, the picture was different. At least for the 1780s, it is possible to present crude estimates of the actual bulk of cargoes coming from the Far East and the West Indies. As practically all the European Far East trade was undertaken by national monopoly companies, there is plentiful source material for this shipping.²⁸⁵ According to this data, in the 1770s and 1780s, on average some hundred ships a year arrived in Europe with goods from the Far East. However, their aggregate tonnage was only about 74,000, that is, just a tenth of the contemporary westward commodity flows through the Sound – or mere five percent of all the cargoes loaded in Baltic ports. Moreover, as these were big ships on long ocean routes, they had large crews (200–300 sailors and soldiers); accordingly, they also had to carry large amounts of food and water, as well as a number of cannons, which diminished their actual cargo capacities by perhaps a third. Reciprocally, the specific value per ton of their cargoes

283. See e.g. Hahn 2011, 5–7 and Oddy's description of German linen industries: Oddy 1807, 401–411.

284. Davis 1979, 92–93, 110–113.

285. A good summary of that data can be found in Bruijn and Gaastra 1993.

was 20–30 times higher than that of Baltic cargoes. No wonder these were dubbed ‘rich trades.’

Another veritable rich trade, that with the West Indies, provided Europe with sugar, coffee and other ‘colonial’ produce. In addition to Britain, the Dutch Republic, France and Spain also had important West Indian colonies and the aggregate value of their trade may, around 1785, have come close to ten million pounds sterling.²⁸⁶ Tonnages for the respective shipping are not available, but if we suppose that the average value of cargoes were approximately the same as that recorded for sugar in the Sound Toll (c. £90/ton), the British West Indian imports would, in the mid-1780s, have required some 50,000 tons of cargo space and those of all the European colonial powers at least 100,000 tons.²⁸⁷ The latter figure, however, represents no more than a seventh of the contemporary westbound commodity flows through the Sound.²⁸⁸ Even within the Baltic the westward commodity flows accounted for cargo volumes three times higher.²⁸⁹

As crude as the guesstimates presented above are, they at least suffice to show that the common Baltic bulk trades transported really impressive volumes of goods. Moreover, these Baltic volumes – as pointed out before – grew in this period by about two percent a year and the British trade growth was even faster. Unlike the urban luxuries of ‘rich trades’ which mainly tell us about consumption, most commodities included in bulk trades had a logical connection to production and economic growth. This connection was most obvious in the case of raw materials but even the grain trade contributed by improving food security.

26. *By way of summary*

The estimates of Baltic commodity flows (or rather, the volume of shipping employed in these) which have been presented in this study are, so far, the first ones with an almost hundred-percent coverage. Yet, compared with the few earlier, more limited ones (like those by Hans Chr. Johansen), they do not present anything dramatic or radical. This particularly concerns the westward transports which, by showing that the growth of cargo volumes clearly exceeded that of the number of passages, actually

286. See Table 2; Pourchasse 2007, 231–232. After the breakout of the French Revolutionary Wars, Britain was able to establish a dominant position in West Indian trade and the worth of the respective British imports alone soared to almost nine million pounds. Davis 1979, 93.

287. STRO, cargoes with ‘sukker’ in 1785 (toll charge multiplied by 100). Sugar accounted for c. 60% of the total value of the British West Indian imports. Even more expensive products could be found onboard, for example coffee at £200–300 a ton.

288. On the other hand, long trans-ocean trades had high aggregate ton-mileages: around 700 million in the Far East (estimated with a typical distance of 13,000 nautical miles) and 450 million in the West Indies trades (typical distance 4300 nautical miles), as compared with some 650 million for the westward trade through the Sound (typical distance 900 nautical miles) and almost 200 million in the westward intra-Baltic trade (typical distance 500 nautical miles). However, while the number of ton-miles is a reasonable physical measure of the production of shipping services it can also be understood as a rough gauge of (minimum) trade costs.

289. The western high-demand side of intra-Baltic trades was estimated at c. 340,000 British tons; see chapter 13, above.

substantiates the earlier 'default' hypotheses, or educated guesses, of a moderate growth of average ship tonnages. The estimate of eastward cargoes may break some new ground by presenting their proportions, in relation to westward volumes, which were much lower than the respective numbers of loaded ships would suggest. New tonnage estimates also substantially inflate the proportions of Dutch and British ships.

Commodity-specific estimates offer another important dimension in the development. According to these calculations, timber products already accounted for over 40 percent of all cargoes in the early 1750s and their share increased to almost 55 percent during the next thirty years; conversely, the proportions of the classic exports like grain, hemp and flax clearly declined.²⁹⁰

Estimates of intra-Baltic voyages and commodity flows cannot be compared with previous research as there is no such analysis available. The estimate of 5700–5900 loaded voyages a year between the Baltic ports in around 1780–1787 suggests that the traffic frequencies across this region were roughly on a par with the traffic through the Sound (4350 westward and 1650 eastward passages in the same period). However, as Baltic vessels were smaller than those sailing farther west, the respective commodity volumes hardly exceeded 60 percent of those recorded at Elsinore. Given that the Baltic Sea was surrounded by a plenitude of populous cities and well-to-do coastal regions, such volumes of maritime trade between them seem very reasonable. Yet it should be remembered that, until 1804, a substantial proportion of German imports (including those to Berlin) did not arrive in Baltic ports but were unloaded in Hamburg or Bremen – thus avoiding the Sound dues – and subsequently ferried south and east along the Elbe and interior waterways which allowed vessels to travel as far as the Oder.²⁹¹

In the final section of the present study, the Baltic shipping was discussed in the wider contexts of transport costs and economic development. As concerns the former topic, the scanty supply of 18th-century freight data means that part of such discussion must be carried out from a base which, empirically, is not particularly firm. Yet the scale of Baltic commodity flows was so substantial – clearly exceeding the cargo volumes of the main oceanic long-trades – that the evidence seems sufficient to substantiate two important things: at first, the relatively high levels of transport costs and, secondly, the substantial commodity-specific variations in the *ad valorem* ratios. The first point is amply demonstrated by the fact that, in the 1780s, the overall freight costs of the commodities carried through the Sound very probably exceeded the value of all British imports from northern Europe by a good margin. Accordingly, we are dealing with cash flows on a true macro-economic scale. How these flows, whether recorded as income or expenditure, were distributed locally or between different economic actors, cannot be meaningfully discussed because the relevant 18th-century source material is far too scanty. Just a few general implications can be presented. First, it is clear that a big proportion, very probably more than half, of all freight income were synonymous

290. Commodity-specific figures were already presented by Hans Chr. Johansen in 1983. His estimate only concerned the year 1787 and the selection of commodities was limited to the most important ones in the westward trade and salt. Unfortunately, he seems to have presented the volumes in metric tons, which makes comparison difficult; at least his figure for barks seems much too high.

291. This alternative is emphasized in Yuta Kikuchi 2018. See also Oddy 1807, 413.

with cash flows to ports of loading and discharge.²⁹² Secondly, it is equally clear that the high transport costs of timber products increased substantially the differences between the original f.o.b. prices and prices in the destination ports, thus effectively cutting the producers' income. At the other end of the scale, freight rates for iron were very low, sometimes close to nil, which meant that Swedish producers (having much lower costs for overland transport than their Russian colleagues) enjoyed a very high share of the price paid by the British purchasers. However, it must be remembered that no efficient discussion on the costs and obstacles of international trade is possible without taking into account the high level of the contemporary customs dues.

The Baltic 18th-century maritime trade seems to present an interesting case of increasingly efficient shipping. While light and valuable goods have always been easy to carry over long distances, the transport of heavy, bulky, cheap products was, for a long time, prohibitively expensive. Timber trade is a graphic yardstick of this development. In the mid-17th century, when great quantities of grain were already transported from Danzig to Amsterdam, the Dutch did not import timber from further away than Norway; at that time the only wood products which were able to cover the costs of transportation from as far as Stockholm were tar and pitch. However, in the 1660s, Dutch entrepreneurs built a big water-powered sawmill in Narva and, subsequently, a few more on the Ingrian coast.²⁹³ Consequently Baltic exports of sawn timber began to gradually grow but, as was mentioned before, the real expansion took place after the Great Northern War and it gained more momentum during the third quarter of this century. At least indirectly, the improving cost efficiency of bulk shipping even contributed to the rapid growth of Baltic trade during the latter half of the 18th century.

292. Still in the 1860s, over half of the total expenses of Finnish deepwater sailors consisted of different port costs (including provisioning bills). Kaukiainen 1991, 259.

293. de Vries and van der Woude 1997, 378; Åström, 1988, 45.

Appendices

Appendix 1. Estimate of late eighteenth-century stowage factors

A ship's carrying capacity has two dimensions. On the one hand, when carrying heavy goods, the critical factor is the weight of the cargo which may sink the hull below the load line (determined by the minimum safe freeboard) before the cargo holds have been filled. On the other hand, when carrying light cargo, the critical factor is the cubic volume of the commodities: all the cargo holds may be filled but the ship still retains a lot of reserve buoyancy and floats above its load line. In extreme cases, some ballast had to be stowed at the bottom of the cargo-hold in order to lower ship's vertical centre of gravity and ensure sufficient athwart gravity (ship's ability to counteract the heeling pressure of wind on rigging and sails).

This binary nature of capacity is demonstrated by the fact that, depending on commodities, tonnages of ships have been measured by both weight (deadweight) and cargo space volumes. An example of the former is the Swedish *svår läst* ('heavy last') which, at least since 1778, was tested empirically by immersing the vessels using iron weights.²⁹⁴ An example of the latter is the British ton, which originally recorded how many big wine tuns (weighting c. one metric ton) a ship was able to carry. Since empty spaces between the round containers could not be avoided, the ton came to signify the whole space occupied by the tuns. With a gradual 'inflation' of this gauge, the British ton was in the middle of the 18th century equal to c. 1.7 cubic metres of cargo space.²⁹⁵

Compared with weight, light commodities require more space in cargo holds than heavy ones. These differences are nowadays expressed in so-called stowage factors, which most often denote cubic metres per metric ton. As many commodities are still similar to those of the 18th century, modern stowage factors can often be applied to older data, as well. This requires, of course, that old tonnages are expressed in volumetric equivalents. In the case of Danish or Swedish lasts this can be done fairly easily since we know that one Danish *kommercelaest* was equal to 2.4 British tons and the Swedish *svår läst* to two tons.²⁹⁶ Multiplying the British ton's 1.7 cubic metres with

294. Swedish *Kongl. reglemente* 11 Apr. 1778; see also Kaukiainen 2007, 143.

295. Lane 1964, 220-.

296. Johansen 1983, 40–41; Johansen 1992, 489.

these ratios we can estimate that the Danish last represented a cargo space of about four and the Swedish last of 3.4 cubic metres.

While stowage factors of commodities like iron, steel or coal have remained quite similar since the 18th century, the stowage practices have changed in many other cases. Thus, all the grain, as well as linseed, tallow and potash were still two centuries ago regularly shipped in bags²⁹⁷ which – compared with modern shipping in bulk – add to the volume of cargo by some seven percent. Equally, the wooden barrels for liquids have now disappeared or been replaced by metal containers. Nor are such typical 18th-century commodities like tar or pitch recorded in modern lists of stowage factors. However, for many of them normal ratios of stowage in barrels per last are known²⁹⁸ and, since the specific gravity of these goods was close to that of water, the last can be taken as a unit of volume with an addition of c. 20 percent (for the empty spaces between barrels), or a stowage factor of 1.2. Similar factor can also be applied for wine tuns.

The lightest Baltic commodities, flax and hemp, are particularly problematic. They were usually shipped in bales which, if uncompressed, could occupy up to seven cubic metres per ton. In the middle of the 19th century, this volume could be diminished to about 2.5 cubic metres by mechanical pressure and some compression could be achieved even earlier by using pulleys and wedges when loading.²⁹⁹ At least in one case, recorded in 1787, a British ship of 230 tons (390 cbm) managed to load 840 ship-pounds (c. 130 tons) of hemp in Riga – which suggests a stowage factor of around three.³⁰⁰ Of course, this may have been better than the standard ratio of the time but at least it presents a firm ground to estimate the minimum volume of shipping which was needed to transport hemp and flax.

Leather, hides and skins are another problematic group of commodities which were seldom measured for weight or volume but usually counted in deckers (*dægge*), i.e. tens of pieces.³⁰¹ However, in the Sound records some 90 percent of them consisted of Russian so-called juch-leather. According to Horace Doursther's dictionary four deckers of such 'Russian cowhides' were estimated at Elsinore to be equal to one ship-pound.³⁰² As the specific gravity of leather is slightly below one, it can be concluded that the corresponding stowage factor would be around 1.1. For furs (which accounted for much smaller volumes) the factor is clearly higher, around 1.5–2.0 – and more when shipped in bundles.

297. See e.g. de Vries and van der Woude 1997, 414.

298. See e.g. Kaukiainen 1993, 189.

299. Stevens 1863, 17.

300. Johansen 1983, 84; STRO ID 26020. In fact, since the ship in this case, because of stability, also had to take on some ballast in the lower hold, the actual stowage factor of hemp alone must have been better than three. A vivid description of how raw hides were, in the 1830s, pressed into the cargo-hold can be found in Richard Henry Dana's *Two Years Before the Mast*, chapter XXIX.

301. Johansen 1983 explains this unit but does not specify any weight or volume for it.

302. Doursther 1840, 123.

On the basis of the foregoing considerations and a selection of modern data,³⁰³ the following stowage factors (cubic metres per ton) for typical 18th-century commodities seem feasible:

Commodity	Stowage factor	Commodity	Stowage factor
Copper	0.25	Pitch, in barrels	1.1
Iron and steel	0.3	Tar, in barrels	1.2
Limestone	0.75	Salt, in bags	1.0
Coal	1.4	Ash, potash, in bags	1.0
Sugar, in bags	1.2	Tobacco	3.0
Coffee, in bags	1.9	Tallow	1.2
Wheat, in bags	1.4	Hemp and flax, in bales	3.0
Rye, in bags	1.5	Hempseed, in bags	2.1
Barley, in bags	1.7	Linseed, in bags	1.7
Herring, in barrels	1.2	Wine, in barrels	1.2
Hides, leather	1.1	Furs and skins	1.5+

A proper application of these stowage factors naturally requires that all 18th-century physical units of measurement must be converted to metric tons. Local weights and measures varied from place to place, and Werner Scheltjens has proposed – interpreting a few fairly obscure clauses in the Dutch-Danish Toll-Treaty of 1701 – that goods were charged in Elsinore according to the local units of each port of departure.³⁰⁴ However, the summary publication of the Odense Sound Toll project, while it does not explicitly discuss the problem, does not seem to share this interpretation. It published a list of 74 different 18th-century weights and measures – often with commodity-specific variations – which were applied when establishing the actual toll-payments. This list even contains some information about how different weights and measures were interpreted. Perhaps the most interesting feature is that, with regard to grain cargoes, the standard was the Dutch rye last of about 2900 litres. As cereals from some Baltic ports had been measured in local lasts, they were normally converted into Dutch lasts; sometimes, however, the local lasts were recorded in the books but then ‘a different toll rate was used’.³⁰⁵ Such practice is even confirmed by Oddy who reports that non-Danish (non-Dutch) corn measures were ‘reduced to Danish Lasts’ by applying five different port-specific corrections, ranging from +1/7 to +1/3.³⁰⁶ Thus, it seems that conversion to Danish units was the normal procedure but even foreign unconverted units could be recorded in the toll registers. Unfortunately, Johansen did not present any estimates of their relative proportions; the reader, however, gets an impression

303. Stopford 1997, 386; Transport Information Service, https://www.tis-gdv.de/tis_e/misc/staumass.html/ (accessed 20.7.2023); Wärtsilä, [wartsila.com/encyclopedia/term/stowage-factor](https://www.wartsila.com/encyclopedia/term/stowage-factor) (accessed 30.7.2023); Marinesko, marinesko.org/dry-bulk-chartering/stowage-factors (accessed 10.6.2024); Onze, onze.lt/en-cargo-transport-by-sea/stowage-factor (accessed 10.6.2024); cargohandbook.com (accessed 19.8.2024).

304. Scheltjens 2015, 21; Scheltjens 2022, xvii–xviii.

305. Johansen 1983, 124–129.

306. Oddy 1807, 369.

that foreign unconverted measures were exceptions to the rule. Opting for the lesser of two evils, the weights and measures were in this study converted to metric tons according to the 'Odense list'.

No timber or wood products have been included in the table above. This is because they are the most awkward commodities to quantify. They were not measured at all, either for weight or volume; instead, they were tallied by pieces. As such pieces ranged from big masts, sometimes weighing over two tons, to barrel staves and wooden nails, it is clear that the overall totals of pieces (which e. g. the Sound Toll Tables record)³⁰⁷ do not tell us anything meaningful. Fortunately, the Sound Toll Registers are much more specific – so specific indeed that they often contain almost hundred different denominations, some of which are very difficult to interpret. However, the number of really important sorts was not huge. As far as sawmill produced wood was concerned, most of it consisted of three generic assortments of boards, deals and planks; actual dimensions may have varied locally and, in Sweden, the roughly corresponding sorts were called *enkla bräder*, *halvbottenbräder* and *helbottenbräder*.

The most important types of heavier timber were balks (*bjelker*) and sleepers (*sparrar*) which, unlike boards or deals, were formed with axe to a more or less square cross section. Even the very light laths (*laegter*, which were used in Central-European lattice construction) were typically hewn with axes. Barrel staves and bottoms of oak, which were the staple products of North German ports between Stettin and Lübeck, were also hand-made.

The last major group of wood products consisted of masts and other rigging spars. They represented an extremely wide scale of sizes, from long and thick masts to light poles, the only common feature being that they were normally round – and often of larch (which was the mast-tree *par excellence*). Another common feature was that most of them were carried as deck cargo – indeed, a mast sixty feet long and weighting about two tons could not have been stowed below, not even in ships with special timber ports in the stern. This means that they did not demand any valuable cargo-hold space and, being lighter than seawater, only added to the deadweight of the cargo at a fairly moderate rate. Even if the air-dried timbers of the 18th century had a higher moisture content than modern kiln-dried wood, their specific gravities were still clearly below one (e.g. pine and larch c. 0.6, oak c. 0.8).

As the actual weights of different timbers can only be estimate approximately while the respective dimensions are known reasonably well, it seems logical to base their stowage factors directly on cubic volumes. Doing this has been helped by two recent research contributions by Nathan Gallagher and Lauri Karvonen, both of whom record a number of volumes (as well as weights) of different types of items made of wood.³⁰⁸ Gallagher has even estimated the volumes of masts and spars in an innovative way by supposing that the different sizes were exported at the same rate as they were needed in a complete rigging.³⁰⁹ However, it may be proposed that heavier masts, which were in shorter supply in western Europe, might have represented a higher proportion of the exports. Yet, while his estimate seems a bit conservative, it must

307. STT, *Varetransport-volumes*, Tables 3 (*vestpaa, trae*).

308. Callagher 2016, 752–773; Karvonen 2020. For older research, see e.g. Sven-Erik Åström 1988, 201–204.

309. Gallagher 2016, 763–764.

be remembered, on the other hand, that most of the masts and heavier spars were carried as deck cargo, liberating cargo-hold space for more sensitive (light) goods. In this sense, masts on deck could be assigned a stowage benefit of, say, twenty to thirty percent of their actual volume.

The list below gives the typical unit volumes and amounts per one Danish last of four cubic metres.

Balks (*bjelker*): 0.53 cbm/piece, 7.5 pieces per last
 Spars, sleepers (*sparrar*): 0.22 cbm/piece, 18 pieces per last
 Planks (& *helbottenbräder*): 0.14 cbm/piece, 2.4 doz (29 pc.)/last
 Deals (& *halvbottenbräder*): 0.06 cbm/piece, 5.6 doz (67 pc.)/last
 Boards (& *enkla bräder*): 0.04 cbm/piece, 8.3 doz (100 pc.)/last
 Laths (*låkter*): 0.02 cbm/piece, 17 doz (204 pc.)/last
 Masts: 1.0 cbm/piece, 4 pieces/last
 Rigging spars: 0.5 cbm/piece, 8 pieces/last
 Barrel staves and bottoms, average: 0.008 cbm/piece, 8.3 skok (à 60 pieces)/last

While the ratios presented above seem fairly precise, it must be remembered that the actual dimensions of different sorts of timber varied from place to place. Thus, the list must be understood as a collection of approximations. Balks are a particularly critical item, not only because they were number one in terms of volumes but also because their thicknesses varied quite a lot, typically from six to twelve inches. Hans Chr. Johansen believed that they entailed no fewer than 300,000 tons of shipping in 1787. On the other hand, the average thickness computed by Gallagher only suggests half of that tonnage. Indeed, it seems that Johansen's estimate would inflate the total of timber cargoes of the 1780s to an unreasonably high level.³¹⁰

The great diversity of timber products means that the statistics of 'pieces' published in the STT (without any distinction of different kinds) cannot be used when estimating cargo volumes. Fortunately, there is a shortcut which makes it possible to avoid the collection of data for every single timber cargo from the STRO. As mentioned before, Werner Scheltjens undertook, a few years ago, a massive computer project: by exploiting the huge amount of data on commodities, recorded in the Sound Toll Registers, he estimated the overall volumes of commodity flows through the Sound in metric tons. He published his data sets online and, in the case of timber products, they can be used to reconstruct the numbers of pieces of different timber products by dividing the published tonnages by the conversion rates applied by the author (also published).³¹¹

Smaller pieces of wood such as, in particular, barrel staves etc. were recorded in skoks (60 pieces). As the variation in sizes was moderate in these cases, the totals of skoks printed in the STT (table 1), as well as published in Johansen's microfiche tables, have been used in the estimate.

310. Johansen 1983, 108; Gallagher 2016, 762.

311. Werner Scheltjens, *Tetradas*: tonnage estimates of trade through the Danish sound, 1670–1856, <https://journaldata.zbw.eu>; auxconversions, cbexcommodities. As the only measurement in these cases was the number of pieces (instead of several weighs or volumes), such a reconstruction of the original data is possible. For the period 1784–1795, the statistics compiled in the Odense project can also be found in Johansen 1983, Tables 4.10–14 and microfiche appendices.

Appendix table 1. East–west passages: Estimated cargo space required by the main commodity groups, 1751–1787.

Thousand pieces, metric tons, Danish lasts and British tons

CBM = cubic metre

1751–1755

WOOD	Pieces	Pc/last	Dan lasts	Br tons
Balks	218.3	7.5	29.1	69.8
Sleepers	26.7	18	1.5	3.6
Planks	107.7	29	3.7	8.9
Deals	1109.5	67	16.6	39.8
Boards	479.1	100	4.8	11.5
Masts	3	4	0.8	1.8
Spars	4.1	8	0.5	1.2
Staves	*67.5	*8,3	8.1	19.5
Sum			65.1	156.6
GRAIN	tons	CBM/last	Dan lasts	Br tons
Rye	62.6	1.5	23.5	56.4
Wheat	34.2	1.4	12.0	28.7
Other	9.7	1.7	4.1	9.9
Sum			39.6	95.0
HEMP etc	tons	CBM/ton	Dan lasts	Br tons
Hemp	25.5	3	19.1	45.8
Flax	9.7	3	7.3	17.5
Hempseed	11.6	2.1	6.1	14.6
Linseed	14.1	1.7	6.0	14.4
Sum			38.5	92.3
OTHER	tons	CBM/ton	Dan lasts	Br tons
Tar, pitch	12.0	1.2	3.6	8.6
Iron	34.6	0.3	2.6	6.2
Potash	3.3	1	0.8	1.9
Tallow	0.3	1.2	0.1	0.2
Hides, skins	1.7	1.1	0.5	1.2
Sum			7.6	18.1
Sum total			150.8	362.0

1767–1771

WOOD	Pieces	Pc/last	Dan lasts	Br tons
Balks	262	7.5	35.0	84.0
Sleepers	32	18	1.8	4.3
Planks	294	29	9.0	21.6
Deals	1310	67	19.9	47.5
Boards	587	100	5.8	13.9
Masts	9.3	4	2.3	5.6
Spars	10.3	8	1.3	3.1
Staves	*95.6	*8.3	11.5	27.6
Sum			86.6	207.6
GRAIN	Tons	CBM/last	Dan lasts	Br tons
Rye	92.3	1.5	34.6	83.0
Wheat	47.6	1.4	16.7	40.1
Other	17.9	1.7	7.6	18.2
Sum			58.9	141.3
HEMP etc	Tons	CBM/ton	Dan lasts	Br tons
Hemp	23.9	3	18.0	43.2
Flax	11.9	3	8.9	21.4
Hempseed	6.8	2.1	2.4	5.8
Linseed	23.7	1.7	8.5	20.4
Sum			37.8	90.8
OTHER	Tons	CBM/ton	Dan lasts	Br tons
Tar, pitch	9.7	1.2	2.9	7.0
Iron	56	0.3	5.0	12.1
Potash	3	1	0.7	1.7
Tallow	2.4	1.2	0.7	1.7
Hides, skins	1,95	1,1	0,5	1,3
Sum			9.8	23.8
Sum total			193.1	463.5

1783–1787

WOOD	Pieces	Pc/last	Dan lasts	Br tons
Balks	480	7.5	64.0	153.6
Sleepers	150	18	8.3	20.0
Planks	660	29	22.7	54.5
Deals	2660	67	40.3	96.7
Boards	970	100	9.5	22.8
Masts	12.3	4	3.1	7.4
Spars	12.3	8	1.5	3.6
Staves	*137	*8.3	16.5	39.6
Sum			165.9	398.3
GRAIN	Tons	CBM/ton	Dan lasts	Br tons
Rye	80.4	1.5	30.1	72.2
Wheat	62.2	1.4	21.8	52.3
Other	36.5	1.7	15.5	37.2
Sum			67.4	161.7
HEMP etc	Tons	CBM/ton	Dan lasts	Br tons
Hemp	34.5	3	25.8	61.9
Flax	21.2	3	15.9	38.2
Hempseed	7.7	2.1	4.0	9.6
Linseed	22.3	1.7	9.5	22.8
Sum			55.2	132.5
OTHER	Tons	CBM/ton	Dan lasts	Br tons
Tar, pitch	17.2	1.2	5.1	12.4
Iron	67.0	0.3	5.0	12.0
Potash	6.1	1	1.6	3.8
Tallow	12.3	1.2	3.7	8.9
Hides, skins	1.65	1.1	1.8	4.3
Sum			17.2	41.4
Sum total			305.7	733.9

*Staves tallied in skoks, à 60 pieces.

Appendix table 2. West–east passages: Estimated cargo space required by the main commodity groups, 1751–1787.

Thousand pieces, metric tons, Danish lasts and British tons

1751–1755

	Tons	CBM/ton	Dan last	Br tons
COAL	8	1.4	2.8	6.7
SALT	92	1.0	23.1	55.4
WINE*	18.6	1.2	5.6	13.4
COLONIAL	7.4	1.5	2.8	6.7
Col. corr. 50%**		1.4	3.4	
Sum total			35.7	85.6

1767–1771

	Tons	CBM/ton	Dan last	Br tons
COAL	27.7	1.4	9.7	23.3
SALT	102.5	1.0	25.6	61.5
WINE*	22.0	1.2	6.6	15.8
COLONIAL	13.5	1.5	5.1	12.0
Col. corr. 70%**		3.6	8.4	
Sum total			50.6	121.0

1784–1787

	Tons	CBM/ton	Dan last	Br tons
COAL	43.1	1.4	15.1	36.2
SALT	145.1	1.0	36.3	87.1
WINE*	27.8	1.2	7.7	18.5
COLONIAL	20.3	1.5	7.6	18.2
Col. corr. 80%**		6.1	14.6	
Sum total			72.8	174.6

* Thousand tuns (*fads*, à 904 litres).

** Compensation for the underrating of colonial imports in the STRO.

Appendix tables 3: A–H. Comparisons of Baltic and other departures from 1750s to 1780s.
 1= Total number of ships 2= Number of passages westward through the Sound
 3= 1 minus 2, indicating the number of ships for Baltic destinations 4= Percentage of
 Baltic departures.

Averages per annum

3: A. St. Petersburg 1749–1786

Years	1	2	3	4
1749–1752	314	198	116	37
1758–1764	337	226	111	33
1765–1768	435	292	143	33
1772–1775	594	449	145	24
1776–1779	672	514	158	24
1783–1786	700	531	169	24
1793–1796	970	715	255	26
1797–1799	879	617	262	29
1801–1804	1009	639	316	31

Source: Kaukiainen 2021a, 493, 495; Oddy 1807, 122; STRO.

3: B. Riga 1751–1785

Years	1	2	3	4
1751–1755	520	387	133	26
1758–1764	596	352	244	41
1765–1768	822	452	370	43
1772–1775	861	616	245	28
1777–1781*	765	455	310	41
1784–1786	875	555	320	37
1793–1796	883	618	265	30
1797–1799	893	527	366	41
1801–1804	1115	739	376	34

*years 1777, 1779, 1781.

Source: von Storch 1803, 27–28; Oddy 1807, 143; STRO.

3: C. Other Russian Baltic ports, 1761–1763 and 1773–1777

Port	1761–1763				1773–1777			
	1	2	3	4	1	2	3	4
Pernau	72	14	58	81	72	14	58	81
Arensburg	34	3	30	91	9	7	2	22
Habsal	7	1	6	86	12	4	8	67
Reval	145	23	122	84	92	20	72	78
Narva	115	79	36	31	116	92	24	21
Viborg	80	58	22	28	171	89	82	48
Fredrikshamn	37	12	25	68	80	17	63	79

Source: von Storch 1803, 29; STRO.

3: D. Memel 1749–1783

Years	1	2	3	4
1749	110	33	77	70
1762	133	59	74	56
1783	784	699	85	11
1793–1796	691	536	155	22
1797–1799	638	469	169	26
1801–1804	802	636	166	21

Source: Oddy 1807, 223–234; STRO.

3: E. Königsberg 1765–1769

Years	1	2	3	4
1765	823	334	489	59
1768	763	419	344	45
1769	642	305	337	52
1793–1796	766	503	263	34
1797–1799	1132	450	682	60
1801–1804	1162	454	708	61

Source: *De til Forsendelse med Posten allene privilegerede Kiøbenhavnske Tidender*, no. 9/1766, no. 8/1770; Oddy 1807, 231, 235; STRO.

3: F. Danzig 1752–1785

Years	1	2	3	4
1752	986	767	219	22
1765,1769	1152	645	507	44
1770–1772	1091	602	489	45
1773–1775	756	394	362	48
1772–1780	552	346	206	37
1782–1785*	706	(460)	351	50
1793–1796	763	451	312	41
1797–1799	875	538	337	39
1801–1804	1614	880	734	45

*col. 1 and 3 based on *Danziger Anzeigen's* ship-lists.

Source: Oddy 1807, 258–259; *De til Forsendelse med Posten allene privilegerede Kiøbenhavnske Tidender*, no. 9/1766, no. 8/1770; *Danziger Anzeigen*: <https://pbc.gda.pl/dlibra/publication/25465/edition/20528/content>; STRO.

3: G. Stettin 1777–1789

Years	1	2	3	4
1777	1242	173	1069	86
1782	1171	127	1044	89
1783	1209	84	1125	93
1789	1114	99	1015	91
1793–1796	982	155	827	84
1797–1799	834	84	750	90
1801–1804	911	144	767	84

Source: Oddy 1807, 267, 275; STRO.

3: H. Lübeck 1754–1790

Years	1	2	3	4
1754–1760	392	15	377	96
1761–1770	526	18	508	97
1771–1780	560	23	537	96
1781–1785	604	20	584	97
1786–1790	517	20	497	97

Source: Kaukiainen 2022, 372, 385 (data retrieved from *Lübeckische Anzeigen*); STRO.

Appendix tables 4: A–B. Swedish exports and imports to and from Baltic countries:

Estimated cargo space required by the main commodities.

Thousand pieces, tons, Danish lasts and British tons

CBM = cubic metres

A: EXPORTS

1751–1755

WOOD	Pieces	Pc/last	Dan lasts	Br tons
Planks	0	29	0	0
Deals	2.40	67	0.04	0.10
Boards	390.00	100	3.90	9.14
Laths	23.60	204	0.12	0.29
Sum			4.06	9.74
OTHER	Tons	CBM/ton	Dan lasts	Br tons
Tar, pitch	4.19	1.2	1.26	3.02
Iron	9.44	0.3	0.71	1.70
Salt	1.95	1,2	0.59	1.41
Herring	0.05	1,2	0.01	0.02
Sum			2.57	6.17
LIME and limestone	Swe lasts	6.34	5.39	12.93
SUM TOTAL			12.02	28.85

1766–1770

WOOD	Pieces	Pc/last	Dan lasts	Br tons
Planks	1.20	29	0.04	0.10
Deals	46.80	67	0.70	1.68
Boards	754.00	100	7.54	18.10
Laths	196.90	204	0.97	2.33
Sum			9.25	22.20
OTHER	Tons	CBM/ton	Dan lasts	Br tons
Tar, pitch	6.12	1.2	1.84	4.42
Iron	9.37	0.3	0.70	1.68
Salt	1.34	1.2	0.40	0.96
Herring	16.05	1.2	4.82	11.57
Sum			7.76	18.62
LIME and limestone	Swe lasts	5.37	4.57	11.04
SUM TOTAL			21.58	51.79

1781–1785

WOOD	Pieces	Pc/last	Dan lasts	Br tons
Planks	22.80	29	0.79	1.90
Deals	45.60	67	0.68	1.63
Boards	873.60	100	8.74	20.97
Laths	71.20	204	0.35	0.84
Sum			10.56	25.34

OTHER	Tons	CBM/ton	Dan lasts	Br tons
Tar, pitch	6.77	1.2	2.03	4.87
Iron	10.81	0.3	0.81	1.94
Salt	6.38	1.2	1.91	4.58
Herring	24.00	1.2	7.20	17.28
Sum			11.95	28.67

LIME and

limestone	Swe lasts	3.86	3.28	7.87
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SUM TOTAL			25.79	61.90
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Note: A special problem in the Swedish export estimates is the cargo space required for limestone. As its specific gravity is c. 3, all the cargo space could not be filled if no other (lighter) goods were carried onboard. On the other hand, burnt lime was lighter, but the statistics do not specify their respective volumes. As a compromise, the volume of lime and limestone in Swedish lasts, recorded in the statistics, has been used as proxy for cargo volume.

Iron, of course, presents a similar problem when carried in larger consignments. This may have been the case with the most important iron-exporting ports, Stockholm and Gävle. However, no arbitrary corrections have been applied for iron.

B: IMPORTS

1751–1755

GRAIN	Tons	CBM/ton	Dan lasts	Br tons
Rye	16.60	1.5	6.23	14.94
Wheat	4.64	1.4	1.60	3.84
Barley	5.89	1.7	2.30	5.52
Malt	13.01	1.6	5.20	12.48
Sum			15.30	36.78

HEMP etc

Hemp	1.11	3.0	0.83	1.99
Flax	0.96	3.0	0.72	1.73
Sum			1.55	3.72

OTHER

Tallow	0.22	1.1	0.06	0.14
Leather	0.11	1.1	0.03	0.07
Sum			0.09	0.21

SUM TOTAL			16.94	40.71
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1765–1770

GRAIN	Tons	CBM/ton	Dan lasts	Br tons
Rye	31.77	1.5	11.90	28.56
Wheat	3.38	1.4	1.20	2.88
Barley	6.08	1.7	2.58	6.19
Malt	8.36	1.6	3.35	8.04
Sum			19.03	45.67
HEMP etc				
Hemp	1.08	3	0.81	1.94
Flax	1.07	3	0.80	1.92
Sum			1.61	3.86
OTHER				
Tallow	0.43	1.1	0.12	0.29
Leather	0.14	1.1	0.03	0.07
Sum			0.15	0.36
SUM TOTAL			20.79	49.90
1781–1785				
GRAIN	Tons	CBM/ton	Dan lasts	Br tons
Rye	65.13	1.5	34.03	81.67
Wheat	5.52	1.4	1.93	4.63
Barley	9.95	1.7	4.23	10.15
Malt	8.60	1.6	3.44	8.26
Sum			43.63	104.71
HEMP etc				
Hemp	2.15	3.0	1.61	3.86
Flax	1.30	3.0	0.98	2.35
Sum			2.59	6.21
OTHER				
Tallow	0.34	1.1	0.09	0.22
Leather	0.12	1.1	0.03	0.07
Sum			0.12	0.29
SUM TOTAL			46.34	111.21

Appendix 2. Nomenclature

Place names in the study are those in common use during the 18th century. Modern equivalents are found below.

Arensburg > Kuressaar

Christiania > Oslo

Danzig > Gdansk

Elbing > Elbląg

Kolberg > Kołobrzek

Königsberg > Kaliningrad

Libau > Liepāja

Memel > Klaipėda

Pernau > Pärnu

Pillau > Baltiysk

Reval > Tallinn

Rügenwalde > Darłowo

Stolp > Słupsk

Stettin > Szczecin

Swinemunde > Świnoujście

Wiborg (Fi. Viipuri) > Vyborg

Windau > Ventspils

The following Danish and Swedish place names have been written according to modern English or German usage:

Göteborg > Gothenburg

København > Copenhagen

Helsingør > Elsinore

Slesvig > Schleswig

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The Baltic Sea area c. 1770. Map: Eija Hukka.

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Abstract

Shipping and Commodity Flows in the Late Eighteenth-Century Baltic

This study aims to present a comprehensive overall picture of the late 18th-century shipping and maritime trade in the Baltic Sea area. This is done by constructing systematic quantitative series of its volume and scope. Even its international importance is discussed.

The principal data consists of the Sound Toll Records in their different incarnations, from the Sound Toll Tables to the modern online database (STRO). In addition, data on intra-Baltic shipping has been collected from the Swedish manuscript foreign trade statistics, newspapers published in Danzig, St. Petersburg, Lübeck and Copenhagen as well as from contemporary statistical publications.

The Sound Toll Records (as well as most other sources referred to above) only register the numbers of ships, or voyages, while tonnages of ships were not recorded in the 18th century. On the other hand, detailed data about cargoes was collected and from this data the overall commodity volumes can be estimated. This has been done by applying so-called stowage ratios which tell us how much cargo (cubic metres per ton) different commodities required on board ships.

The resulting estimates indicate that the commodity flows through the Sound grew very fast (c. 2% a year) from the 1750s to the beginning of the French Revolutionary Wars. The volumes of intra-Baltic cargoes (which amounted to about 2/5 of the former) also increased almost as quickly. Such growth rates were very rare in 18th-century Europe. Even compared to certain other important sectors of maritime trade these rates and/or volumes were high, clearly exceeding those of e.g. Far East and West Indian shipping.

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