

**CHANGE AND ADAPTATION IN
MARITIME HISTORY
THE NORTH ATLANTIC FLEETS IN
THE NINETEENTH CENTURY**



Edited by

LEWIS R. FISCHER

GERALD E. PANTING

Maritime History Group

1985

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IN MEMORIAM

KEITH MATTHEWS

1938-1984

EDITOR'S NOTE

This volume is dedicated to Keith Matthews, a Principal Investigator with the Atlantic Canada Shipping Project, who passed away in St. John's, on May 10, 1984. Keith was not only a driving force behind the Project but also a founding member and long-time Chairman of the Maritime History Group. He was 45.

Keith Matthews came to Memorial in 1967, primarily to teach Newfoundland history. His seminal thesis, "The West of England-Newfoundland Fisheries," was completed the next year for Oxford University. Over the years he published a series of articles on Newfoundland history which gained him acclaim from specialists. Perhaps most influential was his **Lectures on the History of Newfoundland, 1500-1832**, which has formed the basis for most introductory courses in Newfoundland history.

Although Keith Matthews saw himself very much as a Newfoundland historian, his love for the history of Newfoundland never dwarfed his passion for the sea and the men who wrested a living in that perilous environment. The culmination of this interest was reached in 1971 with the formation of the Maritime History Group, of which Keith was a founding member and Chairman for thirteen years. His energy was crucial to the growth of the MHG as an archive and a research unit with the Department of History.

Keith Matthews leaves behind him an important body of published work in both Newfoundland and maritime history. But he leaves something perhaps even more important as well: a group of scholars all over the world who benefitted from his guidance and example. Although his work was not completed, Keith Matthews left a solid foundation upon which others can build. He will be missed but never forgotten.

L.R.F.
G.E.P.

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PREFACE

This is the sixth and final volume of papers stemming from the annual workshops of the Atlantic Canada Shipping Project. Having examined such diverse topics as shipping entrepreneurs, maritime labor, the regional context, and world trades in previous volumes, this collection is concerned with trying to understand the forces which influenced the major fleets plying the North Atlantic in the last half of the nineteenth century. Participants were requested to focus on the ways in which entrepreneurs and governments reacted toward North Atlantic Shipping in an age of unprecedented growth and change. In addition, the workshop attempted to examine the various ways in which nations succeeded or failed in making the transition from sail to steam.

Eric Sager and Gerry Panting bring together some of the principal conclusions of the Atlantic Canada Shipping Project in their paper on the eastern Canadian fleets. Jeff Safford provides both an historiographic and analytic account of the decline of the American merchant marine. Sarah Palmer in contrast examines the nation which most successfully made the transition: the United Kingdom. Helge Nordvik details another success story in his paper on the fleets of Scandinavia. Walter Kresse examines the incredible rise of the German merchant marine in the years preceding World War I. Finally, Knick Harley places the period of flux in the framework of economic theory.

From this collection of essays a picture of diverse responses and strategies emerges. Shipowners and governments acted in different ways to try to achieve their goals, and it remains unclear just why some nations succeeded while others failed. Although some conclusions are possible, what emerges from the discussions are more questions than answers. Perhaps this is the way it should be; certainly readers of the papers will be able to see more clearly than before the possible directions for future research.

It was this theme of future research directions that formed the basis for many of the remarks by Robin Craig in his conference summary. Adverse circumstances prevented him from revising his comments for publication, but all of the participants recognize the immense contribution that he made to the workshop. In place of his concluding remarks, Panting has prepared a summary of the conference.

We also wish to acknowledge the assistance of our colleagues in the Maritime History Group, especially Heather Wareham, Terry Bishop, Ivy Dodge, Rose Slaney, Lorraine Rogers, and Paula Marshall. To James A. Tague, we wish to extend warm thanks for his unstinting aid in laying out the volume, thereby lightening the load of the editors. Sandy Barry and her colleagues once again performed yeoman service in converting the typescript into print. Kevin Tobin handled our requests for graphics in his usual professional manner. The Social Sciences and Humanities Research Council of Canada and Memorial University of Newfoundland provided the funds for this conference and for the publication of these proceedings.

Our debt to the late Keith Matthews is expressed in the dedication of this volume.

Lewis R. Fischer
Gerald E. Panting

St. John's, August 1984

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1. STAPLE ECONOMIES AND THE RISE AND
DECLINE OF THE SHIPPING INDUSTRY IN
ATLANTIC CANADA, 1820-1914

ERIC W. SAGER
GERRY PANTING

Atlantic Canada Shipping Project

STAPLE ECONOMIES AND THE RISE AND DECLINE OF THE SHIPPING INDUSTRY IN ATLANTIC CANADA, 1820-1914*

Eric W. Sager

Gerry Panting

The Atlantic colonies of British North America were classic staple-producing regions for most of the nineteenth century: the peoples of these colonies depended overwhelmingly upon the production and export of unfinished or semi-processed natural resources. Prominent among the industries which grew directly from the staple economy was one large manufacturing industry — shipbuilding — and one very large service industry — shipping. In terms of total output the two branches of the marine transportation sector were by no means insignificant when compared to the staple industries of the region. Although the precise contribution of these industries to Gross Regional Product remains in doubt, we do possess some measures of their importance. In New Brunswick, shipbuilding output was over half of the value of all timber exports between 1825 and 1879.¹ If the total value of exports is used as a surrogate for staple output (since most resource products were exported), then gross output from shipbuilding was no less than twenty-seven percent as valuable as the output of staple industries in Nova Scotia and New Brunswick between 1825 and 1879.² Output in shipping is much more difficult to estimate, but at its peak gross revenues from the New Brunswick shipping industry were probably not less than forty percent of the gross value of all staples exported from the province³. Between 1820 and 1914 shipowners in Nova Scotia and New Brunswick invested in more than four million tons of new shipping, which may have represented an investment of about 150 million dollars.⁴ By the late 1870s shipowners in these two provinces owned two-thirds of Canada's total shipping capacity, and they were largely responsible for creating what was, however briefly, the fourth largest shipping industry in the world (the countries having greater tonnage on registry were Britain, the United States and Norway).⁵ Our principal theme is the rise and decline of this important industry, and its relationship to the other sectors of the staple economies from which shipping emerged.

Those of us who grapple with this industry have never been unaware of the magnitude of our task. We have been told that we must understand the ships themselves — their construction, their operation and their labour force — since these vessels were not mere statistical abstractions moving across a cliometric sea. Others have suggested that we know too little about the shipowners, who were not statistical abstractions either but men who lived in particular communities and made investment decisions from the perspective of those communities. From the direction of Canadian history come those who argue for a more extensive analysis of the economic and business history of the Maritimes as only in the context of this history may the rise and decline of the shipping industry be understood. Indeed,

without a more thorough analysis of that context a study of the shipping industry may be premature.⁶ To this there is the contrasting reply from maritime historians: the Canadian shipping industry competed in an international market for shipping services. The market itself, and the deployment of Canadian ships within it, must be analyzed and understood thoroughly, for the international market was perforce the context in which Canadian shipowners had to make decisions. Beyond this debate lies the dual challenge of Douglass North: this shipping industry, and the economy of which it was part, must be set within the wider body of economic theory which guides purposeful discussion of economic history; at the same time there must be a popular history of our shipping industry, for the story of these ships is too important to be told to economic historians alone.⁷

This essay will take issue with none of these comments, since all have merit. Instead we offer a few hypotheses about the rise and decline of the shipping industry in both its landward and its seaward contexts. Neither context takes priority, since the shipowner lived and worked simultaneously in both worlds. Ships were factors of production in a service industry whose markets lay both within and beyond the colonies of British North America. The vessel owned in Saint John which sailed from Rangoon to Singapore was operating within both an international market and the New Brunswick economy. The shipowner in Yarmouth calculated his opportunity costs with reference to anticipated returns in an international market as well as to potential returns in alternative industries in Nova Scotia, and his decisions were influenced by experience of more than one industry, since he was never merely a shipowner. Neither was he merely a businessman, of course, and in his pursuit of opportunity costs non-rational influences are likely to be present. Before any such influences can be isolated, however, the economic environment in which shipowners operated must be defined as precisely as possible, for it was this environment which impinged most immediately upon the decisions of shipowning entrepreneurs.

The environment in which our shipping industry arose was that of a pre-industrial society and the decline of shipping occurred during the stage of transition to industrialization. These coincidences were critical factors in the rise and decline of shipowning in Atlantic Canada. The shipping industry grew, first of all, as a linkage from particular staple industries in a society unusually dependent upon staple exports. There can be little doubt that the region was highly dependent upon staples. Unfortunately we cannot measure the importance of staple exports relative to total output in the first half of the century, since estimates of total output do not exist. Some notion of the importance of **exports** comes, however, from a comparison of exports with total population. By this measure Newfoundland presents an extreme case of export dependence, for by the 1820s annual per capita exports were above thirteen pounds sterling.⁸ In the same decade exports per capita in New Brunswick and Nova Scotia, although much lower, were still relatively high (approximately 4.8 pounds per capita in New Brunswick and 5.1 pounds per capita in Nova Scotia). At the same time, exports per capita in the United States were about \$6.83 (about 1.4 pounds sterling) and in Britain domestic exports per capita were only 2.8 pounds sterling.⁹ Of course an unusually large proportion of exports from the Maritime colonies consisted of

unprocessed natural resources, particularly timber in the case of New Brunswick; and fish, timber and agricultural products in the case of Nova Scotia. Dependence upon this narrow range of exports persisted for most of the century. In the five years immediately preceding Confederation, timber accounted for seventy percent of the value of New Brunswick's exports; in the same years, fish products accounted for forty percent of Nova Scotian exports (agriculture accounted for another seventeen percent and timber for eleven percent).¹⁰ Both colonies depended upon imports for a large proportion of their foodstuffs and manufactures.

In recent decades a considerable literature has appeared which attempts to develop a theoretical framework to account for economic growth in such staple-producing economies.¹¹ The point of departure was the staple approach of W.A. Mackintosh and Harold Innis, and the result was "export-base theory." The purpose of the theoretical approach was to link the performance of export staples to aggregate economic growth within a region. By focusing upon the production function for staples one could predict the path of economic growth and diversification around the export base. Linkages from the staple base included backward linkages (whereby the factor requirements of the staple industry stimulate demand which induces growth in other local industries); forward linkages (whereby the output of a staple industry stimulates the growth of industries requiring this product as an input); and final demand linkages (whereby the growth of the export sector, by raising local income and expenditure, can expand the domestic market for locally-produced goods). It is difficult to know how much this approach can tell us about eastern British North America, since very few attempts have been made to apply the theory in this context.¹² It is no surprise to find that Nova Scotia and New Brunswick experienced export-led growth until the middle of the nineteenth century at least; thereafter we simply do not know whether these economies present examples of export-led growth or export-led decline, and as Douglass North has suggested, we may have arrived at the end of what export-base theory can tell us.¹³ Nevertheless, the terminology of export-base theory is appropriate, since shipping and shipbuilding were types of linkages from the developing export base, and the notion of linkages can therefore help us to understand the rise of our shipping industry. Whether these industries were themselves growth-inducing, and whether they produced beneficial linkages, is a complex question which cannot be answered here, although it is worth noting that sixteen years ago Peter McClelland wrote a very important doctoral thesis in which he argued that shipping and shipbuilding generated few growth-inducing linkages or beneficial external effects.¹⁴

The most obvious linkage between staples and maritime transportation occurred between the timber industry and shipbuilding. Shipbuilding was a forward linkage stimulated by the plentiful supply of the necessary building material, and also by the growing demand for shipping capacity on Atlantic trade routes. Although the depletion of timber stands in New Brunswick may have increased the costs of supplying timber to local shipyards by the time of Confederation, building costs do not appear to have risen substantially, and in

this respect, local shipbuilding possessed an important comparative advantage. Shipbuilding became a major growth sector within the economies of Prince Edward Island, New Brunswick and Nova Scotia (annual growth rates of tonnage built between 1825 and Confederation were 4.3 percent for Prince Edward Island, 3.9 percent for New Brunswick, and 4.1 percent for Nova Scotia).¹⁵ Shipbuilders in the region benefitted by the growth of two rapidly expanding markets for ships, a local one in eastern British North America, and an external one, principally in Britain. Vessels frequently found their way into both markets, first carrying timber from the Maritimes to Britain on one or more voyages, and then being sold through a British shipbroker. The shipbuilder who operated a vessel in this manner yielded two returns; one from the freights received in carrying timber, and another from the sale of the vessel itself. According to New Brunswick's Controller of Customs, the freight returns from a single passage with timber could be as much as eight to ten percent of the sale price of the vessel.¹⁶ The net profits received by the shipbuilder or shipowner from these two activities is unclear, and the size of the return has been questioned; but certainly the tonnage involved and gross sales were substantial. Richard Rice has estimated that between fifty-one and sixty-nine percent of the entire shipbuilding output of British North America was sold in the British market between 1809 and 1864.¹⁷ Confirmation of his findings is provided by the data in Table 1, which offers estimates of the volume of newly-registered tonnage in major Maritimes ports sold in various markets. Vessels transferred directly to Britain under Governor-General's pass are not included, but most vessels were registered in the Maritimes before being transferred. The substantial and growing importance of the British market before the 1860s is clear enough. Whatever the profits earned in shipbuilding, the gross returns from this manufacturing industry were very substantial. Exports of ships were not entered into the official trade returns (although most of the imported materials used in ship construction were so entered); if they were entered, New Brunswick exports would be inflated by about nineteen percent in the 1820s, twenty-one percent in the 1830s, thirty-two percent in the 1840s, and forty-one percent in the 1850s.¹⁸ Exports of ships from P.E.I. turned a negative trade balance positive in most years between 1830 and 1870.¹⁹ The returns to factors employed in shipbuilding and the effect of the industry upon regional income levels remain problematic, although McClelland's evidence for 1870 suggests that wider economic benefits should not be exaggerated.²⁰ Nevertheless it is important to note that the export-led economy could generate a very large manufacturing industry from the available resource base.

The ideas discussed above hardly exhaust the stimulus given by the timber industry to the region's marine transport industries. Although shipbuilders appeared content with the short-term earnings from a rapid sale of their products, the importance of freight earnings in the timber trade should not be discounted. Timber stimulated a substantial demand for carrying capacity, and a growing proportion of that demand was met by New Brunswick vessels. Over the four decades prior to Confederation, shipowning in New Brunswick (and elsewhere in the Maritimes) grew even more rapidly than did shipbuilding. The growing

TABLE 1

TONNAGE TRANSFERRED BY PLACE AND DECADE OF REGISTRY (SEVEN PORTS)*

	Transfers to B.N.A.		Transfers to U.K./Ire.		Other Transfers		Sold Foreign		Total Tons Sold Outside B.N.A.	Tons Sold as % of all New Tons	Tons Sold as % of Tons in Service**
	Tons	% of all New Tons	Tons	% of all New Tons	Tons	% of all New Tons	Tons	% of all New Tons			
1820-9	22,329	11.1%	105,697	52.6%	5,026	2.5%	9,210	4.6%	119,933	59.7%	11.3%
1830-9	35,538	11.1	182,322	56.7	7,217	2.2	1,078	0.3	190,617	59.2	13.2
1840-9	64,631	11.9	339,844	62.3	3,972	0.7	5,813	1.1	349,629	64.1	16.0
1850-9	56,289	7.3	500,802	65.1	7,850	1.0	17,733	2.3	528,385	68.4	17.8
1860-9	49,578	6.0	300,741	36.3	20,103	2.4	114,548	13.8	435,392	52.5	9.6
1870-9	34,555	4.5	141,609	18.3	6,184	0.8	185,014	23.9	332,807	43.0	5.2
1880-9	21,370	6.5	18,490	5.6	6,307	1.9	87,374	26.7	112,621	34.2	1.9
1890-9	6,280	5.4	11,837	10.3	7,094	6.1	24,145	20.9	43,076	37.3	1.2
1900-14	21,647	14.1	18,459	21.0	5,458	3.6	42,129	27.5	66,046	52.1	3.0
1820-1914	312,217	7.7	1,619,801	40.1	69,211	1.7	487,044	12.1	2,176,056	53.9	—

*Saint John, 1820-1914; Yarmouth, 1840-1914; Halifax, 1820-1914; Windsor, 1849-1914; Pictou, 1840-1914; Miramichi, 1828-1914; Sydney, 1842-1889.

**Annual average of total tons transferred as a % of annual average of tonnage on registry.

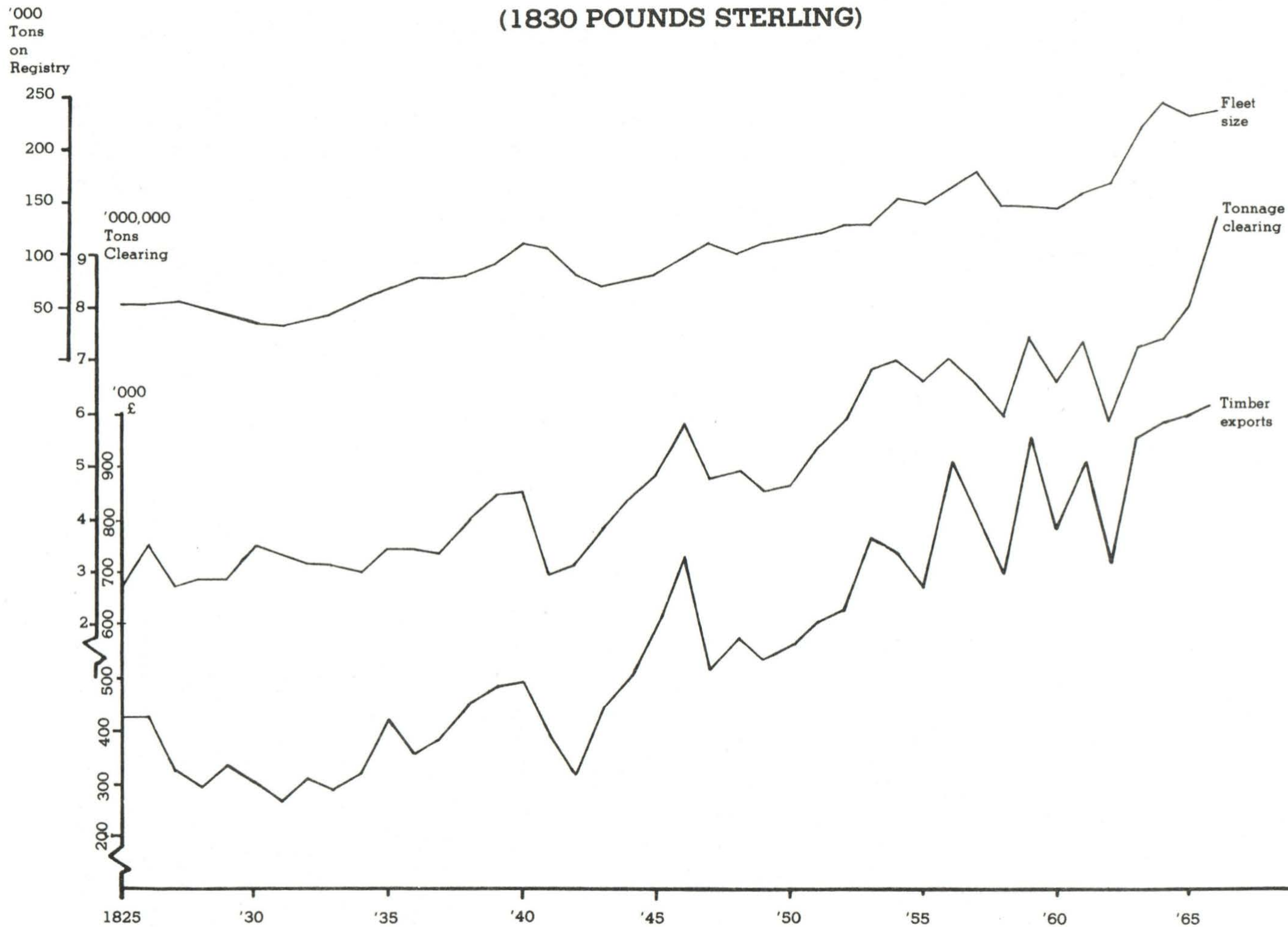
Source: B.T. 107/108 vessel registries.

proportion of vessels sold in the United Kingdom by the 1850s, reflected in Table 1, must not obscure the growing importance of the local market for vessels. Even at the peak of the export trade in ships, thirty-nine percent of tonnage was never transferred outside British North America. From one decade to the next vessels which were transferred remained on the local registry for longer periods, which suggests that more vessels were being used by local shipowners before being transferred. In Saint John, for instance, the fleet on registry grew at an annual rate of 4.5 percent between 1830 and 1859. Even if vessels transferred within three years are removed, the Saint John fleet still grew by 3.2 percent a year, which is significantly faster than the rate of increase of 1.9 percent for total tonnage clearing New Brunswick to the United Kingdom; and almost as fast as the 3.6 percent yearly increase in the constant dollar value of timber exports.²¹ Gradually the timber trade was inducing some local entrepreneurs to operate vessels for the expected freight revenues, and this was occurring before the great shipowning boom of the 1860s.

There can be little doubt that, in New Brunswick at least, the timber trade was the principal stimulus to the growth of shipowning. The staple industry, timber, generated a manufactured product which became an input in a service industry vital to the staple trade itself. Figure 1 suggests how closely the growth of shipping in Saint John mirrored the pattern of growth in the value of timber exports and the volume of tonnage clearing New Brunswick ports between 1825 and 1866.²² The correlations between the three time series are very close: correlating tonnage on registry with tonnage clearing New Brunswick in each year up to yields a coefficient of +.92; correlating tonnage on registry with the value of timber exports yields a coefficient of +.93. There is also a high correlation between either tonnage clearing or timber values and new investment in shipping tonnage over the same period; even annual changes in new investment in shipping were synchronized quite closely with annual changes in the value of timber exports when shipping investment is lagged by a year: up to 1856 the coefficient is +.61. After 1856 other trades exerted a growing influence on the decisions of shipowners. There was a direct causal link shown by these high correlations since the merchants who shipped the timber were very often anticipating their own need for carrying capacity and thus becoming shipowners, however briefly they may have owned each vessel. No less than eighty-four percent of the consigners of timber cargoes from Saint John in 1863 were owners of shipping registered in Saint John; and of T.W. Acheson's forty "Great Merchants" in mid-century Saint John, most of whom were involved in the timber trade, twenty-nine were major shipowners and thirty-seven owned ships.²³ Many of the shipowners in Saint John entered shipping from another direction as well. A large proportion were also shipbuilders, venturing capital in the three closely linked and mutually sustaining industries, the export of timber, the sale of vessels, and shipping.²⁴

To the extent that short-term shipowners and shipbuilders were carrying their own timber in their own hulls, they had a vested interest in keeping timber freight charges to a minimum; indeed, freight charges might conceivably be written off altogether in the interest of maintaining competitive timber prices. There is little

FIGURE 1
SAINT JOHN FLEET SIZE, TONNAGE CLEARING NEW BRUNSWICK
AND VALUE OF NEW BRUNSWICK TIMBER EXPORTS
(1830 POUNDS STERLING)



6

Source: B.T. 107/108 vessel registries, C.O. 193 New Brunswick **Blue Books**. Timber includes all wood product exports.

doubt that by the 1850s, if not before, New Brunswick shipowners or shipbuilders dominated this carrying trade; and if each vessel made two voyages a year, New Brunswick ships could have accounted for the entire volume of cargo shipped to Britain in each year. The local shipping industries must thereby have yielded a substantial reciprocal benefit to the timber trade itself. As McClelland has pointed out, the price advantage enjoyed by New Brunswick timber in the British market relative to Baltic timber was never merely the result of preferential tariffs; it was also the result of a significant differential in freight charges in favour of New Brunswick, and a freight rate which declined at a rate of one percent a year between 1815 and 1849.²⁵ In these circumstances a distinct group of shipowners with a vested interest in freight revenues was unlikely to emerge. Instead, the timber trade spawned a unique type of shipowning staple exporter with a vested interest in low freights, an entrepreneur who maximized the utility of his vessel by shipping his own goods and then selling the vessel when the price was right. Here was a situation which must have encouraged something more than the "gambling spirit" which McClelland attributes to the short-term shipowner, who was forced, McClelland suggests, to accept whatever the wily English shipbroker might offer. This was a situation to encourage not only "gambling" but also a scrupulous calculation of marginal utility, for the shipowner always had the option of deploying his vessel on a second or third passage while awaiting a better selling price. There might come a time, of course, when the calculation would require keeping the vessel for several years. That time came, for many staple shippers, in the 1850s.

Lest there be any doubt about the importance of British North American export trades for this shipping industry in the period of its growth, Table 2 shows the distribution of passages between regions by vessels of four fleets. The data are from the Board of Trade series 98 Crew Agreements, and the sample is large enough to confirm the importance of British North America-United Kingdom trades for these fleets. No less than fifty-three percent of all passages were from British North America to Britain or Britain to British North America, and this is likely to under-estimate the proportion on these routes. Seventy-seven percent of all entrances into port, and the same proportion of tonnage entering, were accounted for by British North America or United Kingdom ports. A third of all passages either began or ended in Saint John, a port of particular importance to the fleet of Yarmouth as well as the fleet of Saint John itself. Eastern United States ports are conspicuously absent, relative to their later importance. In spite of this concentration of shipping activity in British North American trades, there is evidence of some diversification beyond that base as almost a third of all passages neither started nor ended in British North American ports. The short-term shipowner who did not wish to sell his vessel in Britain was clearly exploring other options: of all departures from British ports, fifty-one percent were to places other than Britain or British North America. Nevertheless it is clear that the trading patterns of these vessels confirm our original hypothesis that shipping was a service industry linked closely to its staple base in British North America.

Shipping may have been a type of forward linkage from a rapidly growing export base, but it was more than that. Table 2 does not include that majority of vessels in Atlantic Canada designed for coastal trading or fishing. No less than fifty-three percent of all vessels registered before 1914 in the seven major ports of Nova Scotia and New Brunswick were schooners. Of all tonnage newly registered in these ports twenty-four percent was accounted for by vessels of less than 250 tons each, and the proportion was much higher in the first half of the century. It would be higher still if the Newfoundland fleet were included. The role of these coastal fleets within the staple economy is much more difficult to define than one might imagine. Whether or not these fleets constitute forward or backward linkage is problematic. What is certain is that they were a linkage since the growth of staple industries and the growth of population depending on those industries created the demand for such fleets. Newfoundland offers the most convenient approach to the problem, since in Newfoundland there was only one port of registry and virtually no deep-sea bulk carriers. To a large extent, shipping was a backward linkage in Newfoundland. The staple industries, fishing and sealing, required not only boats but decked vessels as factors of production. The growth of the schooner fleet is closely synchronized with the growth of fisheries output, and the cyclic fluctuations in investment in schooners can be explained in large part as responses to vessel productivity, measured crudely in terms of output per schooner ton employed.²⁶ The seal fishery was particularly capital-intensive, stimulating demand for even larger brigs and brigantines, and later for steamers. The linkages from shipping and shipbuilding on the island were not of a kind to stimulate growth in other industries apart from the felling and sawing of timber. But the preoccupation of export-base theory with linkages beneficial to industrial growth should not distract attention from the critical importance of shipping to the growth of the staple economy itself. Without such vessels the export-base and whatever growth it did generate would not have existed at all. The same vessels performed another function vital to the "traditional" economy. The scattering of population around an extensive coastline created a demand for coastal shipping, and so the same shipping which appeared as a factor of production in the fisheries also functioned as a service industry. It is no surprise to find an extremely high correlation between schooner tonnage in service and the size of Newfoundland's population.²⁷ Coastal shipping was therefore linked by its two functions to the growth of the staple-based economy, and both the rise and decline of shipping in Newfoundland can be explained by the rise and relative decline of the staples which required inputs of shipping tonnage.

The Newfoundland model of staple-based growth in shipping can be applied, with some qualifications, to the growth of coastal shipping in the Maritimes, and particularly in Nova Scotia, where fish was also the principal staple. In this discussion of coastal shipping we focus upon vessels registered in Halifax, for in this port was registered the largest fleet of small vessels in the Maritimes. No less than 46.5 percent of new tonnage registered in Halifax consisted of vessels of less than 250 tons.²⁸ It is difficult to make a precise distinction between coastal and ocean-going shipping, since coastal vessels increased in average size across the

TABLE 2

PERCENTAGE DISTRIBUTION OF PASSAGES OF MAJOR FLEETS, 1846-1854*
(TOTAL PASSAGES: 388)

CLEARED FROM	PORTS ENTERED											
	St. John	Other B.N.A.	Liverpool	Other U.K./Ire.	Europe	East U.S.A.	U.S. Gulf	West Indies	South America	Africa	India	Unknown
St. John		0.5	10.1	12.4		0.25	0.25	0.25				
Other B.N.A.	1.0	1.5	7.5	11.3	1.0			0.25				
Liverpool	5.2	3.1		0.8	0.25	2.1	3.4		0.25	0.25	0.25	0.5
Other U.K./Ire.	1.5	2.3	0.25	1.5	0.8	2.6	1.5	0.5			0.25	0.5
Europe				0.5	0.25	0.25			0.5	0.25		
East U.S.A.	1.5	1.5	1.0	1.5			1.0		0.25			
U.S. Gulf	0.25	0.8	5.2	0.5	0.25							
West Indies	0.25		0.25	0.5			0.5	0.5	0.25			
South America			0.5	1.25		0.25			0.25			
Africa			0.8						0.25	0.25		
India				0.25						0.5		
Unknown			0.5	0.5								
Column												
Total (No.)	38	38	101	121	7	25	28	9	9	5	3	4
% of 388	9.8	9.8	26.0	31.2	1.8	6.4	7.2	2.3	2.3	1.3	0.8	1.0

*Voyages for four fleets are included: Saint John (n=225), Yarmouth (n=53), Halifax (n=47), and P.E.I. (n=63).

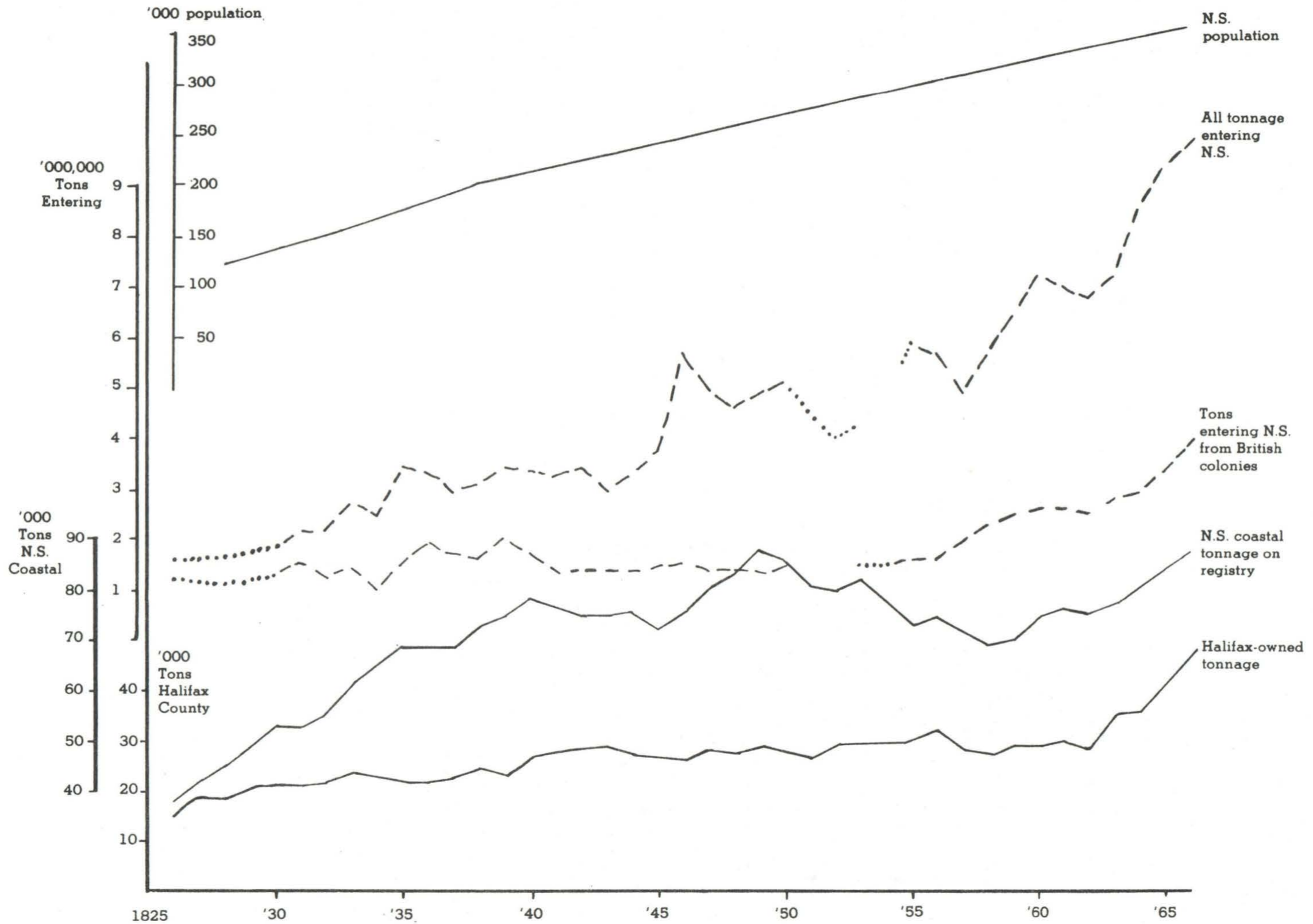
Source: B.T. 98 series "Crew Lists."

century. To include only vessels below 250 tons is highly arbitrary, since many vessels of this tonnage class sailed to South America and across the Atlantic. But we may assume that these vessels were used mainly in coastal voyages along the eastern seaboard of North America, and on passages to and from the West Indies.

Shipowners in Halifax did not venture into the timber trade as extensively as did their contemporaries in Saint John or Yarmouth, and until the shipping boom of the 1860s and 1870s they appear to have shunned the deep-sea trades. Instead, and here they were not unlike their contemporaries in Saint John, they invested in shipping designed to serve the trades in which they were involved as merchant exporters and wholesalers. Most of the major "shipowners" in Halifax in the first half of the century were merchants, earning revenues from the export of fish and other goods to the West Indies, and supplying outport communities with commodities imported through Halifax.²⁹ Samuel Cunard began from such origins, but was exceptional both for the size of his fleet and his early entry into ocean trades. The timber available on the east coast of Nova Scotia was better suited to the building of smaller vessels (when Halifax shipowners did invest in larger vessels most of these came from shipyards on the Bay of Fundy), and here the rapid transfer of vessels to British registry was much less common than it was in New Brunswick or Prince Edward Island.³⁰

We know little about the trading patterns, output or productivity of coastal vessels, since data on voyages by these vessels is scarce. Most of these vessels were used in voyages to British colonies — which means primarily the colonies of British North America and the West Indies. The total tonnage employed on these routes grew slowly between 1826 and 1866, however (see Figure 2). In the late 1820s seventy-four percent of all tonnage clearing Nova Scotia cleared for British colonies, but by the early 1860s only forty percent cleared on these routes.³¹ Halifax-owned tonnage tracked very closely the slow growth of tonnage entering and clearing for British colonies, and there seems to have been no desire by Halifax shipowners to seize a larger share of the freights on these routes. Shipowning in other Nova Scotian ports was expanding more rapidly, however, and as Figure 2 suggests the Nova Scotian coastal fleet (coastal tonnage on registry in Yarmouth, Pictou and Sydney as well as Halifax) was growing in close parallel with all tonnage entering or clearing Nova Scotia. The correlation coefficients in Table 3 suggest how closely the pattern of shipowning in Nova Scotia, and particularly in Halifax, was synchronized with the growth of the volumes and values of trade to and from the colony. Apart from the important trades with Britain, virtually all exports and imports were carried on coastal or West Indian routes. Given that the shipowners were also consigners of cargoes on these routes, there can be little doubt that opportunities in these trades were the major stimulus to shipowning in Halifax and elsewhere in Nova Scotia.

FIGURE 2
NOVA SCOTIAN SHIPPING AND TONNAGE ENTERING



Source: B.T. 107/108 vessel registries; see note 2. Halifax-owned tonnage refers to all tonnage on registry in Halifax with one or more owners resident in Halifax County.

TABLE 3

CORRELATION COEFFICIENTS AND GROWTH RATES,
NOVA SCOTIAN TRADE AND SHIPPING, 1826-1866

	Halifax-Owned Fleet	Halifax-Owned Coastal Fleet	Nova Scotia Coastal Fleet	Annual Growth Rates
Total Value				
N.S. Exports	+ .75	+ .69	+ .68	+ 1.5%
Total Tonnage Clearing N.S.	+ .89	+ .83	+ .75	+ 4.5%
Total Tonnage Entering N.S.	+ .88	+ .82	+ .76	+ 4.4%
N.S. Population (Annual Estimates)	+ .82	+ .90	+ .82	+ 2.7%
Annual Growth Rates	+ 1.5%	+ 1.4%	+ 1.5%	

Source: B.T. 107/108 vessel registries from Halifax, Yarmouth, Pictou, Windsor, and Sydney; Tables of Trade and Navigation, Journals of the Nova Scotia House of Assembly; C.O. 221, Nova Scotia Blue Books and Miscellanea, Tables of Exports and Imports; Nova Scotia Census. All growth rates are estimated from regression equations of the form $\text{Log } Y = a + bt$.

There was clearly a limit, however, to the desire of local shipowners to enter these trades with their own vessels. In contrast to the situation in New Brunswick, in Nova Scotia an increasing proportion of exports and imports were being carried in non-Nova Scotian hulls, as a comparison of the growth rates of fleet size with the growth rates of tonnage entering and clearing, given in Table 3, shows.³² Even within the dominant trades to British North America and the West Indies, Nova Scotian coastal tonnage did not keep pace with the slow growth of tonnage clearing on these routes (2.1 percent a year). This shipowning industry, although by no means small, had reached a threshold beyond which local entrepreneurs did not venture. Halifax merchants appear particularly cautious, for they chose to allow outport Nova Scotians to expand their coastal fleets relative to their own, even though Halifax remained the dominant entrepot through which goods to and from Nova Scotia were trans-shipped.

There are several possible explanations for this caution. First, it was relatively easy for Haligonians, given their geographic location adjacent to major North Atlantic trades, to ship goods in vessels of other countries. More pertinent, however, is the nature of the principal staples being shipped from Nova Scotia — fish and agricultural products. Fish particularly was a commodity of low unit value for which demand would grow no faster than population in established markets. In the absence of a diversification of products or the opening of new markets, the opportunity for expansion of this industry was limited, and the opportunity for earning freight revenues from shipping the commodity was similarly limited. The staple product was therefore unlikely to encourage the growth of an independent class of shipowner. Instead it encouraged the growth of

merchant exporting firms which supplied a portion of the tonnage required, and left much of the shipping business to the large number of small vessel owners in Nova Scotian outports. A further consequence of the staple's low value and its tendency to fall in price was the limit to productivity growth in shipping serving this trade. If productivity is related to the value of goods shipped per unit of shipping employed, it is likely that there was no growth of vessel productivity in the decades before Confederation: between 1826 and 1866 the value of exports to the West Indies grew by a mere 0.3 percent a year, and the value of shipments to British North America by only 0.8 percent a year, while tonnage clearing for British colonies (British North America and the West Indies) grew by 2.1 percent a year. A measure of input costs in shipping may be impossible to calculate, but there is little evidence of a fall in vessel or labour costs so dramatic as to alter this picture of declining productivity. The expansion of Nova Scotian exports to the United States in the 1850s benefitted both the staple sector and its dependent shipping industry, and herein lies part of the explanation for the resurgence of both trade and shipowning in the late 1850s.

We have only begun to explore the connections between shipowning and the staple trades of the Atlantic region. But it does appear that shipping was a service industry, the growth and structure of which was determined to a large extent by demand from particular staple trades, and even by the nature of the staples themselves. This is hardly a surprising conclusion. But our primary purpose is to explain the rise and decline of a shipping industry: the linkages between shipping and local staple trades, it would seem, must now be considered central to this explanation. The staple trades also help to explain the structure of vessel ownership. In Nova Scotia and New Brunswick the industry depended largely upon short-term or part-time owners for whom shipowning was secondary to the production and export of staples. The linkage effects generated by shipowning itself may not have been conducive to wider industrial growth, but the reciprocal benefit of shipowning to the staple trades was substantial, even if productivity gains were limited. In New Brunswick, and even in Nova Scotia (if not Halifax), shipowners provided sufficient carrying capacity to transport most of the region's exports. The principal benefit lay not in the freight revenues earned, but in the competitive advantage afforded local staples by the provision of a large and presumably fairly cheap shipping service; a service which must have helped to maintain net returns in staple trades even as prices fell. This was the economic function of shipping, and the reason for its rapid growth.

The second stage in the history of shipping in the Maritimes began when short-term shipowners began to retain their vessels for longer periods and to enter into ocean trades beyond the original export base in British North America. In this stage, which lasted until the end of the 1870s, a class of shipowners appeared and the proportion of capital invested in shipping relative to investment in staple production expanded rapidly. We have attempted to discover precisely when this stage began. All the evidence points to the conclusion that the transition occurred in the 1850s, and it occurred before the steep decline in the transfer of vessels to the British market in the 1860s. In the fleets of New Brunswick and Nova Scotia, the

average life of vessels (calculated from date of first registry) remained 4.8 years in the 1830s and 1840s, but in the 1850s mean service life increased to 8.2 years.³³ The tendency to retain vessels for longer periods before selling them began in Saint John, where the mean life of transferred vessels (calculated from date of build) increased from 2.6 years in the 1840s to 3.3 years in the 1850s and 6.2 years in the 1860s. Thus the growing proportion of tonnage ultimately transferred to Britain in the 1850s did not retard the growth of physical capital stock as much as it had previously. Figure 3 and Table 4 help to confirm the point. The analysis here is of all tonnage on registry in seven ports after excluding vessels transferred within three years of first registry. The method is not infallible, since there is always the possibility of a considerable delay between actual sale of the vessel and its re-registry in Britain. Nevertheless, this method will exclude most vessels which were sold rapidly outside the region. Although the 1860s remains the decade of most rapid growth in shipowning, sustained long-term growth, particularly in ocean-going classes of shipping, began in the early 1850s. Rapid growth occurred between 1852 and 1855 in four ports: Saint John, Yarmouth, Windsor and Pictou. The timing of this take-off into sustained growth is at first sight surprising, since it coincided with an upward surge in demand for shipping in the British markets. A sharp decline in demand occurred in the late 1850s. Nova Scotian trade returns suggest that newly-built vessels sold in the United Kingdom for 9.6 pounds sterling per ton in 1854 and 1855; prices fell to 7.3 pounds in 1857 and 1858, and to 6.7 pounds in 1860-62.³⁴ While the decision to retain vessels on registry in the Maritimes must have resulted in some part from this fall in price, other factors were at work since the take-off in vessel ownership actually preceded the decline in British demand. It may be that some short-term shipowners were "trapped" into the shipowning industry; but this does not fully explain what was occurring, and given the demand for ocean-going shipping in the years between the California gold rush and the Crimean War, it is unlikely that the entry into shipowning in these years was merely an ill-calculated gamble.³⁵

TABLE 4

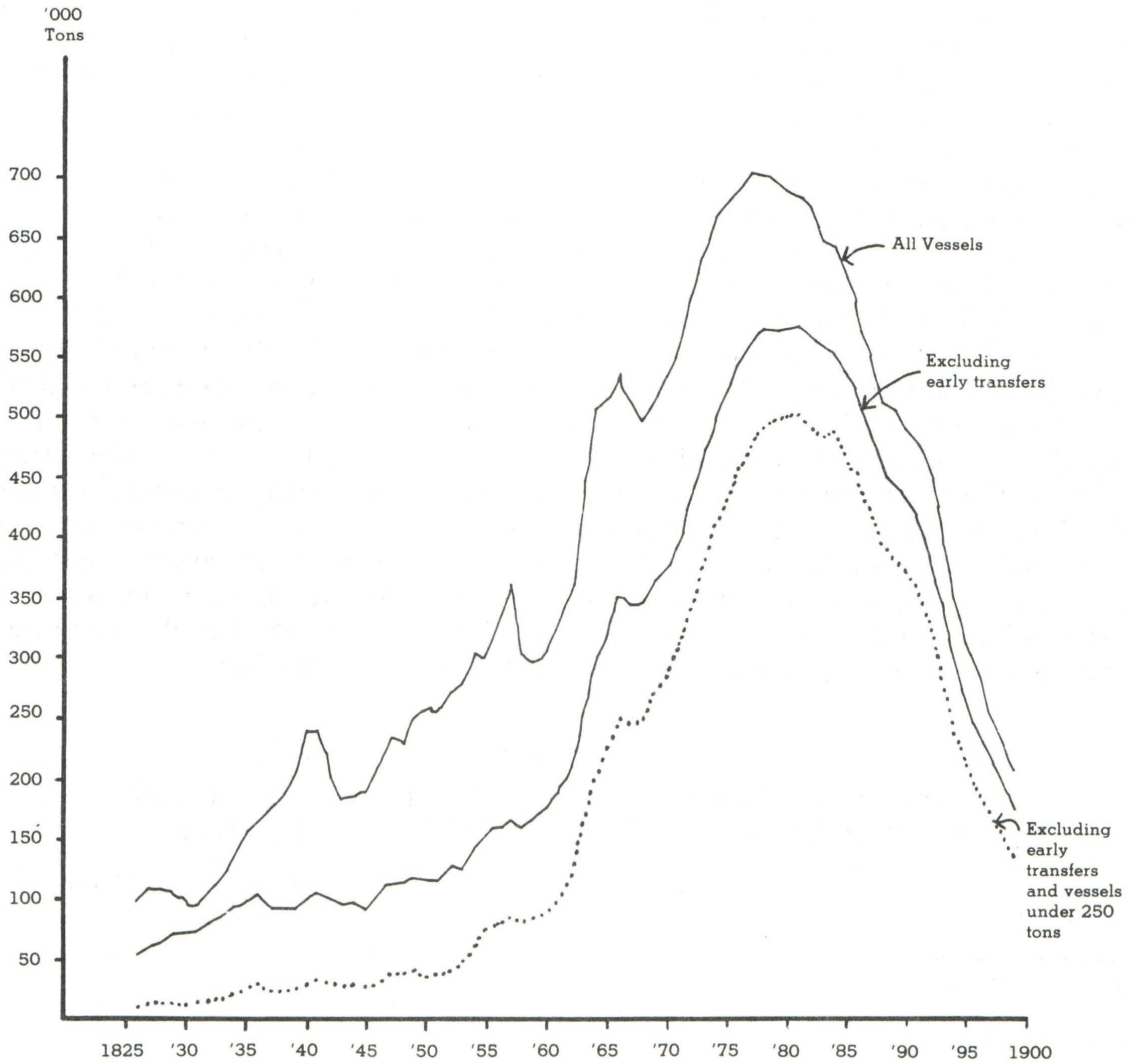
ANNUAL GROWTH RATES OF TONNAGE ON REGISTRY IN SEVEN PORTS INCLUDING AND EXCLUDING EARLY TRANSFERS*

	1826-51	1851-60	1860-80
All Vessels			
Including Transfers	+4.0%	+1.7%	+3.8%
Excluding Early Transfers	+2.3%	+3.8%	+5.9%
Excluding Vessels Under 250 Tons and Early Transfers	+4.7%	+8.3%	+8.4%

*The seven ports are Saint John, Miramichi, Halifax, Yarmouth, Windsor, Pictou and Sydney. Before 1840 Halifax was the major port of registry in Nova Scotia; Pictou and Yarmouth registries opened in 1840, Windsor in 1849. All growth rates calculated from regression equations.

Source: B.T. 107/108 vessel registries.

FIGURE 3
TONNAGE ON REGISTRY IN SEVEN PORTS (SAINT JOHN, YARMOUTH, HALIFAX, WINDSOR, PICTOU, MIRAMICHI, SYDNEY).



Source: B.T. 107/108 vessel registries.

The growth of shipowning in the 1850s may be explained by two events: first, the sustained high level of freight rates in major Atlantic carrying trades in the first half of the decade; and second, the beginnings of a decline in returns from the staple industries of New Brunswick and Nova Scotia. In New Brunswick, the constant dollar value of timber exports indicates healthy, although fluctuating growth in the 1850s and early 1860s. Certainly the volume of timber exports was growing: between 1850 and 1866, the export of deals and deal ends (in measured feet) grew at an annual rate of 2.6 percent. But any increment in returns from this growing volume of exports was wiped out by a steady decline in the price of timber: a weighted index of timber prices suggests a steady decline of 2.7 percent a year between 1853 and 1864. Although the value of all exports continued to increase, and the value of exports per capita increased, the sharp fall in export prices was accompanied by a rise in import prices, and the result was a marked decline in the visible trade balance. Fortunately, McClelland has provided a decadal index of the net barter terms of trade for New Brunswick: this suggests that the terms of trade moved sharply against New Brunswick in both the 1850s and 1860s. Only in these two decades did the import price index rise while the export price index fell.³⁶

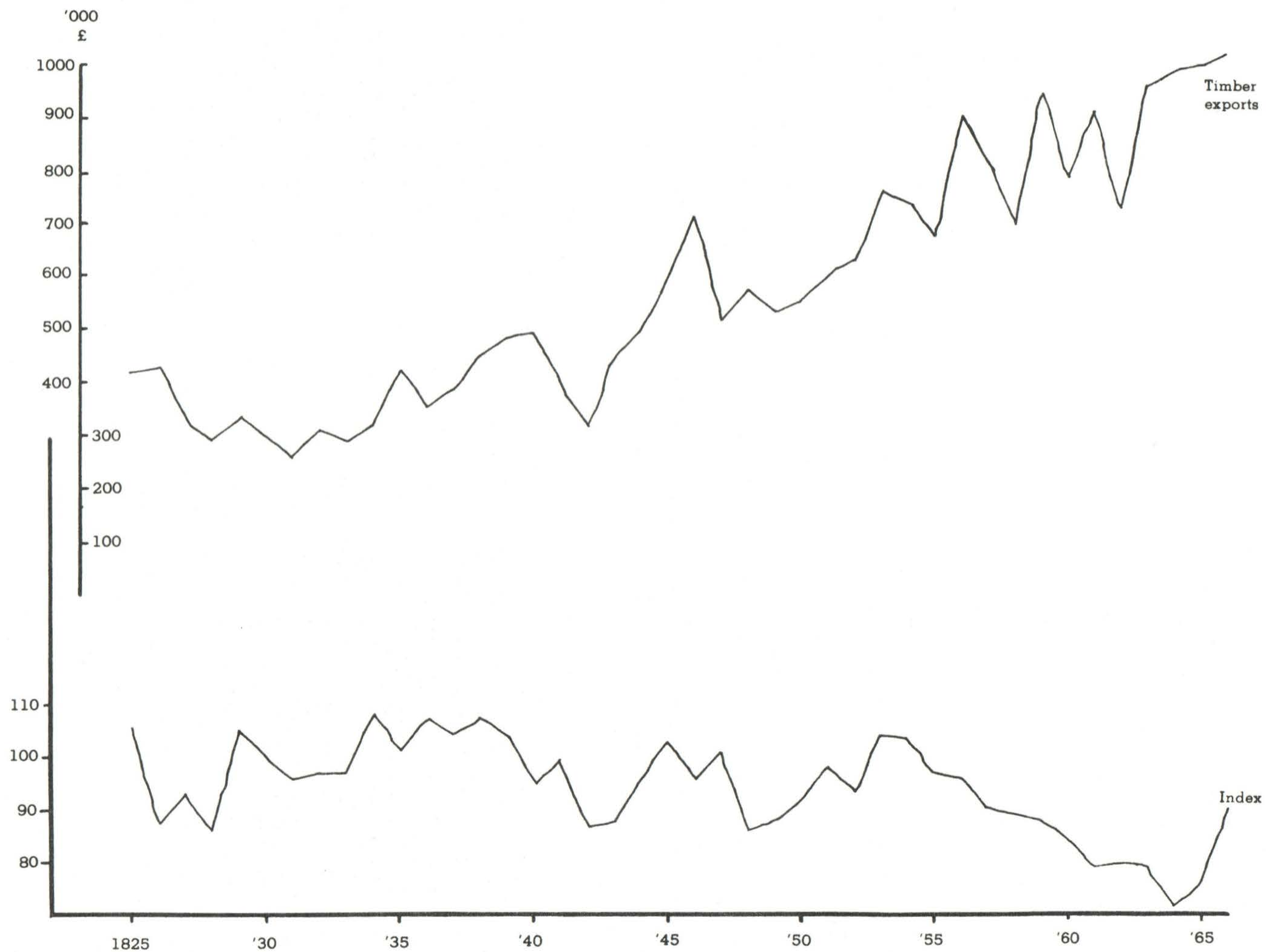
There must have been pressure on real incomes in a society so dependent on exports where the population was growing by 2.7 percent a year. There was certainly a decline in returns to factors of production in the timber industry, despite (or perhaps because of) the growing volume of timber being shipped to Britain from both North America and the Baltic. It is very likely that the New Brunswick staple economy had arrived at the "equilibrium point" defined for us by Douglass North:

For a little while, because of peculiar resource endowments which allow a people to produce something for which there is a demand (however specified and however growing), those people can capture significant rents. Those rents, because they make the opportunity costs of capital so high that they pull in factors from elsewhere, produce a predictable pattern of growth. The pattern of growth continues until you arrive at an equilibrium, a point at which you have dissipated the rents so that, in the traditional neo-classical model, you have an equation between the opportunity cost of capital in a particular export industry and in other economic activities...The frustrating thing is: what happens then?³⁷

Or, one might ask, what other industries appear? Faced with declining rates of return and pressure on real income levels, staple producers had a range of alternatives: lowering input costs, diversification of products, opening new markets, or diversification into other industries. Import substitution was pursued within some staple economies, and there is evidence that this was occurring in New Brunswick in the 1850s. Agricultural output, for instance, increased by fifty-six percent in constant dollars between 1850 and 1860.³⁸

But there was another alternative. Since timber prices were falling, the calculation of marginal utility in shipping may have changed. Returns from the

FIGURE 4
VALUE OF ALL TIMBER EXPORTS FROM NEW BRUNSWICK
(CONSTANT POUNDS STERLING) AND WEIGHTED INDEX OF TIMBER VALUES.



Source: see notes 1 and 21. Timber exports include all wood products exported (mainly ton-timber, deals and boards). The index is based upon 1830 = 100.

sale of both timber and ships were falling but the volume of shipments was growing. In this situation New Brunswick's shipowners appear to have decided that the potential returns from the carrying trades were increasing relative to returns from the rapid sale of their vessels. The Controller of Customs for New Brunswick reported that returns from a single passage with deals could be as high as fifteen shillings per registered ton of shipping in this period.³⁹ It is difficult to know whether this figure is net of all costs; likely it is not, and of course returns fluctuated rapidly. But even if we treat this figure as an expected gross return, a comparison can be made: if a vessel made two passages a year and if it were employed for a mere five years in the late 1850s and 4.5 years in the early 1860s, then gross returns from ship operation could equal gross returns from the immediate sale of the vessel.⁴⁰ The comparison has little value unless we can estimate net returns from vessel sales, and compare these with net returns from vessel operation. But the margin between vessel production costs and the United Kingdom sale price must have dwindled in the 1850s, even if builders were able to benefit from some decline in the price of timber inputs. Freight rates fell briefly in the late 1850s, but freight rates per standard of deals cited in the New Brunswick trade returns suggest that between 1848 and 1863 freight rates remained fairly stable and may even have increased: between these years the freight rate, despite extreme fluctuations, grew by +0.9 percent a year.⁴¹ Furthermore, the better class of vessel being produced in New Brunswick (and inspected since 1852 by a Lloyds surveyor in Saint John) had a longer life expectancy than ever before, and this fact was not unknown to local shippers. It was now possible to amortize the initial investment in a vessel by employing it on one's own account and then make a profit either by continued use of the vessel or by selling it.

Some such calculations as these were undoubtedly being made in New Brunswick in the 1850s and early 1860s. Before we are accused of imputing motives and calculations on the basis of statistical evidence alone, we should offer the views of a man who knew the shipowners well. W.M. Smith was Controller of Customs and Registrar of Shipping in New Brunswick at the end of the 1850s, and a shipowner himself. After frequent laments about the state of prices for both timber and ships, he welcomed the trend towards shipowning with no sense of being "trapped" into a second-best alternative. "New Brunswick is gradually becoming more of a shipowning country than it has been in former years and this is one of the best features in the prospects of the country."⁴² It was Smith who estimated the rate of return in shipping at fifteen shillings per ton, and each year he estimated both the value of ships sold outside New Brunswick and the value of freight returns from shipping timber, noting the increase in the latter relative to the former. By 1864, he knew that shipping was helping to reduce the deficit in the balance of trade:

The most advantageous branch of our trade in 1864 has probably been that of shipowning, which although not exceedingly prosperous for some time past, has been the means of introducing into the Colony a large amount of gold or its equivalent in exchange, to pay for our heavy imports during the year....⁴³

Smith also explained why local shipowners did not invest in iron vessels. He drew upon several years of local experience in shipowning, and his comparison between wood and iron rested upon a knowledge of maximum life expectancies and initial capital costs.

The experience of some of our wealthiest shipowners appears to be in favour of a well built, bay spruce salted ship, as a profitable investment, as such vessels have been known to be running from and to all parts of the world for twenty or thirty years in good condition (with occasional repairs), with this advantage, that the same amount of capital required for the purchase of an iron ship, would purchase two classed spruce vessels of a similar size, which could be kept on the first letter at Lloyd's for upwards of ten years, subject, of course, to the usual periodical inspections.⁴⁴

Using their own manufactured output from their own staple industry, some New Brunswick merchants entered the shipping industry on a full-time basis, shipping their own exports and the exports of other countries.

Nova Scotia may also have arrived at Douglass North's "equilibrium point" as early as the 1850s. Unfortunately, we do not have a terms of trade index, since the appropriate price indices do not exist. It is known that prices of fish exports remained fairly constant between the early 1850s and the early 1860s, and if import prices for New Brunswick increased, they undoubtedly increased for Nova Scotia as well. Whatever happened to the terms of trade, population was growing faster than export values, whereas imports per capita were rising by 2.3 percent a year between 1852 and 1866.⁴⁵ Here too there must have been increasing pressure on income levels in a society so dependent upon external trade. Although the trade figures may be suspect, they do suggest a huge deficit in the balance of trade, which external ship sales could no longer reduce significantly (import values were forty-eight percent higher than export values in the early 1850s, thirty percent above exports in the late 1850s, and forty-nine percent higher than exports in the early 1860s).⁴⁶ One result was an effort to exploit new markets, particularly in the United States. The search for new opportunities led also to ocean shipping, particularly in Yarmouth and Windsor, and then in Halifax. The growing volume of trade with the United States in the Reciprocity years introduced more shipowners and more vessels to eastern American ports, and Nova Scotians were therefore well situated to take advantage of the shipping boom in these ports in the 1860s.⁴⁷

Because of its mobility and because of the existing experience of shipowners in North Atlantic trades, the shipping industry moved easily beyond its original export base in British North America. The export trades of the Maritimes remained important sources of freights in the 1860s, 1870s and 1880s, but little of the growth of shipping reflected in Figure 3 was based on these export trades, which experienced slow growth or decline over the last half of the century. The limited growth of demand for shipping is reflected in the slower growth of tonnage clearing ports in New Brunswick and Nova Scotia. Between 1860 and 1889, tonnage entering and clearing New Brunswick grew by only one percent a

year. Shipping volumes in Nova Scotia appeared somewhat more healthy averaging a 2.9 percent a year increase, but this was because of growth in the decade of the 1880s, while between 1860 and 1879 the rate was only 1.1 percent.⁴⁸

The development of Atlantic Canadian shipping in the 1860s and 1870s rested very largely upon the growth of nearby United States staple trades. American trade statistics suggest how rapidly opportunities for foreign vessels expanded, particularly in the Civil War years. Between 1860 and 1865, American tonnage clearing American seaports declined by 11.3 percent a year.⁴⁹ There followed a slight recovery, but between 1860 and 1880 American tonnage clearing grew by only 1.5 percent a year, while foreign tonnage clearing grew by 10.3 percent a year. In the 1860s and 1870s the average annual increase in total tonnage clearing American seaports was over 500,000 tons. This represents an enormous increase in demand for carrying capacity, and the demand was not being met by American shipowners. Tonnage owned on the Atlantic and Gulf coasts fell by 2.4 percent a year between 1860 and 1889.⁵⁰ Canadian vessels met much of the demand which resulted from the decline in American shipowning.

The result of this shift in trading activities by the British North American fleet was a much more diversified pattern of vessel deployment than that reflected in Table 2. A complete description of voyage patterns between 1863 and 1913 can now be offered, but the picture is a complex one involving fifty thousand passages between ports from the surviving voyage records for four fleets (those of Saint John, Yarmouth, Halifax and Windsor).⁵¹ A passage is any movement by a vessel from one port to another. It would be almost impossible to portray all passages between all ports, and so in the analysis which follows we present all passages between sixteen major regions in the world. Table 5 presents the percentage of all passages accounted for by each trade route. Percentages are given for all passages in each of three periods: 1863 to 1878 (the period of growth in ocean shipping); 1879 to 1890 (the beginning of the decline in all fleets except that of Windsor); and 1890 to 1913 (the final period of decline). Thus if we want to know what proportion of all passages in the 1863-78 period were between ports in eastern British North America and other ports in the same region, we refer to column one and row one in Table 5: 2.3 percent of all passages began in eastern British North America and ended in eastern British North America. In the same period 11.1 percent of all passages began in a port in eastern British North America and ended in a port in the United Kingdom or Ireland.

There is more than a descriptive purpose to this type of analysis. This is a description of the markets in which those operating a service industry earned revenues. Before any explanation for the decline of this industry can be completed we must know as precisely as possible which markets were being served and, if possible, what revenues were being earned in major markets.

The last row in Table 5 offers a convenient summary of the whole, giving the proportion of entrances accounted for by each region in each period. Eastern

TABLE 5

PERCENTAGE DISTRIBUTION OF PASSAGES BY FOUR MAJOR FLEETS
 (% OF TOTAL PASSAGES: PERIOD 1 TOTAL — 26,306; PERIOD 2 — 19,520; PERIOD 3 — 4269)

		East B.N.A.	U.K./ Ire.	North Europe	South Europe	Mideast/ Black	East U.S.	U.S. Gulf	West North Am.	West Indies	East South Am.	West South Am.	Africa	Far India	Aust./ East	N.Z.	Other
East	1)	2.3	11.1	0.2	.03	.01	1.1	.07	0	0.6	0.3	.04	.01	.01	.01	.02	.04
B.N.A.	2)	1.5	6.9	0.3	.05	0	0.5	.02	0	0.7	0.3	0	0	0	0	.02	.05
	3)	2.2	11.2	.09	.05	0	1.0	.02	0	0.2	1.4	0	.02	0	0	.05	0.1
U.K./	1)	5.6	7.4	0.5	0.3	0.3	9.7	1.6	.03	2.6	1.5	0.4	0.1	0.8	0.3	0.3	0.1
Ire.	2)	3.7	6.9	0.4	.08	.02	8.2	0.9	0.1	0.6	4.0	0.1	0.4	0.4	0.4	.07	.09
	3)	5.9	11.3	0.2	.07	0	1.5	1.2	0.1	0.2	4.4	.05	1.4	.09	0.2	.02	.09
North	1)	0.8	2.6	0.8	.05	.01	3.2	0.3	0	0.2	0.1	.04	.02	0	.01	.01	.01
Europe	2)	0.8	2.0	0.9	0.1	0	7.8	0.5	.03	.08	.05	0	.02	.01	.02	.02	.02
	3)	0.7	1.4	0.3	.05	0	1.0	0.2	.09	.02	.05	0	0	0	0	0	.05
South	1)	0.1	0.2	.09	0.4	.02	0.3	.02	0	.07	.03	0	.02	0	0	0	0
Europe	2)	.09	0.1	.03	0.3	.01	0.5	.05	0	.08	.06	.01	.04	0	0	.01	0
	3)	.05	.07	.02	.05	0	.05	.07	0	.02	.05	0	0	0	0	0	0
Mideast/ Black	1)	0	.01	0	.01	.02	0	0	0	0	0	.06	.01	.09	0.1	0	0
	2)	0	0	0	0	0	0	0	0	0	0	0	0	.02	0	0	.01
	3)	0	0	0	0	0	0	0	0	0	0	0	0	0	.02	0	0
East	1)	2.5	8.2	5.7	0.3	.02	2.1	0.2	0	1.0	0.7	.04	.04	.01	.01	.03	0.1
U.S.	2)	1.0	8.1	14.1	0.6	0	1.7	0.2	.01	0.5	1.1	.06	.08	.08	0.7	0.2	.05
	3)	1.9	2.9	1.9	.07	0	1.4	0.3	0	0.6	2.8	.05	0.5	.05	0.9	0.6	.09
U.S.	1)	.05	2.1	0.5	.05	0	.05	0.2	0	0.2	.05	0	0	0	0	.02	.01
Gulf	2)	.03	1.5	1.0	.07	0	.08	0.2	0	.06	0.2	0	0	0	0	0	.01
	3)	.02	2.0	0.4	0	0	.02	0.5	0	0.3	1.8	0	0	0	0	0	.07
West	1)	0	0.1	.01	0	0	0	0	.09	0	0	.03	0	0	.02	.02	0
North Am.	2)	0	0.5	0.2	.02	0	0.1	0	0.3	.01	.02	.06	.01	.01	.03	.08	.01
	3)	.02	0.4	0.3	0	0	.05	0	0.7	0	0.1	.07	.02	0	.07	0	0
West	1)	0.3	1.5	0.2	.01	0	2.6	0.4	0	1.7	.07	.01	0	0	0	0	0
Indies	2)	0.3	0.1	.05	.02	0	1.4	0.5	0	0.6	.08	.03	0	.01	.01	0	.01
	3)	0.7	.09	.07	0	0	1.6	0.9	0	0.7	0.2	0	0	0	0	0	.02
East	1)	.06	0.5	0.2	.02	0	0.5	0.2	.03	0.8	0.8	0.6	.02	.03	0.1	0	.01
South Am.	2)	0.6	0.4	.07	.02	0	1.4	0.8	0.2	1.3	1.1	0.5	.01	0.2	0.1	.07	.02
	3)	1.1	1.4	0.7	0	0	2.6	1.7	0.3	2.7	4.1	0.3	0.3	.09	0.2	0.8	0
West	1)	0	0.8	0.5	.07	0	.05	0	.02	.02	.02	1.9	.02	0	0	0	.02
South Am.	2)	0	0.2	0.3	.01	0	0.1	0	0.1	.05	.04	0.9	.01	.01	0	0	0
	3)	0	.07	0.1	0	0	0.2	0	.05	.05	0	0.7	0	0	0	0	0
Africa	1)	0	0.1	.02	.03	0	.05	.02	.01	.02	0	.02	.07	.04	.05	.02	0
	2)	.07	0.1	.03	.02	0	0.1	.07	.01	.05	.05	.01	0.1	0.1	.07	.02	.01
	3)	0.3	0.1	.02	0	.02	0.2	0.3	.02	0.3	0.1	.02	0.2	0.2	0.1	0.4	0
India	1)	.01	0.4	.09	0	.02	.07	.01	.03	.01	0	0.1	.09	.02	0.3	0	.01
	2)	0	0.2	0.2	0	0	0.3	0	.01	0	.01	.01	0.1	0.3	.06	.02	.01
	3)	0	.05	0	0	0	0.3	0	0	0	0	0	.09	.05	.02	0	0
Far East	1)	0	0.4	0.1	0	0	.03	0	.05	0	0	.06	0.1	0.2	0.4	.02	.01
	2)	.09	0.4	.07	.04	0	0.4	0	0.3	.01	0	.04	.07	0.2	1.1	.01	.02
	3)	0.3	0.2	0.1	.02	0	1.4	0	0.5	.07	0	0	.09	.07	1.5	0.1	.05
Aust./ N.Z.	1)	0	.02	0	0	0	0	0	.05	0	0	0.2	0	.05	.04	0.2	.01
	2)	.01	.04	.04	0	0	.01	0	0.1	0	.01	.04	.01	.03	0.2	0.3	0
	3)	.02	0.2	.07	0	0	0	0	.02	0	.02	0	0.2	0	1.4	0.8	.02
Other	1)	0	.02	.01	0	0	0	0	0	0	0	0	0	0	0	0	0
	2)	0	0	.01	0	0	.01	0	.01	0	0	0	0	0	0	0	0
	3)	0	.02	0	0	0	.05	0	0	0	0	0	0	0	0	0	0
Column	1)	3107	9323	2366	344	103	5182	826	78	1919	958	922	138	420	359	156	105
Total	2)	1604	5394	3420	261	5	4458	596	242	652	1350	358	165	264	534	162	55
(No.)	3)	568	1343	183	13	1	488	221	73	221	642	47	112	22	192	116	22
% of all	1)	11.8	35.4	9.0	1.3	0.4	19.7	3.1	0.3	7.3	3.6	3.5	0.5	1.6	1.4	0.6	0.4
Entrances	2)	8.2	27.6	17.5	1.3	.03	22.8	3.1	1.2	3.3	6.9	1.8	0.8	1.4	2.7	0.8	0.3
	3)	13.3	31.5	4.3	0.3	.02	11.4	5.2	1.7	5.2	15.0	1.1	2.7	0.5	4.5	2.7	0.5

1 = 1863-78
 2 = 1879-90
 3 = 1891-1913

Source: Crew Agreements for vessels of Saint John, Halifax, Yarmouth, and Windsor contained in the archive of the Maritime History Group, Memorial University.

British North America is much less important than it had been in the years from 1846 to 1854. British entrances, although thirty-five percent of all entrances, were also much less important. Instead entrances into American and European ports had increased, and they became even more important in the 1880s. Fully thirty-four percent of all passages in the first period, and forty-four percent in the second period, were from the United States to Britain or Europe, or back from Britain or Europe to the United States. The North Atlantic contained most of the preferred trades in all periods, and the proportion of passages wholly within the North Atlantic (including United States Gulf ports but excluding the West Indies) changed little between the first and second periods (seventy-one percent) and declined only in the third period (fifty percent). There was a diversification of trading activity, however, which these figures only partly reflect. First, larger vessels tended to be employed on some of the longer routes outside the North Atlantic, and the proportion of entrances into ports in eastern South America, the Far East and Australia tended to increase across each period. Further, the master who had put into the United Kingdom or northern Europe seems to have possessed (or perceived) a range of alternatives which did not appear in the period from 1846 to 1854. For instance, if we exclude departures to other United Kingdom ports, vessels clearing the United Kingdom between 1863 and 1878 did not have to return at once to British North America or the eastern United States: thirty-six percent departed on other routes. Certain trade routes are conspicuously under-represented, given the volume of traffic on those routes: these include the European and British coastal trades, and Black Sea trades. It seems likely that close access to long-established and dense coastal trades was a critical factor in the British transition from wood and sail to steam and iron. In British North America the demand for coastal shipping (except perhaps around the Great Lakes) was neither large nor was it expanding so rapidly, particularly after the 1870s when the Maritime provinces were connected to central Canada by railway.

Generally Canadian vessels carried a narrow range of staple commodities, even when they moved beyond their original base in British North America. Two-thirds of all vessels entering Liverpool and London in selected years in the 1860s and 1870s carried only three commodities: petroleum, cotton, or timber (Table 6). Seventy-six percent of vessels entering carried either these three commodities or wheat or flour.⁵² If we had data on northern European entrances, the picture might change in detail but not in general. Freight rates for American cotton and grain increased rapidly from about 1856 to 1862 or 1863, then declined sharply in the late 1860s, rising to new high levels in the early 1870s. New Brunswick timber freight rates followed a similar pattern and peaked in 1863 and 1873.⁵³ In spite of the continuing importance of timber cargoes, the link between shipping and export trades in the Maritimes had to a large extent been severed.

It is a paradox of no little importance to the decline of the shipping industry that as the industry expanded in the 1860s and 1870s its linkages with the local economy decreased. The vital linkage with shipbuilding remained, of course, as did the service which coastal shipping performed within the local economy. But it

TABLE 6

CARGOES CARRIED TO U.K. BY FOUR MAJOR FLEETS: 1868, 1873, 1878*

(ENTRANCES TO LIVERPOOL AND LONDON)

Origin of Cargo	Cargo	Number of Voyages	% of all Voyages
United States (East Coast)	Petroleum Products	76	9.2%
	Wheat/Flour/Corn	56	6.8
	Cotton	37.5	4.6
	Rosin/Turpentine	26	3.2
	Phosphate Rock	13.5	1.6
	Miscellaneous	13.5	1.6
	Timber	5	0.6
	Tobacco	3.5	0.4
	Other	6	0.7
United States (Gulf)	Cotton	138.5	16.8
	Timber	22.5	2.7
	Wheat/Corn	4.5	0.5
	Phosphate	1.5	0.2
	Other	1	0.1
United States (West Coast)	Wheat	6	0.7
	Fish	1	0.1
Maritimes and Newfoundland	Timber	219	26.6
	Fish	7.5	0.9
	Agricultural Products	3	0.3
	Mineral Ores	1.5	0.2
Canada	Timber	27	3.3
	Wheat	5	0.6
West Indies	Sugar/Rum	17.5	2.1
	Molasses	11.5	1.4
	Other	7	0.9
South America	Guano	12	1.5
	Bones/Hides/Tallow	12	1.5
	Sugar	4.5	0.5
	Copper	2	0.2
	Other	4.5	0.5
East Indies/ Asia	Rice	28	3.4
	Timber	8.5	1.0
	Other	2.5	0.3
India	Cotton/Wool	7	0.9
	Timber/Wheat/Rice/Jute	4	0.5
	Miscellaneous	3	0.4
Australia	Wool/Bones/Tallow	1	0.1
	Wheat	1	0.1

TABLE 6 (continued)

Africa	Wool	1	0.1
	Ballast	1	0.1
Central America	Timber	1	0.1
Baltic	Timber	8	1.0
Europe	Ballast	7	0.9
Other		3	0.4
Total		822	

*Fractions indicate mixed cargoes.

Source: U.K. Bills of Entry (London and Liverpool), 1868, 1873, 1878.

is increasingly difficult to argue that either shipping or shipbuilding was the "linch-pin" of the economy, or part of what Harold Innis called "a magnificent achievement, an integration of capital and labour, of lumbering, fishing and agriculture, on which rested a progressive community life."⁵⁴ Shipping and shipbuilding may have been part of such an integration in the decades before 1860, when the plentiful supply of local shipping was essential to sustained growth in the staple sector. But even before 1860 it is possible that this "integration" had some effects which were neither progressive nor conducive to long-term growth. As Douglass North has pointed out, "the initial development of transportation facilities to implement the export industry tends to reinforce dependence upon it and inhibit more diversified economic activity."⁵⁵ Further, the plentiful supply of local shipping is likely to have increased the supply of inward tonnage, thereby lowering inward freight charges, keeping import costs low, and so delaying the growth of local industries and import substitution. Furthermore, it is unlikely that shipbuilding or shipping contributed as much to final demand in the Maritimes as the size of such industries might suggest. By 1870, 7.4 percent of the industrial labour force, and 1.6 percent of the entire labour force, were employed in shipbuilding.⁵⁶ The numbers employed on locally-owned vessels were never large, and a declining proportion of the shipping labour force was Canadian. For example, in 1870 "mariners" accounted for 2.4 percent of New Brunswick's labour force, and 6.6 percent of Nova Scotia's labour force. As local ships moved beyond local shores it is likely that a declining proportion of wages was repatriated. The multiplier effects from shipbuilding were likely to have been limited. These are McClelland's conclusions and so far no one has questioned them.

In one important respect shipping is likely to have contributed to savings in the region, if not to final demand. Even if we take the lowest available estimates of net returns from shipping in 1871, profits in ocean shipping may have accounted for a fifth of all provincial profits if we assume that profits were as much as ten percent of Gross Provincial Product.⁵⁷ Of course only a portion of these revenues could have been reinvested in industries outside the marine sector. In 1871 and 1881, at least, profits generated in shipping, or capital equivalent to those profits, was reinvested in shipping itself. In New Brunswick the value of new shipping in

those years was equivalent to our middle-range estimates of profits from Saint John-owned ocean-going shipping.⁵⁸ This does not, of course, take into account revenues from the substantial sale of tonnage outside the region which could have been over \$200,000 a year from vessels registered in the 1870s.⁵⁹ In the 1880s a declining proportion of revenues from shipping and from the sale of ships was reinvested in new shipping. In this decade shipping likely contributed to the savings which shipowners are known to have been deploying into other businesses. The total savings generated directly from shipping and ship sales, and not reinvested in shipping, could have been more than \$500,000 in the year 1885, and in an economy the size of New Brunswick's this was a substantial contribution to domestic savings, all of it accumulated in the hands of entrepreneurs known to have been investing in landward businesses.⁶⁰ These are estimates, of course, but they are based on both a hypothetical reconstruction of shipping profits and on the records of returns from particular vessels. At the moment the only conclusion to be drawn is that linkage effects from ocean-going shipping were likely to have been small for an industry representing so large a proportion of domestic investment, but that savings accumulated by the industry were likely to have been substantial in some years.

The third stage in the history of shipping in the Maritimes occurred in the 1880s and 1890s, when shipping capacity in the region declined at a rate of almost six percent a year. It is difficult to assign causal priorities to this decline, since it coincided with two events which both had a direct bearing on the industry. There was a rapid and virtually continuous decline in freight rates in the trades to which Canadian sailing ships were most heavily committed; as well as an accelerating growth of investment in many new landward industries in the Maritimes. Our current hypothesis is that the decline in freight rates, and hence presumably in gross revenues, was a necessary condition for the decline; but that the growing range of investment opportunities in the heavily protected landward industrial sector was the sufficient condition for decline.

Several pieces of evidence tend to support this hypothesis. First, there were still opportunities for sailing ships in some ocean trades in the 1880s, and the decline in freight rates was not enough in itself to force all shipowners to withdraw from the industry. For instance, the fleet on registry in Windsor, Nova Scotia continued to grow and did not reach its peak until 1891; the Norwegian industry was also growing, although slowly, in the 1880s.⁶¹ Second, by a number of cost-saving efficiencies, which we have reported elsewhere, shipowners were able to compensate to some extent for the decline in freight rates.⁶² Third, by the 1870s shipowners knew that iron steamers were replacing sailing vessels in major trade routes in the North Atlantic, and shipowners in the Maritimes could have invested in the new technology, but chose not to. Fourth, at the local level within the Maritimes there appears to have been an inverse relationship between the growth of investment and output in shipping and the growth of investment and output in landward industry. The decline in shipping usually began when the growth of landward industry was most rapid; although, as we shall see, it was still possible for both sectors to grow simultaneously.⁶³ All of this suggests that shipowners were not forced out of the shipping industry, but instead were persuaded that a

plethora of opportunities had opened up in the new Canadian Confederation, thereby increasing the opportunity costs of capital invested in shipping.

The enthusiasm for economic diversification in the Maritimes in the last decades of the century, an enthusiasm which most major shipowners evidently shared, did not follow from disappointment with returns in the shipping industry, since economic diversification preceded the sustained decline in freight rates. Instead economic diversification followed from disappointment with the traditional staple industries. By the 1870s the "equilibrium point" defined by Douglass North had long since been passed. Export figures are of less interest after Confederation, since they do not include shipments to the rest of Canada; but timber exports from New Brunswick which include almost all timber shipped from the province suggest a long-term growth in the industry of only 0.2 percent a year between 1860 and 1889, in spite of a brief recovery in the 1870s.⁶⁴ The value of fish exports from Nova Scotia grew by about two percent a year between 1870 and 1889, but a growing proportion consisted of re-exports of Newfoundland fish, and prices declined, particularly in the 1880s.⁶⁵ The old West Indian trade also suffered fairly continuous decline in both the 1870s and 1880s. The transition to an industrial economy was already underway in both provinces by 1870 as by then industrial establishments in New Brunswick employed twenty-one percent of the labour force and accounted for about forty-eight percent of estimated Gross Provincial Product, while in Nova Scotia industrial establishments accounted for thirteen percent of the labour force.⁶⁶ In New Brunswick industrial output per capita was as high as in Canada as a whole, although this was not true for Nova Scotia.⁶⁷ A large proportion of industrial output in New Brunswick was from the forest industries, and therefore the growth of industry does not by itself imply movement away from a staple-based economy. Nevertheless the traditional staples were experiencing relative decline which continued after 1871. In New Brunswick, for instance, the contribution of forest industries to all industrial output declined from forty-six percent in 1871 to thirty-nine percent in 1891.⁶⁸ At the same time industrial capital and output increased relative to investment and output in shipping, particularly between 1881 and 1891. If the Census figures on "Capital Invested" in industrial establishments have any meaning, then capital invested in shipping was approximately forty-four percent of all industrial capital (industries plus shipping) in New Brunswick in 1871. By 1881 this proportion had fallen to about thirty-nine percent, and by 1891 to about seventeen percent.⁶⁹ The proportion of capital invested in shipping was higher in Nova Scotia, but its relative decline was equally rapid. Industries experiencing particularly rapid growth in both provinces included textiles, food products, electrical industries and utilities, a variety of service industries, and (in Nova Scotia) iron and steel.

Shipowners were always involved in landward economic activities and they were well situated to prosper by their growth. Shipowners' investments in landward enterprise pre-dated the decline of shipping and they anticipated and facilitated the growth of particular landward sectors. It is difficult to argue that shipowners, finding themselves trapped in an unprofitable shipping industry, suddenly shifted capital into landward industries after 1879. Instead shipowners

were among those who initiated the gradual movement of capital from seaward to landward enterprise. We have traced the dispersion of shipowners' interests by assembling data from many sources on the major shipowners of the region. One such source is the statutes incorporating companies in Nova Scotia between 1850 and 1889. There were 467 such acts of incorporation between these years (Table 7).⁷⁰ Most of these incorporations were in the tertiary sector (merchandising, supply and services) or the primary sector, which includes primary manufacturing. About a quarter of the incorporations were in secondary manufacturing while financial establishments such as banking and insurance made up the smallest proportion of the total. With the passage of time, the joint-stock company became increasingly common among business formations. There were fifty such companies formed in the 1850s, sixty-six in the 1860s, 172 in the 1870s and 179 in the 1880s. There were a relatively large number of companies in the primary sector in the 1860s amounting to thirty-nine percent of all incorporations in that decade and forty-one percent in the 1870s. Tertiary sector incorporations were relatively numerous when primary sector formations were few consisting of fifty percent in the 1850s and forty-two percent in the 1880s. Financial companies decreased in importance in the later decades, while secondary manufacturing firms increased from ten percent in the 1850s to twenty-seven percent in the 1870s and thirty percent in the 1880s. Across the whole period there was a relative shift from financial and tertiary businesses in the 1850s to primary and primary manufacturing in the 1860s and 1870s, and then to both secondary and tertiary in the 1880s.

TABLE 7

NOVA SCOTIAN INCORPORATIONS, 1850-1889

Decade	Primary	Decade %	Secondary	Decade %	Tertiary	Decade %	Finance	Decade %	Totals
1850s	11	22%	5	10%	25	50%	9	18%	50
1860s	26	39	8	12	18	27	14	21	66
1870s	70	41	46	27	45	26	11	6	172
1880s	45	25	53	30	75	42	6	3	179
Totals	152	33	112	24	163	35	38	8	467

Source: Nova Scotia, *Statutes*, 1850-1889, Library of the Nova Scotia Legislature.

Since an incorporator was almost always an investor, it is possible to infer investment activity although not necessarily the size of investment from these acts. It would be more correct to say that we are imputing intentions to invest from this source, since some of the companies may not have survived or even operated after their incorporation. There were 2047 individuals named as incorporators in these acts, of whom seven percent were major vessel owners in the ports of Halifax, Windsor, Yarmouth or Pictou.⁷¹ The imputed investment by major shipowners was

larger than that of other incorporators, since shipowners appeared much more frequently than did non-shipowners. No less than forty-one percent of all incorporations involved at least one shipowner. Of those companies which did involve at least one shipowner, the average number of incorporators per act was slightly more than one compared to four per company for those involving no shipowners.⁷² This suggests that shipowners operated on a larger scale, and more often alone, than did non-shipowners. A further indication of the wider scale of activity by shipowners comes from the analysis of the average number of incorporations per individual. In the total sample ninety percent of the individuals were involved in only one or two companies. Shipowners, however, tended to be involved in several companies and only fifty-seven percent of the shipowners made only one or two incorporations. Of those individuals involved in six or more companies, the majority were shipowners.⁷³ Two individuals were involved in fifteen companies, and both were major vessel owners: Edward W. Dimock of Windsor and Thomas E. Kenny of Halifax.⁷⁴

The number of joint-stock firms increased over time, but did incorporations by shipowners also increase? It appears that they did (Table 8). Almost sixty percent of incorporations involving shipowners occurred in the last two decades, with the peak occurring in the 1870s before the decline in shipping tonnage on registry began and at the same time as gross investment in shipping peaked in most ports.⁷⁵ But there is an important qualification to be made here. As time passed fewer incorporations involved shipowners, and the proportion of new companies involving shipowners declined significantly in the 1870s and 1880s (Table 9). Shipowners were critical to the first stages of company formation, but less important as industrialization progressed. Nevertheless, it is clear that shipowners did not hesitate to initiate joint-stock firms in landward enterprise, although the joint-stock company remained a very rare vehicle for investment in shipping. We might reasonably conclude that the failure to initiate this form of company in shipping was a consequence, not a cause, of the failure to invest in iron steamers where a wider investment base and limited liability were appropriate and perhaps necessary. Certainly the old family firms in shipping did make the transition to the new form of capitalization for at least sixty-three percent of all major shipowners in the four Nova Scotian ports were involved in at least one newly-incorporated company.

TABLE 8
INCORPORATIONS INVOLVING NOVA SCOTIAN VESSEL OWNERS,
1850-1889

Decade	Primary	Decade %	Secondary	Decade %	Tertiary	Decade %	Finance	Decade %	Totals
1850s	4	13%	4	13%	18	56%	6	19%	32
1860s	14	30	5	11	13	28	14	30	46
1870s	14	24	13	22	21	36	11	19	57
1880s	10	18	22	39	18	32	6	11	55
Totals	42	22	44	23	70	36	37	19	190

Source: Nova Scotia, *Statutes*.

TABLE 9

**COMPANIES INVOLVING VESSEL OWNERS AS A PERCENTAGE
OF ALL INCORPORATIONS IN EACH DECADE AND EACH SECTOR**

Decade	Primary	Secondary	Tertiary	Financial	Decade Totals
1850s	36%	80%	72%	67%	64%
1860s	54	63	72	100	70
1870s	20	28	42	100	33
1880s	22	42	23	100	31
Totals	28	39	41	97	41

Source: Nova Scotia, *Statutes*.

Between 1850 and 1889 shipowners were over-represented among company formations in the tertiary and financial sectors. This was true also for New Brunswick, where it is clear that shipowners were generally under-represented in secondary manufacturing. In Nova Scotia shipowners were heavily involved in tertiary sector businesses throughout the period, and this is no surprise since so many had entered the shipping business from merchandising and the import-export business. Shipowners were also strikingly over-represented in financial companies. No less than ninety-seven percent of all new financial companies involved shipowners, although their interest in forming new financial companies had declined by the 1880s. To some extent this reflects the success of companies already established, but it also reflects the declining interest in marine insurance. Vessel owners had least impact upon the formation of companies in the primary sector where only twenty-eight percent involved shipowners.⁷⁶ In Nova Scotia shipowners appear to have had a greater impact upon company formation in secondary industry than they did in New Brunswick. In the early decades shipowners were very prominent in the formation of firms in secondary industry, but much less influential by the 1870s and 1880s.

The evidence suggests that diversification by shipowners was occurring while they were still investing heavily in shipping. We cannot yet compare rates of return in shipping with returns in the landward sectors; but whatever those rates of return may have been, it appears that shipowners were attracted by them even when shipping was still profitable. Shipowners were pulled gradually away from the shipping business; they were not forced out of it. The analysis of incorporators in particular ports bears out this point. In Windsor there were forty major vessel owners who were also incorporators, in Halifax there were thirty-eight, in Yarmouth thirty-seven, and in Pictou twenty-three.⁷⁷ In all ports an active minority were involved in a disproportionate number of companies, and half of the 138 were involved in three or more.⁷⁸ In Halifax, shipowners' involvement with new companies was spread across all decades but the peak of 152 individual contacts with companies occurred in the 1870s when both gross investment and capital stock in shipping also peaked.⁷⁹ The interest in tertiary sector businesses was

always high, whether individuals or companies are used as the unit of analysis.⁸⁰ But the interest in secondary manufacturing was not insignificant, and this interest increased in the 1880s. In the other three ports, where shipowners were involved with 102 companies through 247 individual contacts, the pattern was slightly different. In both Pictou and Windsor participation in new companies preceded the decline in shipping. The peak in tonnage on registry in Pictou occurred in 1884, but this was always a relatively small fleet where interest in landward enterprise began early and peaked in the 1870s. In Pictou, in spite of its growing industrial base, the tertiary sector remained of primary interest to shipowners. In Windsor the peak in gross investment in shipping occurred in 1874, but the peak in tonnage on registry occurred as late as 1891. Company formation and industrial growth peaked in the 1880s, when gross investment in shipping declined slightly but a large fleet remained in service. In Yarmouth alone company formation peaked in the 1880s after the peak in tonnage on registry in 1879.⁸¹ In all ports interest in landward enterprise preceded the decline in shipping freight rates in the late 1870s and 1880s. The peak in company formations occurred when shipowners still retained very substantial fleets in service, but as the number of new landward interests grew, so the amounts of capital reinvested in shipping declined.

Were shipowners reinvesting profits from shipping in their new landward ventures? The timing of their company formations suggests that they may have been doing so, but precise information on the deployment of their financial assets is extremely difficult to discover. It is most likely that the insurance companies were based on fortunes in shipping. It appears likely that, at least in the initial stages, new companies in other industries may have been launched with capital re-deployed from shipping. Only in Yarmouth did interest in other companies follow almost always after the peaks in shipping investment, and even then many of the individuals mentioned below were operating ocean-going vessels while investing in new ventures. In Pictou, William Gordon invested in shipping between the quinquennia 1850/54 and 1865/69. At the same time he was involved in the formation of eight companies, moving in the classical pattern from primary interests to secondary and tertiary. In 1851 he was an incorporator of the Pictou Fishing and Trading Company; by the 1860s he was involved with the Pictou Marine Railway, a steamboat company in 1863, and an oil company in 1869; and by the 1870s he was also involved in the Pictou Bank and a publishing company.⁸² James W. Carmichael of Pictou invested in shipping between 1850/54 and 1880/84, and before the peak in his shipping investments he was involved with three railway companies, a steamboat company, and several insurance companies.⁸³

The interest in tertiary and financial sectors is most apparent in Windsor, where secondary industry was small and late in its development. Here eighty percent of the major shipowners were involved in financial companies.⁸⁴ Bennett Smith, whose shipping investments peaked in 1880/84, helped to initiate the Commercial Bank of Windsor in 1865, marine insurance companies in 1863 and 1877, and two fire insurance companies.⁸⁵ Godfrey Payzant, whose shipping

investments peaked in 1875/79, was involved in the same financial firms as Smith, as well as two secondary industries in 1873 and 1874.⁸⁶ Edward Dimock whose shipping peaked in 1875/79 and again in 1895/99 was also connected with several financial companies, but was one of the minority of shipowners heavily involved in secondary manufacturing firms, participating in six of these between 1870 and 1883.⁸⁷ Allen Haley whose shipping peaked in 1890/94 illustrates the widespread interest in local utilities, such as a telephone company, a street railway and a gas company.⁸⁸

In Yarmouth a group of twenty-five individuals with a variety of shared business interests instituted four companies, all formed while capital investment in shipping was still growing.⁸⁹ The companies set up were the Bank of Yarmouth in 1859, the Exchange Bank of Yarmouth in 1867, the Western Counties Railway in 1870, and the Burrell Johnson Iron Company in 1878.⁹⁰ In Halifax the major shipowners were interested in finance companies, but they also initiated many of the new firms in mining, manufacturing, and utilities. For several of these shipowners, the incorporations coincided with or even preceded the peak of their investments in shipping. Examples include Thomas E. Kenny whose new shipping peaked in 1875/79, William J. Stairs with his peak in 1880/84, Alfred G. Jones in 1870/74, Robert Boak Jr. in 1870/74 and William Esson whose shipping investments peaked in 1865/69 but continued until 1885/89. Apart from the inevitable banks and insurance companies, businesses formed by these men included several mining companies, a gas lighting firm, an electrical utility, tanning and pickling firms, sugar refineries, cotton factories, and railways.⁹¹

In general, economic diversification by shipowners began before the decline in shipowning and continued as shipping declined. Shipowners were prominent figures in the first stages of industrialization and prominent among those who created the local financial system which facilitated industrialization. By the 1880s, however, as many of the great shipowners of the previous decades approached retirement they left the critical stage of industrialization to a new generation of entrepreneurs. The evidence does little to resolve the debate between those who would make a distinction between mercantile and industrial capitalists and those who belittle the importance of such a distinction, since both sides might find comfort here. Nor does the evidence tend to refute Peter McClelland's argument that substantial investment in shipping acted as a constraint upon diversification. If we accept McClelland's thesis that viable alternatives did exist, it is possible to argue that a smaller shipping industry would have encouraged an even more vigorous search for landward alternatives and, perhaps, an industrial sector better financed and better equipped to meet central Canadian competition by the 1880s. Whether we accept this or not, what we can conclude is that the old generation of entrepreneur declined in importance in conjunction with the relative decline of the old staple export industries and their service sector linkage to the shipping industry. Further, the shipowning entrepreneur did not disappear under the pressure of collapsing freight rates; he seized new opportunities in landward markets and engineered his own smooth transition into the new industrial society which he helped to build.

When the traditional "wood, wind and water" staples failed to yield a sufficient growth of productivity and output to sustain employment and incomes at accepted levels, entrepreneurs in the Maritimes began to develop new mineral resources and new industries. These new industries did not stimulate a demand for shipping capacity as the older staple exports had done. Nor did the production of these new goods and services offer forward or backward linkages into the existing shipping industry. The new sugar refineries and cotton factories did require imported raw materials, but the volume was not large enough to stimulate a substantial demand for shipping even in the old West Indies trades. Much of the output from the new industries was transported by rail, which began to compete with coastal shipping for the growing volume of trade between the Maritimes and central Canada. Many businessmen in Saint John and Halifax expected that the completion of railways from central Canada would stimulate the development of port facilities and offer new opportunities in shipping. To some extent this did happen, and new steamship companies appeared in both ports, taking advantage of the growing volumes of freight and small federal government mail subsidies.⁹² But at this point the failure by local shipowners to invest in steam vessels became a very costly one. Many of the new steamship companies originated in central Canada, and the federal government subsidized steamships rather than sailing vessels. By the late 1880s Halifax merchants were opposing government subsidies for shipping, because these subsidies encouraged steamship services which competed with their sailing vessels in the West Indian trades.⁹³ Even after the completion of the Inter-Colonial Railway in 1876 and the Canadian Pacific Railway line to Saint John in 1889, a large proportion of Canadian shipments passed through Portland or New York or Montreal. The growth of the port of Montreal was particularly important, and for reasons which remain obscure shipowners in the Maritimes did not exploit this nearby market for shipping. Until the end of the 1880s, however, the total tonnage clearing Montreal in each year did not exceed tonnages clearing Saint John. Tonnage clearing Montreal had grown by seven hundred percent since the late 1850s, but the demand was still small compared to the demand in eastern American ports.⁹⁴ The shipping lines based in Montreal, such as those of Hugh Allan and later the Canadian Pacific, were better situated to serve the port of Montreal. Further, much of the demand in Montreal was being met by steam vessels, which Maritimers did not provide. When Maritimers chose to serve the growing staple trade outside British North America, the close integration between shipping and Canadian staples weakened, and the local market was lost.

Atlantic Canada possessed an important comparative advantage in shipping for most of the nineteenth century. Access to a plentiful supply of timber was an essential part of that comparative advantage, but not the whole of it. If export-base theory has anything to tell us about the shipping industry, it is that the "integration" of seaward and landward economic activities referred to by Harold Innis existed through a complex series of linkages between staple trades and shipping. We have only begun to explore the nature of those linkages, and it remains unclear whether export-base theory can tell us much about relative economic retardation in the Maritimes, still less about the decline of a single

industry. But it does appear that the staple industries and shipping were mutually self-supporting until the 1860s at least, and that this was no little part of Atlantic Canada's comparative advantage in shipping. The new industries of the late nineteenth century did not afford the same comparative advantage. When in the 1860s and 1870s the shift to iron and steam might have been made, the local iron industry was not sufficiently advanced to afford a comparative advantage in shipbuilding. There were a few attempts to build shipyards to produce iron vessels in Nova Scotia, but most of these ventures failed, either because costs were too high or government subsidies inadequate.⁹⁵ Thus when capital, entrepreneurial talent, and expectations for growth shifted away from the old staple trades, this was a sufficient condition for the decline of a shipping industry which grew from those trades.

We persist in believing that the decline of the shipping industry in Atlantic Canada is a complex historical phenomenon, still inadequately understood. The decline can no longer be explained simply by reference to the technological transition from sail to steam and from wood to iron. Maritimers chose a particular path towards industrialization, a path which often departed from the traditional industries which they knew best. Export-base theory may tell us that the staple industries of the region did not produce linkage effects or external economic benefits conducive to industrial growth, and Peter McClelland has given us a powerful statement of this case. But export-base theorists tend to focus upon particular models of industrial growth in particular successful regions. It is not self-evident that the American or the central Canadian patterns of industrialization were most appropriate for the Maritimes. We should not be misled by hindsight into assuming that the path actually chosen was the only alternative. The alternatives foregone by Maritimers before the First World War included the modernization of their shipping industry, the modernization of fishing fleets, and the development of pulp and paper mills, any of which might have benefitted from local resources or local skills.

It is not clear that the path of industrialization in the Maritimes may be fully explained by reference to the staple industries of the region. But Douglass North has posed a question which is relevant to the problem, and to the decline of shipping: did the export base affect the role of government and commit government to investing in particular types of industry?⁹⁶ The answer seems to be that nothing in the old staple base committed either provincial or federal governments to the further development of those staples or to shipping. There would be protection and subsidies for certain types of industry and for railways, but relatively little for fishing fleets, shipbuilding or shipping, as Maritimers expended their political capital in the battles over political representation in the House of Commons and over tariffs and railway freight rates. Further, in spite of the very large investment of capital and human effort in the shipping industry, nothing in the export base or in shipping committed Maritimers to campaign collectively for the means to buy or build iron steamers for use in Canadian export trades. Capital invested in wooden shipbuilding and shipping was too easily liquidated or transferred; shipbuilders easily became house carpenters. There was no outpouring of "maritime enthusiasm" of the kind which Walter Kresse

perceives in Germany. Maritimers became Canadians, and enthusiasts for landward development. Into the shipowners' calculation of opportunity costs political considerations necessarily intrude as do expectations conditioned by the enthusiasms of a non-maritime nation. The weakening of our comparative advantage in shipping occurred at many levels. What importance we attach to any of these factors depends in part on the experience of other maritime nations, for their experience and their comparative advantages may allow us to define our own, and so to explain our departure from the maritime nations of the world.

FOOTNOTES

*This paper is the result of almost six years work by members of the Atlantic Canada Shipping Project. We are particularly indebted to the late David Alexander, Lewis R. Fischer, Keith Matthews, James A. Tague, Rosemary Ommer, Heather Wareham, Olga Prentice, Janet Bartlett, Terry Bishop, Ivy Dodge and Rose Slaney, as well as the staffs of the Maritime History Group and the Newfoundland and Labrador Computer Services.

1 Calculated from the sum of tonnage built in New Brunswick from Richard Rice, "Measuring British Dominance of Shipbuilding in the Maritimes, 1787-1890," in Keith Matthews and Gerald Panting (eds.), *Ships and Shipbuilding in the North Atlantic Region* (St. John's, 1978), Appendix I, 148-51. Tonnage is valued arbitrarily at thirty-five dollars a ton. Timber export values are from C.O. 193, *New Brunswick Blue Books, Customs Returns; New Brunswick, Journals of the House of Assembly, Annual Reports on Trade and Navigation; Canada, Sessional Papers, Annual Reports on Trade and Navigation*. The total value of timber exports was \$149.8 million; between 1825 and 1879 over 2.3 million tons of shipping were produced in New Brunswick.

2 Calculated from the sources mentioned in note 1; the sum of Nova Scotian exports is calculated from C.O. 221, *Nova Scotia Blue Books, Customs Returns; Nova Scotia, Journals of the House of Assembly, Annual Tables of Trade and Navigation; Canada, Sessional Papers, Annual Reports on Trade and Navigation*.

3 Our "lower limit" estimated gross revenues of Saint John-owned ocean-going shipping only is \$2.38 million in 1871; total exports (not including goods shipped to Canada) were valued at \$5.3 million in 1871. The estimate of forty percent is, if anything, too low because not all New Brunswick vessels are included in the revenue estimate. See Lewis R. Fischer, Eric W. Sager and Rosemary E. Ommer, "The Shipping Industry and Regional Economic Development in Atlantic Canada, 1871-1891: Saint John As a Case Study," in Lewis R. Fischer and Eric W. Sager (eds.), *Merchant Shipping and Economic Development in Atlantic Canada* (St. John's, 1982), 43.

4 Total new tonnage registered in Saint John, Yarmouth, Halifax, Windsor, Pictou, Miramichi, Sydney and Richibucto. Some vessels are counted twice, if they were previously registered in one of the other ports; on the other hand, several smaller ports of registry are not included at all.

5 See Keith Matthews, "The Shipping Industry of Atlantic Canada: Themes and Problems," in Matthews and Panting *Ships and Shipbuilding*, Appendix 4, 14-15.

6 See the "Discussions" in Rosemary Ommer and Gerald Panting (eds.), *Working Men Who Got Wet* (St. John's, 1980), 381-7; and Fischer and Sager, *Merchant Shipping*, 239-40.

- 7 Douglass North, "Conference Summary," in Fischer and Sager, *Merchant Shipping*, 227-37.
- 8 James F. Shepherd, "Newfoundland and the Staple Theory: Export-led Growth or Decline?" (paper presented to the Ninth Conference on Quantitative Methods in Canadian Economic History, University of Western Ontario, 1978).
- 9 Calculated from export and population figures in United States, Bureau of the Census, *The Statistical History of the United States from Colonial Times to the Present* (New York, 1976); B.R. Mitchell and P. Deane, *Abstract of British Historical Statistics* (Cambridge, 1962). In 1860 exports per capita from Canada were \$12.57, from Nova Scotia, \$19.45, from New Brunswick, \$17.63; see S.M. Saunders, *The Economic History of the Maritime Provinces* (Ottawa, 1939), 11.
- 10 Calculated from trade figures in the sources mentioned in notes 1 and 2; cf. Saunders, *The Economic History*, 112.
- 11 See particularly Melville H. Watkins, "A Staple Theory of Economic Growth," *Canadian Journal of Economics and Political Science*, XXIX, No. 2 (May 1963), 141-158; K. Buckley, "The Role of Staple Industries in Canada's Economic Development," *Journal of Economic History*, XVIII (1958), 439-50; G.W. Bertram, "Economic Growth in Canadian Industry, 1870-1915: The Staple Model and The Take-Off Hypothesis," *Canadian Journal of Economics and Political Science*, XXIX, No. 2 (1963), 159-184; E.J. Chambers and D.F. Gordon, "Primary Products and Economic Growth: An Empirical Measurement," *Journal of Political Economy*, LXXIV, No. 4 (August 1966), 315-32; Douglass C. North, *The Economic Growth of the United States, 1790 to 1860* (Englewood Cliffs, 1961); Albert O. Hirschman, *The Strategy of Economic Development* (New Haven, 1958). This is a selection of works in which discussion of the subject began.
- 12 See, however, Peter D. McClelland, "The New Brunswick Economy in the Nineteenth Century" (Ph.D. thesis, Harvard University, 1966); Rosemary E. Ommer, "From Outpost to Outport: The Jersey Merchant Triangle in the Nineteenth Century" (Ph.D. thesis, McGill University, 1979). The idea that shipping was both a forward and backward linkage from the timber staple is suggested in Rosemary E. Ommer, "The Decline of the Eastern Canadian Shipping Industry in the 19th Century—a Speculative Framework" (paper presented to the Canadian Association of Geographers, Corner Brook, August 1981), 5.
- 13 North, "Conference Summary," 235.
- 14 McClelland, "The New Brunswick Economy" (Ph.D. thesis).
- 15 Calculated from Rice, "Measuring British Dominance," Appendix 1, 148-51. All growth rates in this paper are estimated from regression equations of the form $\text{Log } Y = a + bt$.
- 16 W.M. Smith, New Brunswick Controller of Customs and Registrar of Shipping, in C.O. 193, New Brunswick *Blue Books*, Table of Trade and Navigation (1863), 6.
- 17 Rice, "Measuring British Dominance," 142.
- 18 Assuming sale prices to be between eight and nine pounds sterling per ton.
- 19 Lewis R. Fischer, "Enterprise in a Maritime Setting: The Shipping Industry of Prince Edward Island, 1787-1914" (forthcoming, St. John's, 1985), 241.
- 20 McClelland, "The New Brunswick Economy" (Ph.D. thesis), 168-239.
- 21 Fleet size estimates are taken from our analysis of the B.T. 107/108 vessel registries rather than from official figures. The date when the vessel actually went out of service is used,

rather than the official date of registry closure. Where the date of actual disposal is unknown, the vessel is given an estimated service life based on the mean service life of vessels of the same decade and the same tonnage class for which dates of disposal are known. The result is a much more accurate estimate of physical capital stock than that given in official figures.

22 In order to estimate constant dollar values of timber exports a price index for timber had to be constructed (see Figure 4). This was achieved by calculating the sterling value of timber per ton in each year, the value of deals per measured foot, and the value of boards per foot in each year from the trade returns in note 1. In the final index each commodity is weighted according to its proportion of all timber export values in each year (1830 = 100). The pound sterling is valued at \$4.86. Compare McClelland, "The New Brunswick Economy," (Ph.D. thesis), Tables XXXIII and XXXV. Tonnage volumes are from the New Brunswick customs and trade returns in note 1.

23 A detailed list of timber consigners has been taken from the Saint John newspapers for 1863. See also T.W. Acheson, "The Great Merchant and Economic Development in St. John, 1820-1850," *Acadiensis*, VIII, No. 2 (Spring 1979), 3-27.

24 Many of the major shipowners appear as shipbuilders in Esther Clark Wright, *Saint John Ships and Their Builders* (Wolfville, N.S., 1976), 172-197. In the 1830-50 period these include John Haws, George Thomson, John Owens, William and James Lawton, John W. Smith, William Olive, William and Richard Wright, Hugh Irvine, Francis and Joseph Ruddock, Robert Stackhouse, John Storm, James Nevins, Stephen Rowan, and others. Many would have been short-term owners only.

25 McClelland, "The New Brunswick Economy" (Ph.D. thesis), 93-101. The freight rate index used is that of Douglass North, cited in *Ibid.*, 93-5, and compiled from freight information in British Sessional Papers and Select Committee Reports.

26 The evidence is presented in Eric W. Sager, "The Port of St. John's, Newfoundland, 1840-1889: A Preliminary Analysis," in Matthews and Panting, *Ships and Shipbuilding*, 19-40; "The Merchants of Water Street and Capital Investment in Newfoundland's Traditional Economy," in Lewis R. Fischer and Eric W. Sager (eds.), *The Enterprising Canadians: Entrepreneurs and Economic Development in Eastern Canada, 1820-1914* (St. John's, 1979), 77-95; "Sailing Ships and the Traditional Economy of Newfoundland, 1850-1934" (paper presented to the Annual Meeting of the Canadian Historical Association, Halifax, 1981).

27 Correlating population (annual estimates) and schooner fleet size from 1840 to 1889 yields coefficients greater than +.90; see Sager, "The Port of St. John's," 36.

28 B.T. 107/108 vessel registries; data on Sydney new registrations are from 1842 to 1889 only. We are indebted to Rosemarie Langhout for collecting the Sydney registries.

29 See David A. Sutherland, "Halifax Merchants and the Pursuit of Development, 1783-1850," *Canadian Historical Review*, LIX, No. 1 (March 1978), 1-17; "The Merchants of Halifax, 1815-1850: A Commercial Class in Pursuit of Metropolitan Status" (Ph.D. thesis, University of Toronto, 1975). Many of the West Indian merchants in Sutherland's studies appear as registrants of shipping in Halifax.

30 Of all new tonnage registered in Halifax in the 1840s thirty-seven percent was transferred to Britain; in the 1850s twenty-seven percent was transferred to Britain; from B.T. 107/108 vessel registries.

31 All figures on trade and tonnage entering and clearing are from the sources in note 2.

- 32 Estimated total tonnage on registry in Nova Scotia ports (Halifax, Yarmouth, Windsor, Pictou and Sydney) grew by 3.5 percent a year from 1826 to 1866; see also note 20.
- 33 Much of this increase must have been due to better construction, better maintenance, or improved seamanship, since only part of the increase was the result of the longer retention of transferred vessels.
- 34 Nova Scotia *Blue Books* (1853-1862).
- 35 Compare McClelland, "The New Brunswick Economy" (Ph.D. thesis), 168-209.
- 36 McClelland's terms of trade index (weighted at 1857/66 prices) is as follows: 1824-40: 1.30; 1840-50: 1.17; 1850-60: 0.89; 1860-70: 0.86; 1870-80: 1.30; 1880-90: 1.26. *Ibid.*, Table XL.
- 37 North, "Conference Summary," 235.
- 38 McClelland, "The New Brunswick Economy" (Ph.D. thesis), 50.
- 39 *New Brunswick Blue Books* (1863), Tables of Trade and Navigation.
- 40 We assume a return of 1.5 pounds per ton per year and a sale price of 7.3 pounds per ton in the late 1850s and 6.7 pounds per ton in the early 1860s.
- 41 Freight rates in July of each year from 1848 to 1863, cited by W.M. Smith in *New Brunswick Blue Books* (1863), Tables of Trade and Navigation.
- 42 *Ibid.*
- 43 *Ibid.*
- 44 *Ibid.*
- 45 Import and export values are from sources cited in note 2. The import and export figures were deflated by the Rousseaux index, in the absence of an appropriate Nova Scotian price index.
- 46 Calculated from the sources cited in note 2.
- 47 Thomas Raddall has stated that in 1862 a third of all vessels entering Boston were sailing vessels from Nova Scotia; see Thomas H. Raddall, *Halifax: Warden of the North* (Toronto, 1971), 198.
- 48 Calculated from the sources in notes 1 and 2.
- 49 Calculated from United States Bureau of the Census, *The Statistical History of the United States*, Series Q506-517. Northern border ports are not included.
- 50 *Ibid.*, Series Q417-432.
- 51 The voyage records referred to here are the "Agreements and Accounts of Crew" contained in the archive of the Maritime History Group at Memorial University of Newfoundland. Each Crew List contains a detailed description of the voyage, including details on ports of call during a voyage. The Crew Lists yielded 8829 voyages by Saint John vessels, 4340 voyages by Yarmouth vessels, 3577 voyages by Windsor vessels, and 1844 voyages by Halifax vessels. See also David Alexander and Rosemary Ommer (eds.), *Volumes Not Values: Canadian Sailing Ships and World Trades* (St. John's, 1979); Ommer and Panting, *Working Men Who Got Wet*; Lewis R. Fischer and Eric W. Sager, "An Approach to the Quantitative Analysis of British Shipping Records," *Business History*, XXII, No. 2 (July 1980), 135-51.

- 52 See also Keith Matthews, "The Canadian Deep Sea Merchant Marine and the American Export Trade, 1850-1890," in Alexander and Ommer, *Volumes Not Values*, 197-243.
- 53 Sailing ship freight rates from American ports, as well as rates for deals from New Brunswick, were collected by Keith Matthews.
- 54 C.R. Fay and H.A. Innis, "The Maritime Provinces," *The Cambridge History of the British Empire* (New York, 1930), VI, 663.
- 55 North, *Economic Growth of the United States*, 5-6.
- 56 Calculated from Canada, *Census* (1871), vol. III; see also McClelland, "The New Brunswick Economy" (Ph.D. thesis), 241.
- 57 Our lower-bound estimate for potential profitability of Saint John ocean vessels in 1871 is \$839,737; see Fischer, Sager and Ommer, "The Shipping Industry and Regional Economic Development," 44. McClelland estimates New Brunswick Gross Provincial Product to be \$35.7 million at this time; see McClelland, "The New Brunswick Economy" (Ph.D. thesis), 272-3.
- 58 This assumes a cost of thirty-four dollars per ton. There were over 38,000 new tons registered in Saint John and Miramichi in 1871, and 14,600 new tons in 1881.
- 59 This assumes a value of fifteen dollars per ton for transferred vessels. In the 1870s the annual average of tonnage transferred or sold foreign from Saint John and Miramichi was 14,600 tons. Of course some portion of the sale price would accrue to British shipbrokers rather than to owners in New Brunswick.
- 60 In 1885, 208,000 tons of ocean shipping remained on registry in Saint John and Miramichi. We assume, conservatively, an annual net return of four dollars per ton, yielding over \$830,000. The value of new shipping in 1885 in these ports (8620 tons) may have been \$290,000. In addition about sixty thousand tons a year were sold abroad from these ports in the 1880s.
- 61 See Matthews, "The Shipping Industry of Atlantic Canada," 11-15.
- 62 See particularly the essays by Alexander, Fischer and Sager in Alexander and Ommer, *Volumes Not Values*; and Sager, "Labour Productivity in the Shipping Fleets of Halifax and Yarmouth, Nova Scotia, 1863-1900," in Ommer and Panting, *Working Men Who Get Wet*, 155-184.
- 63 Eric W. Sager, Lewis R. Fischer and Rosemary E. Ommer, "Landward and Seaward Opportunities in Canada's Age of Sail," in Fischer and Sager, *Merchant Shipping*, 22-28.
- 64 Calculated from McClelland, "The New Brunswick Economy" (Ph.D. thesis), Table XXXV (New Brunswick Export of Timber, Boards and Deals at 1857/66 Prices).
- 65 Estimated from values of fish exports, in Canada, *Sessional Papers*, Annual Reports on Trade and Navigation.
- 66 Canada, *Census* (1871); see also note 54.
- 67 Sager, Fischer and Ommer, "Landward and Seaward Opportunities," 26. See also David Alexander, "Economic Growth in the Atlantic Region, 1880 to 1940," *Acadiensis*, VIII (Autumn 1978), 47-76; and T.W. Acheson, "The National Policy and Industrialization in the Maritimes," *Acadiensis*, I (Spring 1972), 3-28.
- 68 Canada, *Census* (1871 and 1891).
- 69 In 1871 shipping may be valued at \$4.87 million if the 256,000 tons on registry in New

Brunswick is valued at nineteen dollars per ton. "Capital Invested," according to the *Census* was \$5.98 million. The figures for 1881 are \$5.5 million for shipping and \$8.43 million for "Capital Invested." For 1891 the estimates are \$3.2 million (shipping) and \$15.82 million (Capital Invested). For Nova Scotia in 1871 the estimates are \$7.6 million (400,000 tons of shipping) and \$6.0 million (Capital Invested); in 1881 the estimates are \$10.06 million (shipping) and \$10.2 million (Capital Invested); in 1891, \$7.8 million (shipping) and \$19.8 million (Capital Invested).

70 Nova Scotia, *Statutes* (1850-1889). in the Library of the Nova Scotia Legislature. In the collection there were 701 statutes of which 608 dealt with the founding of companies. However, for 216 of these the names of incorporators have not been discovered. From the remaining 485 statutes, only those from 1850 and after have been used in this analysis.

71 These registrants are residents of the urban centres, i.e., Halifax-Dartmouth, Pictou, New Glasgow, Windsor, the Avon River estuary, and the town of Yarmouth. Their tonnage figures were drawn from the registry analyses carried out by members of the Atlantic Canada Shipping Project. A "major owner" is a resident of one of these places who registered one thousand tons or more. The major vessel owners were involved with 190 companies, hence forty-one percent of the total of 467 companies with lists of incorporators. The proportion of shipowners among incorporators would be much higher if all shipowners were included.

72 The 2047 incorporators were involved with 467 companies.

73

		1850-1889													
No. of Company		1	2	3	4	5	6	7	8	9	10	11	13	15	Total
Contacts:															
All Incorporators:		1485	343	103	45	26	16	8	5	4	6	3	1	2	2047
% of Total:		73	17	5	2	1	.8	.4	.2	.2	.3	.1	.1	.1	—
Vessel Owning															
Incorporators:		50	29	24	7	6	7	4	4	2	3	—	—	2	138
% of Vessel															
Owners:		36	21	17	5	4	5	3	3	1	2	—	—	1	—
% of															
Incorporators:		3	8	23	16	23	44	50	80	50	50	—	—	100	—

74 There was one incorporator who was not a vessel owner involved with thirteen companies.

75 See Table 8.

76 See Table 9.

77 **COMPANY CONTACTS OF VESSEL OWNERS BY PORT OF REGISTRY 1850-1889**

Port of Registry	1	2	3	4	5	6	7	8	9	10	15	Totals
Halifax	10	5	6	1	3	3	4	2	2	1	1	38
Pictou	8	5	5	1	2	1	—	1	—	—	—	23
Windsor	15	9	7	2	1	2	—	1	—	2	1	40
Yarmouth	17	10	6	3	—	1	—	—	—	—	—	37
Totals	50	29	24	7	6	7	4	4	2	3	2	138

Source: Nova Scotia, *Statutes*.

78 The number and percentage of incorporators involved in three or more companies are as follows: Pictou, 13 (57%); Windsor, 24 (40%); Yarmouth, 17 (46%); Halifax, 21 (55%).

79 HALIFAX VESSELS OWNER CONTACTS WITH NEW INCORPORATIONS,
1850 — 1889

Sectors

Decades	Decade		Decade		Decade		Decade		Total
	Primary	%	Secondary	%	Tertiary	%	Finance	%	
1850s	5	13	4	11	16	42	13	34	38
1860s	9	23	5	13	15	38	10	26	39
1870s	15	32	5	11	16	34	11	23	47
1880s	7	25	11	39	6	21	4	14	28
Totals	36	24	25	16	53	35	38	25	152

Note: Row percentages do not necessarily equal 100% due to rounding.

80 HALIFAX INCORPORATIONS INVOLVING VESSEL OWNERS, 1850-1889

Sectors

Decades	Primary		Secondary		Tertiary		Finance		Totals
		%		%		%		%	
1850s	1	7	2	13	8	53	4	27	15
1860s	8	33	4	17	8	33	4	17	24
1870s	11	41	3	11	8	30	5	18	27
1880s	3	14	11	53	4	19	3	14	21
Totals	23	26	20	23	28	32	16	18	87

Note: Row percentages do not necessarily equal 100% due to rounding.

81 INCORPORATIONS INVOLVING VESSEL OWNERS IN PICTOU (P),
WINDSOR (W) AND YARMOUTH (Y), 1850-1889

Sectors

Decades	Primary			Secondary			Tertiary			Finance			Totals			Ports
	P	W	Y	P	W	Y	P	W	Y	P	W	Y	P	W	Y	
1850s	3	—	—	—	2	—	5	3	2	—	1	1	8	6	3	17
1860s	3	1	2	1	—	—	2	3	—	3	4	2	9	8	4	21
1870s	1	2	—	3	6	1	6	2	3	1	5	—	11	15	4	30
1880s	3	3	1	1	8	2	3	4	6	—	2	1	7	17	10	34
Totals	10	6	3	5	16	3	16	12	11	4	12	4	35	46	21	102
3 Ports	19			24			39			20						

By Percentages

	P	W	Y	P	W	Y	P	W	Y	P	W	Y
1850s	38	—	—	—	33	—	63	50	67	—	17	33
1860s	33	13	50	11	—	—	22	38	—	33	50	50
1870s	9	13	—	27	40	25	55	13	75	9	33	—
1880s	43	18	10	14	47	20	43	24	60	—	12	10
Totals	29	13	14	15	34	14	46	26	52	11	26	19

Note: Row Percentages do not necessarily equal 100% due to rounding.

82 Between 1854 and 1864, Gordon was an initiator of the following companies: Pictou Steam Ferry Boat, 1854; Laurel Hill Cemetery, 1859; Pictou Marine Railway, 1861; Pictou Steam Boat, 1864; and the Lake Ainslie Oil Company, 1869. In 1875, he was involved with the Morning Herald Printing and Publishing Company.

83 The companies for which James W. Carmichael acted as initiator were: Pictou Marine Railway, 1861; Eastern Railway, 1870; Antigonish and Sydney Steam Boat, 1872; and Whitehaven, New Glasgow and North Shore Railway, 1872.

84 The number of major vessel owners involved in financial incorporations was 32 of 40.

85 The companies in which Bennett Smith was involved were: Windsor Marine Insurance, 1863; Shipowners Marine Insurance, 1877; Windsor Fire Insurance, 1873; and Nova Scotia Fire Insurance of Windsor, 1878.

86 The companies involving Godfrey P. Payzant were as follows: Avon Marine Insurance, 1851; Barker Skate and General Manufacturing, 1873; Windsor Gaslight, 1874; Temperance Hall Company of Windsor, 1850; and the Morning Herald Printing and Publishing.

87 The companies involving Edward W. Dimock were as follows: Hants Manufacturing, 1870; Barker Skate and General Manufacturing, 1873; Windsor Tanning, 1883; Mayflower Gold Mining of Windsor, 1868; Mineral Exploration and Mining Association of Nova Scotia, 1873; Temperance Hall Company of Windsor, 1850; and Windsor Temperance Reform Club Hall, 1878.

88 The companies involving Allan Haley were as follows: Shipowners Marine Insurance, 1877; Nova Scotia Fire Insurance, 1878; Windsor Temperance Reform Club Hall, 1878; Nova Scotia Telephone, 1887; Yarmouth Street Railway, 1887; Cumberland Land Reclamation, 1888; Windsor Plaster, 1878; Maritime Reaper and Mower, 1881; Hants Mineral Oil and Mining, 1889; and Maritime Fuel and Heating Gas, 1889.

89 The number of vessel owners involved in only one incorporation was seventeen or forty-six percent of the thirty-seven as incorporators. Abel Cutler Robbins was an initiator of six companies (his shipping investments ranged from 1845/49 to 1875/79 and peaked 1870/74).

90 Those connected with the Bank of Yarmouth were Amasa Durkee (in shipping to 1875/79), Samuel Killam (to 1865/69), J.C. Farish (to 1880/84), John Flint (to 1875/79) and Andrew Lovitt (to 1875/79) while Joseph Burrell (to 1870/74), Nathaniel Churchill (to 1875/79) and Freeman Dennis (to 1875/79) were involved with the Burrell Johnson Iron Company, and Frank Killam (to 1880/84) and Thomas M. Lewis (to 1875/79) were incorporators of the Western Counties Railway. Hugh D. Cann (to 1885/89) and Abel C. Robbins were in the iron company, Thomas Killam, Jr. (to 1875/79), Joseph R. Kinney (to 1875/79) and Augustus F. Stoneman (to 1900/04) in the railway, as well as in other companies. Those in both banks were George S. Brown (1865/69), Lyman Cann (1865/69), John K. Ryerson (1870/74) and William Townsend (1865/69), the latter two being also incorporators of the railway. Those in the Exchange Bank and the railway were George B. Doane (1875/79), Aaron Goudey (1875/79), Samuel Ryerson (1875/79) and John Young (1870/74), the former two being also incorporators of the iron company. John W. Lovitt (1870/74) was an incorporator of the bank and the railway; while Nathan W. Blethen (1875/79) was a director of the railway and the iron company. Dates in brackets indicate the quinquennia in which the owner made his last investment in newly-registered tonnage.

91 The eight incorporators of insurance and mining companies were Jonathan C. Allison

(1855/59), Robert Boak, Jr. (1870/74), John Duffus (1875/79), William Esson, Alfred G. Jones, Thomas E. Kenny, William J. Stairs, and Benjamin Wier (1865/69). The six incorporators of secondary companies were Boak, Esson, Kenny, Jones, Stairs and Wier. The companies incorporated during the 1850s were Atlantic Mutual Marine Insurance, Nova Scotia Mutual Marine Insurance, Union Mutual Marine Insurance, Acadian Iron and Steel and Acadian Iron. The two incorporators in insurance were Boak and Stairs with Duffus, Stairs and Wier as the group of three. The companies were Stadacona Gold Mining, Metropolitan Gold Mining, Provincial Gold Mining and Nova Scotia Salt Works and Exploration Company. The companies incorporated in the 1870s were as follows: Globe Gold Mining Association (Allison); Eldorado Gold Mining; United Mining Association; Mooseland Gold Mining; and Sydney Coal Mining (Boak); Port Aconi Coal Company (Duffus, Esson and Kenny); Northern Head Coal; Blackhouse Coal and Railway (Esson); Nova Scotia Manufacturing and Contract, and Truro Gaslight Company. The companies launched during the 1880s were: Low Point, Barasois and Lingan Mining (Jones, Kenny and Stairs); Halifax Electric Light; Logan Tanning, and Halifax Vinegar and Pickling (Esson); Atlantic Sugar House (Jones); Nova Scotia Sugar Refinery (Boak, Jones, Stairs); and Nova Scotia Cotton Manufacturing (Kenny).

92 In 1895, for instance, the Beaver Line transferred its terminus from Portland, Maine, to Saint John; Saunders, *The Economic History of the Maritime Provinces*, 15.

93 *Ibid.*, 16.

94 McClelland, "The New Brunswick Economy" (Ph.D. thesis), Table XIV.

95 David Frank, in Fischer and Sager, *Merchant Shipping*, 120. A limited shipbuilding program was begun in Nova Scotia in the First World War, with financial support from the federal government; see L.D. McCann, "The Mercantile-Industrial Transition in the Metal Towns of Pictou County, 1857-1931," *Acadiensis*, X, No. 2 (Spring 1981), 57.

96 Douglass North, "Conference Summary," in Fischer and Sager, *Merchant Shipping*, 235.

2. DISCUSSION FOLLOWING THE PAPER OF SAGER AND PANTING

HARLEY agreed with the contention that the rise of the shipping industry in the 1850s was not an act of desperation, but wondered about the argument that potential profits remained high in the 1880s.

SAGER replied that while shipbuilders most certainly faced a price squeeze in the 1880s, shipowners fared better. Owners cut costs wherever they could, particularly by decreasing the amount of labour employed on vessels. The precise manner by which owners managed to remain in the industry is likely to become clearer when a good series on costs is developed.

CRAIG commented that evidence exists for certain trades to support a conclusion that profits were still substantial in the 1880s, but doubted that such a generalization could be sustained for the industry as a whole. He recommended that members of the Atlantic Canada Shipping Project attempt to study specific vessels engaged in particular trades to test their hypotheses.

HARLEY suggested that people often confuse the terms "amortization" and "profit." Amortization in a strict economic sense refers to the amount of money which is required to be put aside each year so that when the vessel's useful career is completed, enough capital is available to replace it.

CRAIG returned to the issue of costs. It might be useful to divide repair costs into two categories: those repairs which are the results of accidents and those caused by simple wear and tear. The former had to be undertaken, but the latter could be postponed if the owner wished to cut costs. Related to this, however, was the question of insurance, which could be extremely variable. There is always a relationship between the willingness of an owner to undertake discretionary repairs and to carry adequate insurance on the one hand, and his calculation of the likely second-hand value of his vessel. These factors should be studied in greater detail. So too should the role of the master in the profitability of the industry.

SAGER agreed with all of these suggestions. He pointed out that some work has been done on the question of repairs and insurance through existing shipping ledgers, although the nature of these documents makes conclusions about these issues extremely perilous. It is also known that owners favoured local masters when they could obtain them, but the precise relationship between this trend and profitability remains to be explored.

CRAIG asked how the shipbuilding industry in the region was financed. He argued that there was no way that a shipbuilding operation could be commenced with a substantial outlay of capital, and doubted that it could all be raised within the region.

SAGER commented that it seems likely that most of the capital was generated within the region, especially from the timber trade.

PANTING reminded people that the materials needed to answer this question are extremely scattered. But it does appear that in some parts of the region — along the shores of the Northumberland Strait, for example — a fair amount of the capital probably was imported. Elsewhere, the bulk of the capital would appear to have come from other ventures, such as merchandising.

CRAIG re-iterated his belief that most of the early capital probably came from the United Kingdom, but conceded that such capital flows are extremely difficult to study. By the 1870s and 1880s, however, financial institutions in the region were more mature and hence likely providing a greater percentage of capital requirements locally. This would also explain why so many of the major ship-owners were also investors in financial institutions. The rise of local financial institutions might well be at least partly the result of a redirection of capital out of shipping.

HARLEY associated himself with CRAIG'S observations and went on to stress the need to recognize that the industry is highly capital intensive. It is vitally important to study the credit arrangements involved in the building and sale of a vessel.

SAGER commented that these kind of credit arrangements further complicate the question of the rates of return received by builders in Atlantic Canada who sell their vessels in the British market. We still need to know something about the commission rates of British shipbrokers as well.

CRAIG answered that based upon his reading of the Kellock Papers, the average fee charged by brokers would probably be close to five percent. In addition, Canadians likely paid another one or two percent to brokers as a commission if they assisted the builder in locating a source of capital to construct the vessel. This might also have served as an inducement to people in Atlantic Canada to start their own financial institutions.

PANTING agreed with this last conclusion, stressing that many of the major owners and builders had strong interests in finance. Many were directors and even founders of banks. Even in a small community like Yarmouth vessel owners were attempting to launch banks as early as 1858; by 1871, there were two banks operating in the town. The same point could be made about insurance companies as well. Yarmouth, for instance, had a mutual insurance company as early as the 1830s.

FISCHER suggested that further research on the financial links with Britain is necessary. From the scattered evidence available, it appears that a kind of shift occurs in the 1850s. Some records exist for shipyards in Saint John from the 1820s onward, and they show that most of the necessary capital comes from Britain and Scotland. The letterbooks of James Peake show the same thing for Prince Edward Island. In addition, the Peake Papers show another important trend. In the 1840s and even in the early 1850s, Peake would generally write to his brother in Plymouth to ask about the kinds of vessels that should be built. By the mid-1850s, he stopped this practice and began making

these decisions locally. These kinds of evidence suggest that the 1850s was in fact an important transition period.

HARLEY concurred, and suggested that there was yet another type of evidence which supported this conclusion: the reports of the Lloyd's surveyors. These appear to suggest that the percentage of fully-finished vessels being sold by Canadian builders in the British market declined rapidly in the second half of the 1850s.

3. THE DECLINE OF THE AMERICAN MERCHANT
MARINE, 1850-1914: AN
HISTORIOGRAPHICAL APPRAISAL

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THE DECLINE OF THE AMERICAN MERCHANT MARINE, 1850-1914: AN HISTORIOGRAPHIC APPRAISAL

Jeffrey J. Safford

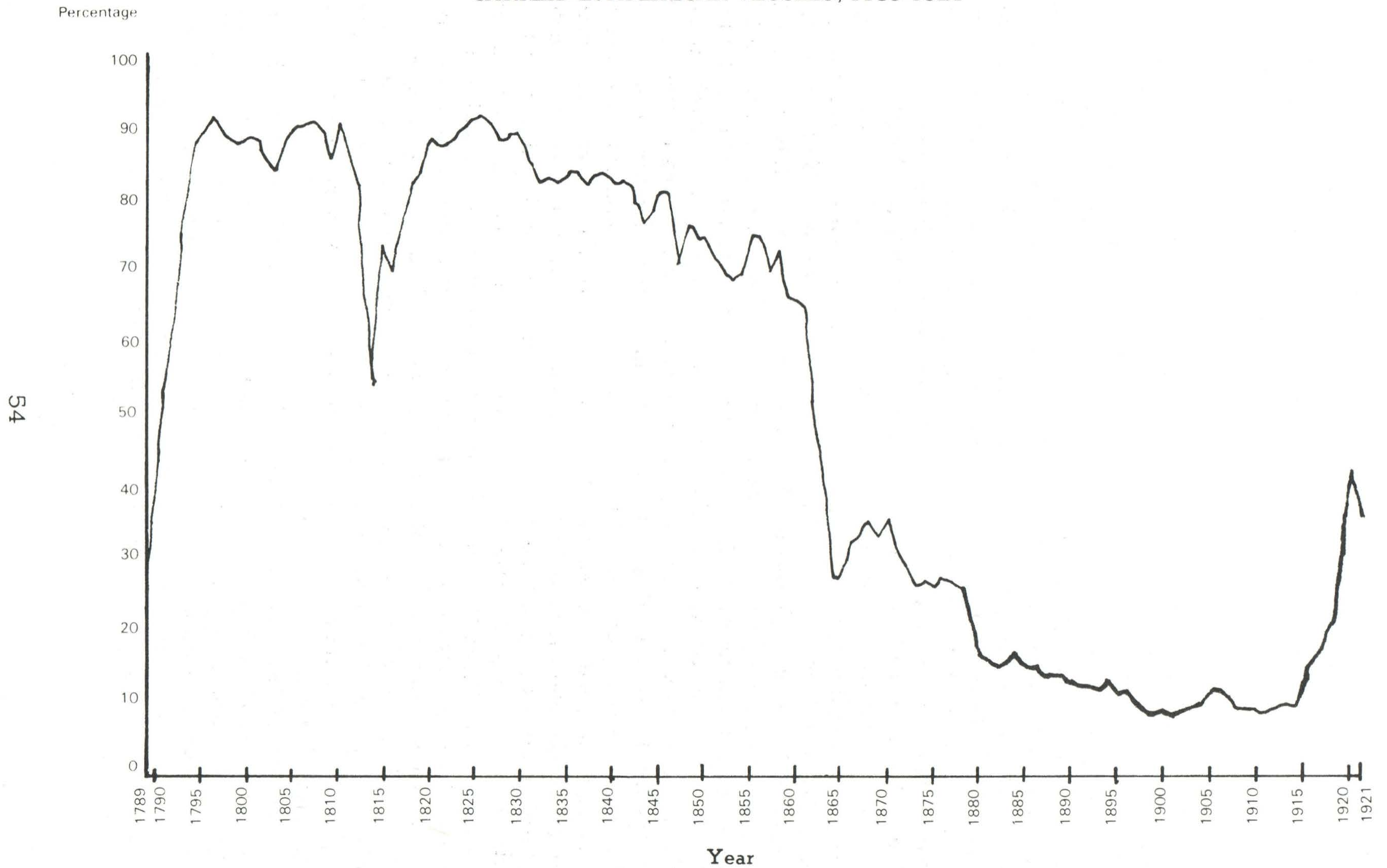
The maritime industries played a vital role in the building of eighteenth and early nineteenth century American economic strength as for the most part the wealth generated in the colonial and early national periods was mercantile. From the lucrative commercial activities of the maritime sector flowed much of the capital that financed the growth of the American agricultural and mining frontiers and the construction of the American canal and railroad systems. The earnings from shipping made possible the maintenance of a stable trade balance and stimulated development of manufacturing. American shipyards were run efficiently and profitably, and American ships were managed and manned by capable personnel. In the people's conviction, embellished by the testimonials of the nation's *literati*, the magnificent clipper ships of the 1840s and 1850s symbolized the triumphant genius of American shipping and shipbuilding, and perhaps as well the emotional psyche of the nation itself — frenetic energy and industry, brute strength, great size, expansion, and speed. Had any American, standing in the mid-1850s on a Boston Harbor wharf, or on New York's Battery, dared suggest that American shipping would soon wane dramatically, most likely he would have met hostile disavowals or, at best, statements of incredulity.

From the 1860s, however, the once magnificent American merchant marine degenerated rapidly. Only the great wooden square-riggers survived, but their years would be limited and their dependence upon foreign crews absolute. Economic advantages in cost of operations and construction vanished, government became apathetic, the Civil War wreaked havoc on American shipping, the adoption of protective tariffs and restricted registry prostrated maritime industries, and the nation's once proud nautical traditions faded into oblivion. Whereas in 1860 two-thirds of all export and import tonnage was carried in American bottoms, this had fallen by 1866 to thirty percent, and nine years later to twenty-seven percent (see Figure 1). The decline continued at a precipitous rate; in 1881 it was sixteen percent and in 1910 but 8.7 percent. On the eve of World War I, of all the vessels engaged in the world ocean-carrying trade, only two percent were of American registry.¹ The so-called golden years of American maritime ascendancy were quickly followed by the dark age of American maritime decline.

Consequently, the period 1850-1914 is an appropriate one by which to gauge American shipping developments, as it marks not only the end of a great boom in American maritime enterprise but also the entirety of the sad demise of United States' overseas shipping.² Before embarking upon an analysis of causes of the decline, an outline of developments relating to the American oceanic shipping industries during this period will be instructive.³

FIGURE 1

PERCENTAGE OF UNITED STATES IMPORTS AND EXPORTS
CARRIED IN AMERICAN VESSELS, 1789-1921



Source: Harold U. Faulkner, *American Economic History* (New York, 1924), 255.

With respect to the size and structure of the American national fleet, the 1850s marks for certain the end of the greatest period of success in American overseas shipping. In 1830, American ships were registered in foreign trade to the extent of 537,000 tons (see Figure 2); in 1861 this had increased to approximately 2.5 million tons, in the process placing the United States in the position of challenging Great Britain for supremacy on the North Atlantic, as well as other transoceanic trades. The trade routes favored by the pre-1860s American fleet were principally those to England, continental Europe, the West Indies, and the Orient. Boston, New York, Philadelphia, Baltimore, New Orleans and San Francisco were the principal ports, with New York dominating the Atlantic Coast export traffic.

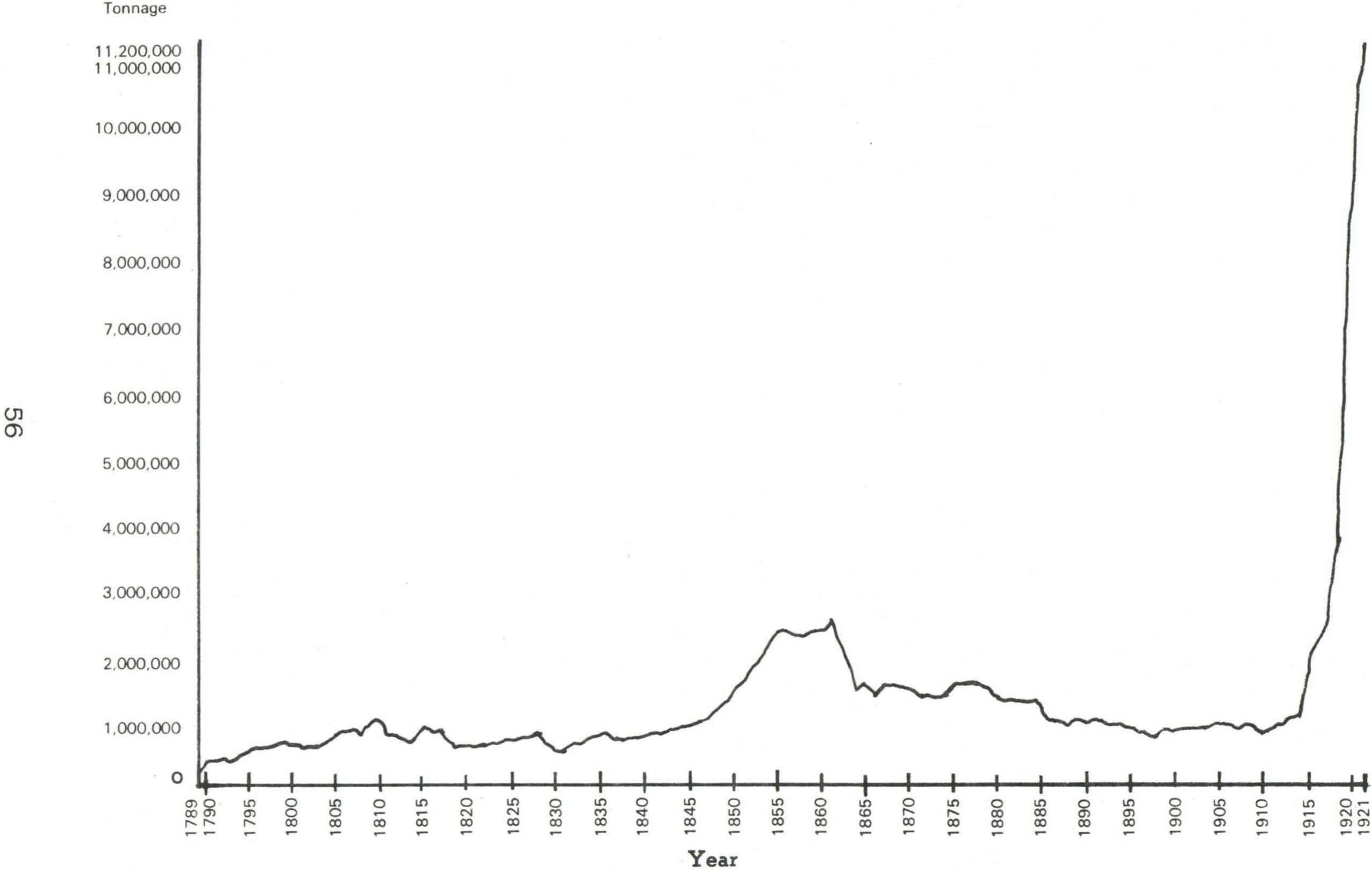
During the period 1847-1859, Americans were unrivaled in the world as builders of sailing vessels. New York and Boston together boasted of not less than fifty yards in 1855. Although the number of yards was greatly reduced, after the Civil War sailing ships remained the most substantial part of the United States merchant marine engaged in foreign trade throughout the entire 64-year period, particularly to the turn-of-the-century. Not until 1902 did American steam tonnage surpass sailing tonnage, and the gross-ton mileage, as high as four-to-one in favor of sail over steam at this time, continued to favor sail until World War I.

By the end of the century, however, American sailing vessels were almost exclusively engaged in the long-voyage freight trades; the passenger trades had transferred to steam vessels, and the sailing packet lines that had hauled ninety-six percent of all passengers arriving in New York as late as 1856 were virtually gone, the last disappearing in 1881. For a period of time after the Civil War, American yards competed successfully in the construction of wooden sailing vessels. But this phase of American leadership terminated during the mid-1870s when declining British iron ship prices met rising American wooden costs. In the construction of square riggers, for example, by 1886 Great Britain was launching four, virtually all of them iron or steel hulled, for every one built in an American yard, almost all of which were still constructed of wood. Due to prohibitive cost factors, those American shipwrights who stayed in the business never did produce but a handful of metal square riggers, remaining faithful to wood, even as trade and profits declined, right up to World War I. Consequently, construction of sailing vessels after the mid-1870s was transferred from a rivalry between the English and the Americans to solely an internal competition between British owners and builders.

Steam played a very minor role in the American long-voyage trades throughout the remainder of the nineteenth Century. American steamship operations, where they existed, were limited almost exclusively to the North Atlantic; there a few American lines managed to eke out an existence in the combined passenger and freight services. Several efforts to service South American passenger and freight trades by steamship lines met dismal failure. All oceanic trades considered, what followed was this: the United States with ever-increasing volumes and dollar values in exports and imports, carried less and less of that trade, and where American ships were employed, these were predominately sail. The essential trades were in grain, coal, hides, jute, coffee, and

FIGURE 2

TONNAGE OF THE UNITED STATES MERCHANT MARINE
ENGAGED IN FOREIGN COMMERCE, 1789-1921



Source: Faulkner, *American Economic History*, 643.

wood. But even the California grain trade, the jewel of American export trades following the Civil War, fell into the hands of the British, who by the 1890s replaced American vessels with more economically-competitive ships in this long and arduous passage. In short, United States ships did not enter into international steam competition on serious terms until after the turn-of-the-century.

It should be pointed out, however, that while American capital was reluctantly committed to American shipping, much domestic investment was made in foreign ships. Starting with the transfer of numerous vessels to foreign flags during the Civil War, by 1901 the number of tons of ships controlled by Americans under foreign registry was seventy-five percent of that of the entire American flag fleet then engaged in foreign trade. American investors in foreign shipping, whether large or small, did so invariably to secure lower costs of operation and more reasonable costs of ships themselves. The most significant of American foreign flag ventures was the International Mercantile Marine Company, created in 1902 by the American financial mogul, J.P. Morgan. This firm, eighty-five percent of which consisted of purchases from Britain, quickly assumed the gargantuan proportion of one million gross tons, greater in tonnage than the entire American foreign carrying fleet, or for that matter, the entire French merchant marine. For brief months, the IMMC created fearful hearts in Great Britain, and raised the expectations of Americans, but the Morgan firm had made the error of over-capitalizing and of paying excessive prices for its vessels. By 1914 the corporation was essentially defunct. This failure underlined the ineffective role United States shipbuilders and owners would play in the development of international steamship trade networks prior to World War I.

If ship production modes changed radically in the pre-and-post Civil War eras, so did the enterprise of shipping itself, particularly in forms of ownership and finance. In the late 1840s and 1850s, the most common form of shipping enterprise had been quite small, most often a single-ship operation owned by the master himself, or by a single family unit. Firms owning ten or more ships were exceedingly rare. Shipbuilding patterns paralleled those of ownership with one-ship operations being the norm. Four-to-six ways in a yard would be most uncommon. The number of single ship yards was impressive; before the Civil War virtually every town with the capability constructed wooden freighters or clippers.

After the Civil War, the old private single-ship companies virtually disappeared. So did the old relationships between shipping and mercantile firms. Shipping became more and more competitive and ownership now fell to specialized shipping firms. Shipbuilding everywhere declined; where it remained it became quite localized, with sail moving to Maine, and steam, what little was produced, moving to the Delaware River under more complex and integrated operations. From the beginning, however, United States steam construction suffered under extreme handicaps, technologically and economically, and quickly fell behind that of British competition. Although by the 1890s American steam shipping overcame many of the technological difficulties, economic factors, such as cost differentials and absence of sufficient supportive capital investment, continued to plague the industry up to the eve of World War I.

Understandably, the profitability of American shipping in foreign trade suffered during the period 1850-1914. Former excellent earnings in American deep-sea trades began to decline as far back as the 1830s, but this was not abundantly evident until more than twenty years later, when prices for vessels and cargoes, particularly for the former, rose more than increasing labor, construction, and operating costs. On the face of it, up through the 1850s, American shipping and shipbuilding was quite profitable, but the boom actually concealed the fact that the United States had been losing its favorable differential in construction costs over a period of two-to-three decades. A slow deterioration had been occurring prior to the Civil War, and probably would have continued at that rate except that it was hastened dramatically by major events during the 1850s and the outbreak of war between the States in 1860. The sharp withdrawal of capital from the maritime industries during this period exacerbated the decline.

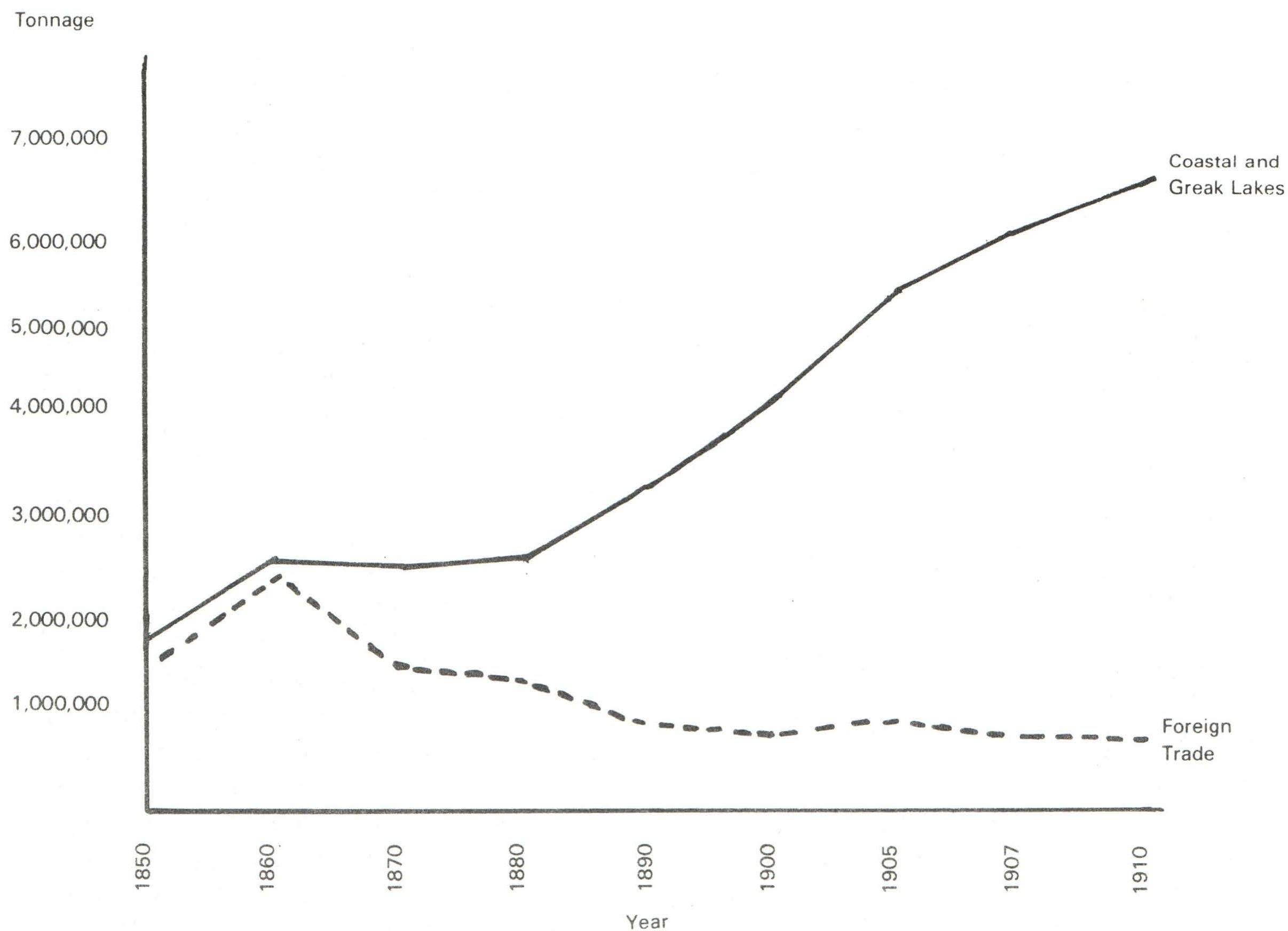
The reduction in profitability was most striking in American steam shipping. Losing operations after the 1850s were virtually guaranteed. Profits from sailing ships declined less precipitously, however, and through the late 1870s there was sizeable American activity in the long-voyage sailing trades. Profits in shipbuilding for the ocean trades matched the decline in earnings won from shipping. Steamship construction, except for new naval contracts let in the 1880s, was negligible, and the sailing ship construction industry collapsed in the late 1870s, forced out of business by a combination of unfavorable economies and European competition. American owners engaged in foreign trade simply could not afford to purchase American-built ships.

United States governmental policy towards transoceanic shipping did little to stem the decline. Throughout this period no defined theory of public support developed. Subsidies were applied ineffectually and without enthusiasm, and then to areas, such as the North Atlantic, where they had the least likelihood of success. At the same time, Congress saddled American shipping with restrictive registry laws that forced American companies to purchase ships in the States at considerably higher cost. To add to the difficulty, the United States government opted to provide the American shipbuilding industry with protective tariffs. In effect, with respect to foreign trade, United States policy protected American shipbuilders, but abandoned the shipowners and operators. These policies, on the other hand, strengthened American coastal and lake trades, and while tonnage in foreign trade declined rapidly, tonnage in coastal and lake shipping increased markedly. Whereas in 1860 American tonnage in foreign and coastal and lake trades was roughly equal, in 1901 coastal and lake tonnage outweighed United States registered deep-sea tonnage by better than five-to-one (see Figure 3). In 1910 the ratio had increased to over eight to one. The fact that a measure of foreign registered tonnage was owned by Americans did not radically alter these ratios.

Unlike its European competitors, the United States was slow to make great efforts to combine military needs with transportational considerations. Not until the 1880s did this linkage occur, and a permanent governmental-military incentive to maritime growth was not institutionalized until World War I. In addition, America's late start in steam shipping put it in a poor condition to

FIGURE 3

UNITED STATES MERCHANT TONNAGE, 1850-1910



1. All Figures include both sail and steam.

Source: A. W. Kirkaldy, *British Shipping: Its History, Organisation and Importance* (New York, 1970, reprint of 1914 edition), Appendix XVII.

counter developing foreign discriminations and monopolistic practices. The United States government did little to restrain these influences before 1916. In short, these policies nullified attempts to resuscitate the American shipping industries and to maintain American ships in foreign carrying trades. Not until the very close of the period under consideration did active and corrective governmental measures emerge. To summarize, in international trades, American shipping declined from a position of near world leadership in 1850 to insignificant proportions in 1914.

Precisely why the decline in American shipping occurred has been the subject of much investigation. When this decline commenced has likewise generated much interest, as has why it persevered over the years. Many and varied have been the answers to these questions. As one chronicler observed as early as 1880:

There were almost as many opinions on the point as there were men to utter them. Views differed according to the interests of the several authorities and the amount of pain each took to investigate the subject.⁴

Nevertheless, over time it may be said that a corpus of understanding has emerged. The second part of this essay will undertake a selective and, to some degree, interpretative overview of the most important views expressed since the decline commenced. In doing so it takes a line somewhat novel concerning the history of the decline: a composite analysis of the major works published over the years — a bringing of them together in one precis — has, to my knowledge, never been undertaken.

The historiography of the dramatic deterioration of the American merchant marine in foreign trade began in earnest directly following the conclusion of the Civil War. Had the States settled their differences without conflict, a dispassionate attempt to assess the causes for the decadence of American shipping might have emerged. But the Civil War caused a dramatic acceleration in the decline and consequently infused the debate with such emotion that it frequently became difficult to separate fact from frenzy. The politics of party, class, interest, and section intruded vigorously into the controversy and solutions for recovery were often mixed inextricably with the need not only to list the causes but also to assign culpability. Two 1870 United States government reports from the first Grant administration outlined the debate in terms that would become familiar.

Joseph Nimmo, chief of tonnage in the Treasury Department, determined that maritime decadence had been wrought primarily by the great transition from sail to steam, and from wood to iron. The speeding technological revolution at sea had left the United States far astern, the result of a basic conservatism that induced Americans to cling to wooden hulls, paddle wheels, and sails long after the nation's competitors had abandoned them for iron, propellor, and steam. It has been the outcome of economic cost differentials, and while the United States possessed vast internal industrial strengths, American shipbuilders had lost their capacity to compete with Great Britain's more efficient and less costly use of its resources. Nimmo added that over-extension and antiquation in American shipping, the development of foreign subsidy programs, and American mail payments to foreign steamship lines had also acted to retard America's shipping and shipbuilding industries. Nimmo held that the demise of American shipping had not been a phenomenon born of the recent war; rather, decay had set in as early as 1855. The War Between the States had not initiated, but exacerbated the decline.⁵

Simultaneously, the Congressional Committee on the Decline of American Commerce, better known as the Lynch Committee, came to its own conclusions, some of which were complementary to Nimmo's. In one critical area, however, the Lynch Committee and the Treasury official were of an entirely different mind — the Congressmen differed radically in arguing that the primary cause of decadence was related not to pre-war shipping and shipbuilding economies, but "mainly, if not solely, to incidents of war."⁶

This concept was understandably popular in the postwar period. The Civil War had devastated the American merchant marine. The Confederacy, with a small but effective fleet of armed cruisers, had terrorized Northern shipowners, and many of those whose ships eluded capture or destruction sought refuge in foreign registry. In addition to the loss of about 110,000 tons of shipping to war, another 750,000 tons, or close to one-third of the entire American fleet, were sold or transferred to foreign flags. Inasmuch as Great Britain had received the vast majority of these transfers, had openly aided the Southern war cause, and had greatly strengthened its own maritime position as a result of the war, a retaliatory sentiment prevailed in the United States against the British and those Americans who all abandoned their flag. Influenced as well by interests favorable to the American shipbuilding industries, the Lynch Committee determined that a denial of re-entry to those vessels transferred would serve as an appropriate act of retribution, while at the same time stimulating the domestic constructive enterprises in the North. Accordingly, the Committee set a course for protection and denounced as "traitors" those shipowners who had transferred their vessels. Another congressional outcome was the decision to prohibit foreign-built vessels from registering in U.S. foreign trade, in addition to retaining long-standing navigation laws limiting registry in the extensive American coastal trades to American-built ships. For the next four decades American ocean-shipping would suffer under the added disadvantages of high tariffs and restricted registry.

Hence, the post-Civil War years became a battlefield for the conflict over whether to retain, or to eradicate, the newly-established policies. On the one hand, the shipbuilding industries, represented principally by the Republican Party, advocated restricted registry, the reintroduction of government subsidies, and high tariffs (which covered many materials absolutely vital to ship construction — anchors, cable, copper, zinc, tin, lead, iron, points, rope and canvas, for example). These policies were the most preferable way, they argued, to compete with foreign ship construction and to influence the reconstruction of what had been formerly the most extensive and lucrative enterprise in American business. In contrast, shipowners and operators, found mainly in the Democratic camp, sought relief from the prohibitively priced American shipbuilding industry by advocating lower tariffs and campaigning for the repeal of the restricted registry laws. They maintained that costs would be decreased substantially and the American merchant marine made competitive if more cheaply built and operated foreign bottoms were allowed to participate in the nation's foreign trade. Of all the world's maritime states, they argued, only the United States lacked a free ships policy.

This debate quickly attracted some very articulate and capable publicity agents whose pamphlets, books, and statements before Congressional committees claimed national attention. The free ships proponents were most ably represented by Captain John Codman, a shipmaster and lobbyist of long experience, who opined repeatedly that in consideration of broad national interests, commerce and the carrying trade were of infinitely greater importance than shipbuilding. But for the opposition of Maine and Delaware shipbuilders, he complained, American shippers, merchants, and seamen would have gained fortunes in freight fees.⁷

The protectionists received their most vigorous and outspoken support from the shipyard owners, most particularly the Delaware River builders John Roach and Charles Cramp, and from Henry Hall, influential shipping editor of the *New York Tribune*. Roach, Cramp and Hall strongly opposed changes in the registry laws, and received support from shipyard labor, from certain mercantile elements with shipping ties, and from various nationalistic elements, most notably the United States Navy, to which Roach and Cramp were allied through lucrative contracts.⁸

Historically, then, chroniclers of the decline were obliged to consider the free trade versus protection issue, a new dimension, in addition to the other causes previously set out. Of the various analyses produced between the 1880s and early 1900s, four deserve serious attention. Two supported free trade; two favored protection.

In 1883 J.D. Jerrold Kelley, a junior naval officer, produced an able study, *The Question of Ships*. This was an effective, if brief and somewhat cynical, attack on those who proclaimed as the primary causes of the decay the recent war, and who sought to emphasize British complicity in both. Decline, Kelley corrected, "began before the war," and could not be explained by American wartime venality and British discriminations. The slippage of American seapower he ascribed instead to a variety of causes in combination: the substitution of steam for sail, the use of iron in place of wood, and unwillingness of the nation to subsidize American shipping, navigation law restrictions, and government impediments. While Kelley acknowledged that the abandonment of subsidies in the United States had hindered America's competitive abilities in foreign shipping, he opposed subsidy as economically unnatural and pronounced in favor of free ships, the "denial of [which] forbids the return of commercial prosperity."⁹

Kelley's antagonism towards protection was more fully articulated by the economist David A. Wells. Perhaps the most prominent free-trader of his time, Wells offered a similar and more thorough estimate of shipping's woes and a set of remedies predicated upon the abolition of commercial restraints. Wells agreed with Kelley about the pre-war origins of the decline. The failure of the shipbuilders and shippers to adjust to iron, steam, and propellor before the war caused the decline, and the restrictive commercial policies of the protectionists after the war prohibited its recovery. All other maritime nations had faced similar technological problems, and all save the United States had remedied them by adopting a free ships policy. Republicans were the bane of Wells' existence; and he saw the decay and disaster not continued by accident, but by Republican design. Wells argued that the logic behind subsidy was sterile and adolescent and that Great Britain did not maintain its supremacy through subsidies but through successful competition in the free marketplace. He would be one of many to turn to the British maritime historian W.S. Lindsay, whose 1874 study of English shipping Wells believed authenticated these observations.¹⁰

The pro-subsidy, anti-British lobby received its own historical "authenticity" from the writings of a former Commissioner of Navigation and maritime insurance broker, William W. Bates. In *American Marine: The Shipping Question in History*

and Politics (1892), Bates acknowledged the cause of the decline as a pre-war occurrence, in the process taking the Lynch Committee to task for its failure to appreciate this. Bates preferred, however, to see British discriminations against American ships, and not purely economics and politics, as a primary cause. The decay of the American marine, he contended, was a direct result of the assignment by Lloyd's of London of prejudicial insurance rates to foreign vessels, the effect of which had "depreciated, disparaged, degraded, and decried" American shipping in the ocean trades. Although Bates must have sensed that the comparative weakness of the American marine insurance business was not caused solely by British malefactions, he chose to externalize the issue by drawing a picture of black-hearted Britons determined to drive the American flag from the high seas through scheme and device. In this setting the commencement of the free ships campaign in America was accredited to a maliciously timed ante-bellum propaganda attempt on the part of London and Glasgow to promote the sale of British vessels to American shippers, and even the opening of the Suez Canal in 1870 appeared as a sinister effort to ruin the American round-the-Horn square-rigger grain trade. As a solution to the problem, Bates favored continued protection, a system of bounties, and, understandably, a series of hard-hitting counter-discriminations.¹¹

In the end, Bates' work revealed as much about the dilemma of the American merchant marine as it did about the causes for its decline. His dogged insistence that wooden vessels remained superior to iron in efficiency, cargo capacity, speed, safety, and seaworthiness spoke to an emotionally genuine but retarding attachment to the past with but remote reference to the reality of changing times. Bates also exemplified how the hauling down of the stars and stripes for the red ensign caused irrational generalizations on the part of many late nineteenth century maritime analysts. Entranced by British actions, Americans of Bates' conviction persistently searched for the hand of the British in every shipping situation and came to attribute to them an influence and power over American maritime matters which they simply did not possess. American chauvinism was an important force that should not be underestimated: it did much to deter Congress from addressing the shipping question in creative and constructive ways.

Not until after the turn of the century was a comprehensive work produced: Winthron L. Marvin's *The American Merchant Marine: Its History and Romance From 1620 to 1902*. Marvin's broad analysis covered a variety of subjects in addition to trans-oceanic trade. Unlike previous chroniclers of the merchant marine, Marvin included chapters on the coastal and Great Lakes traffic. His efforts at comprehensiveness, buttressed by a statistical approach, had their rewards as the book succeeded commercially. As late as the 1940s it was employed in maritime history courses and seminars as a primary text.¹²

Although Marvin claimed to be thoroughly objective, he produced a work quite as controversial in its leanings as those of his predecessors. Several strong biases permeated his discussion: an indictment of the ante-bellum South, a strong argument for subsidies, and the familiar prejudice against Great Britain. While

Marvin agreed that the decay of American sea trade had preceded the Civil War, and that it "would have gone on if the war had never been fought," he also believed that "it might not have begun at all if the war had never been contemplated." According to Marvin, the turning point had occurred in 1855 when a politically partisan, sectional war against subsidy commenced in Congress. Southern pro-slavery leaders, formerly strong proponents of subsidy, focused their growing hatred on Northern abolitionist agitation by flailing out at that section's economic strengths. Marvin portrayed a scene in which a small and vile cabal of Southern Senators won an important pre-war skirmish by destroying the "historic principle of national protection and encouragement to our maritime interests." The subsequent 1858 withdrawal of subsidy from the American Collins Line was nothing short of a "political crime," nipping in the bud a delayed but growing and commendable response to British competition in ocean iron steamship trades.

Whether done maliciously or not, Southern pre-war behaviour, Marvin alleged, had played right into the hands of America's arch-competitors by throwing to the British the whole Atlantic postal service. The Civil War fostered by slavery advocates completed what they had begun in the previous decade. As Americans withdrew from the Atlantic during the war, the British steadily increased their ship subventions and extended their lines of operation. Subsequent American subsidies after the war were too little, too late. The British maintained their hegemony through continued state subsidy and discrimination, particularly in marine insurance and classification. United States internal development turned previous investments in maritime pursuits inland. In those circumstances, "no national legislation, however liberal or however strenuous, could have caused American shipping to spread and increase between 1865 and 1890." But prompt and appropriate subsidization would have at least spared it from the "swift and terrible decline that was the heavy price of our actual national policy of neglect and discouragement." Marvin concluded that "but for the brief and melancholy stifling of the passion of nationality in the sectional quarrel that produced the Civil War, our splendid steamship lines never would have been abandoned." British domination symbolized a "vivid sign of our national defeat and humiliation."

Several other points need to be made about Marvin's study. The economic differentials identified by previous chroniclers, especially those advocating free ships, are treated superficially, and the free traders themselves are depicted as dishonest wrongdoers, having supported the surest way to guarantee Great Britain's maritime monopoly. Marvin's work is also significant for the observations it makes of American maritime developments and the general national environment at the turn-of-the-century. Critical new factors explained a heady enthusiasm in Marvin's work: the availability of energy and capital released after the closing of the frontier and the completion of the internal transportation system; the Spanish-American War as a demonstration of the strengths and weaknesses of the American merchant marine; the infusion of a new spirit demanding an adequate naval auxiliary; and the growth of American industry and the

centralization of wealth and power. Marvin was ecstatic over J.P. Morgan's shipping venture as a manifestation of new American commercial capabilities: "the same indomitable spirit which wrought our great railway system, subdued the Western wilderness, and is now driving the surplus output of our industries into all the markets of the world, can win supremacy on the ocean for the United States...." While Marvin misinterpreted the eventual worth of Morgan's efforts, his work exuded the newly energized nationalism born of events at that time.

Marvin's account is written well and colorfully. Thoroughly patriotic and dedicated to his friend, Theodore Roosevelt, it made engaging reading and reached a wide audience. In fact, Marvin's work actually produced a result of which no other historian of the American merchant marine can boast: the creation by a United States President of a commission to solve the maritime conundrum. But the Merchant Marine Commission of 1904-1905 blatantly confined its hearings almost exclusively to the testimony of the pro-subsidy interests. Marvin, with strong commitments to New England industry, and as the Merchant Marine Commission's secretary, conspired with other Commission members to determine that.¹³

In important ways, the pro-subsidy recommendations of the Mercant Marine Commission were becoming obsolete even as they were published. While the philosophy of subvention would never die, powerful corrosive forces were at work. The most significant of these Marvin identified: America's remarkable commercial growth after 1900. In the early years of the century American foreign trade, despite its dependence on foreign carriage, increased beyond all imagination. Even adjusting for inflated commodity prices, between 1900 and 1913 United States export and import trades expanded by eighty percent in dollar value, and the trade surplus reached an all time national high. Naturally, the desirability of maintaining, protecting, and increasing these lucrative sources of national income generated much concern.

For years men like Jerrold Kelley and David A. Wells had argued that one of the important means to these ends should be the creation of even greater opportunities through the elimination of the many remaining barriers to trade. Lower tariffs were extremely popular with students of this school of interpretation, which grew with intensity and increasing political power after the turn-of-the-century. First, they alleged, lower tariffs would benefit the domestic economy. By breaking down and redistributing the wealth and power of the Northeast industrial interests, broader commercial opportunities would be encouraged nationwide. Secondly, the lowering of tariffs would encourage reciprocal behaviour among America's competitors and would liberalize global trade relations, thereby establishing more outlets for growing American surpluses.

Maritime historians were not immune to these sentiments and low tariff positions characterized the best analyses of this period. In 1905 the American Economic Association published *History of Shipbuilding Subsidies* by Royal Meeker, a political economist.¹⁴ An Iowan whose philosophic roots were strongly populist, Meeker minced few words in laying out his thesis: his multi-national analysis had convinced him that "subsidies to shipping are harmful." French and

Italian subsidization over the years had been heavy, but their shipping interests had not prospered. As for the British, one school argued that subsidies were the backbone of their maritime supremacy, but another asserted that Britain's merchant marine thrived and provided its best services when unaided. Meeker believed that the evidence supported the latter. Like others before him, he understood that with the failure of the Collins Line all hope of replacing the British in ocean shipping services had perished. Meeker allowed that fate beyond human control had played a hand and while the losses of Collins Line vessels at sea had been important, economic conditions in America at the time made it certain the United States could not compete in steam navigation. The tragedy, as he saw it, was the failure of the shipbuilding industry and its advocates to profit from the experience. To Meeker the implication was clear: Lobbyists for subsidy, like Marvin and Cramp, were erroneous in their assertion that America could have held its own by continuing aid after 1858. England had all the economic advantages, particularly in iron and coal, had developed a critical surplus in goods and income seeking profitable investment overseas, and depended absolutely upon imports of raw materials and foodstuffs to survive. The necessity for maintaining Britain's life-lines to the Empire added additional urgency. Even had Americans been able to build as cheaply, Great Britain's greater wealth and imperative necessity to possess a major maritime navy would have resulted in her continued shipping supremacy.

From the historiographic standpoint, these observations were important in that they signaled an effort to combat the strident anti-British tone that had pervaded discussion during the previous years. They coincided with a noticeable improvement in Anglo-American relations generally. Meeker insisted that his readers understand the dynamism of the British economy on its own. Economic conditions in the two countries were quite different — maritime transportation was the absolute key to the success and solvency of Great Britain and its imperial structure. Moreover, the British had incomparably better facilities for building and operating iron steamships. Meeker was voicing his belief that from an international point of view the day had arrived for the substitution of trade barriers for reciprocity. On this basis, he agreed with Lindsay that given the criticality of shipping to the British, the subsidy policies adopted in Great Britain had been "wise and liberal," whereas, given American needs, the policy in the United States had been "extravagant and a tax upon the people."

But the major response to Marvin came actually not from Meeker, whose work was confined to rather narrow academic circles, but from the pen of John R. Spears, an accomplished author-journalist in naval and maritime history. In *The Story of the American Merchant Marine* (1910),¹⁵ Spears decried the arguments that governmental stimulation had accounted for either the rise or the decline of the American merchant marine. American shipping had obtained supremacy before the Civil War "by actual merit." "Merit" did not mean simplistic economies, since American shipping had not been measurably cheaper. Rather, shipping ascendancy had been achieved "because the whole environment of the American seafaring population had evolved a ship and crew which, taken together as a unit,

were able to give more ton-miles for a dollar than any other similar unit in the world." The creation of steam propulsion and the development of the screw propeller, combined with the regularity which steam provided in the Atlantic trades, changed the nature of the contest.

Spears was another who thought highly of Lindsay's work, particularly his belief that the repeal of the ancient British navigation laws in 1849 had been a turning point in British and, hence, American maritime history. Facing the superiority of American wood and sail, British shippers had been forced to take up steam shipping, "or abandon the sea." Spears agreed that the Inman Line's decision in 1850 to convert to steam doomed the American sailing packet. That Inman operated without subsidies, sustaining his company on outward-bound emigrants and return bulk imports, was of great importance. In short, America lost its trade position, not to British subsidies, but to British steam cargo efficiency. Then during the ensuing Civil War, the British took advantage of American extremities to perfect their art and establish themselves firmly in the old American trades.

Spears advanced other theories to explain the demise of American shipping. He pointed out that the lack of sound engineering and engine works in the United States impeded America's inability to keep pace in steam shipping. He also took strong issue with Marvin's depiction of a Southern antebellum conspiracy to destroy the nation's Northern shipping industries. Spears' examination of Congressional testimony and debate revealed little other than purely economic reasoning; reasoning that parties on both sides of the slavery issue employed to oppose the continuation of the Collins Line subsidy. The failure of the Collins Line to demonstrate that it was a viable enterprise, with or without subsidy, and not the sectional issue, had caused the final vote.

Spears also devoted much space to the impact of deteriorating seafaring conditions upon the continuing decay of American shipping. With the transition to steam, the "private venture" method of augmenting a sailor's income had disappeared, and the old custom of running the forecabin as a schoolroom, with ships' officers serving as navigational instructors, had died out. In numbers, too, vessels increased prior to the Civil War with such rapidity as to outstrip the national labor market. The results were progressively poorer crews. The sorry state of working conditions on American vessels had also promoted decay. Over the course of time American ships had not rid themselves of their reputation as "floating prisons." Conditions for labor in the American merchant marine had been, and yet were, "repugnant to the dictates of humanity and condemned by the instincts of decency."

These factors had greatly discouraged American signings with consequent decline in ship efficiency and service. Protests like this helped to produce the La Follette Seamen's Act of 1915, or as it was appropriately called, the Seaman's Emancipation Proclamation.

One additional account published prior to America's entry into World War I warrants examination. The Carnegie Institution's *History of Domestic and Foreign Commerce of the United States* (1915) is significant because it provides a

historical perspective of the shipping question from the viewpoint of professional economists at the very close of the period under examination.¹⁶ Two units in Volume II of this study covered the state of American shipping, 1850-1914: "The Foreign Trade of the United States Since 1789," by G.G. Huebner; and "Government Aid and Commercial Policy," by D.S. Hanchett. Huebner was a well-known economist of transportation. His analysis was brief and to the point. A multiplicity of forces had combined to reduced United States trans-oceanic shipping. The now familiar failure of the American shipbuilders to keep abreast of technological change was cited, along with the development of significant cost differentials between British and American shipbuilders and owners. Restrictive American registry laws added to these handicaps. Another fundamental reason for the decline was the opening of more profitable fields of domestic investment. Huebner denied that manufacturing, agriculture, mining, and railroad enterprise consumed all available investment capital: the growth of the protected coastal trade and the large recent investments made by Americans in foreign flag operations contradicted that. American shipping received sparse support simply because it produced unsatisfactory profits in competition with foreign registries.

Huebner added other factors of significance. The Civil War had caused severe damage to American tonnage and had come at a most injurious moment. Moreover, Congress had not acted vigorously to remedy the decline. The punitive banning from American registry of vessels transferred during the war, the retention of heavy war-revenue taxes until 1868, heavy duties exacted upon the importation of shipbuilding materials, the absence of liberal mail contracts until 1891, and neglect of the American navy until 1882 all contributed to the failure of the American merchant marine to rebound after the surrender of the Confederacy. Huebner's analysis was noteworthy in avoiding taking sides in the volatile issue of protection versus free trade, instead attributing the decline to a series of fundamental economic and political developments.

Hanchett's study of governmental aid and commercial policy corroborated Huebner's. It was more detailed and opinionated, however. American shipowners and shipbuilders, despite heroic efforts, found that favorable economic conditions, formerly enjoyed by the American shipping industry, had transferred to the British. Hanchett emphasized the advantages the British had in engine construction, and in more accessible and cheaper coal, iron, and labor. Like Meeker he endorsed the argument that Britain had considerably more need to support its merchant navy than did the United States. Hanchett reflected Marvin's belief as well that pre-war sectional and inter-industry sail versus steam squabbles had contributed to the withdrawal of subsidies to American trans-Atlantic steamship services. But in contrast to Marvin, Hanchett argued that the withdrawal of subsidy, while finishing the Collins Line, had not in itself precipitated its failure. Rather, the subsidy had been withdrawn as the result of the line's failure to compete economically with its British rivals. Hanchett felt, however, that that had been a myopic act, that the pre-Civil War subsidy plan had produced much of value and that the withdrawal of subsidies "came at the time they were most needed", when the American steam marine was yet in an infant

state and required additional nourishment. The general attitude conveyed is that Congress had been derelict in not acting with greater vigor in protecting its shipping; it had also erred in the postwar era by failing to modernize the navy, a helpful way to maintain vitality of commercial shipping.

Hanchett believed that internal developments and the industrialization of the nation had resulted in a concentration of American investment in domestic enterprise. The natural growth of the nation's population augmented by an enormous influx of immigrants, had provided the expanding manufacturing sector with a more than satisfactory market. Consequently, an apathy developed in the United States toward foreign commerce and its nautical arms, an attitude hardly shared by maritime nations such as Great Britain. Hanchett concluded that Congress's failure to act under these circumstances, while reprehensible, had not been surprising.

As important, Hanchett reflected the growing enthusiasm with which maritime proponents viewed the future on the eve of American entry into World War I. As he interpreted events, times had changed for the good since 1890. The nation's burgeoning industrial capacity had outstripped domestic consumptive abilities to a point where external markets and the means to reach and service them had taken on critical dimensions. The new steel navy had brought about needed improvement and modernization in American shipyards. Growing American capabilities in steel and iron production, combined with even greater naval demands stemming from the experience of the Spanish-American War and the pro-nautical policies of Presidents Roosevelt, Taft, and Wilson, had prepared the way for a rebirth of the commercial shipping industries. No doubt reflecting expanding American commercial opportunities provided by the ongoing European War, Hanchett exuded the nautical optimism characteristic of the nation at the conclusion of the period, 1850-1914. But as it would for the dreams of others of his era, the passing of time would reveal the sad inaccuracy of his prognosis.

The close of World War I witnessed slight, but not dramatic changes in interpretation of the conditions of American shipping in the period 1850-1914. Despite the repudiation of the League of Nations and the setting-in of a nasty xenophobia during the 1920s, anti-foreignism was not reflected in the most significant American maritime studies of the inter-war period.

The post-World War I period produced several studies of Civil War maritime history, three of which deserve mention. Two of these disregarded evidence to the contrary and argued that the Civil War was the primary cause of the decline in the American maritime industries. Frank Lawrence Owsley's *King Cotton Diplomacy* (1931), would become a thirty-year bulwark of Civil War foreign affairs analysis.¹⁷ Interpreting the conflict from the Confederate perspective, Owsley emphasized the enormous benefits of war reaped by Great Britain at the expense of the American economy, most notably that of the American merchant marine. He argued that American shipping in 1860 had reigned supreme in the trans-Atlantic trades, and that the Civil War had destroyed it utterly. Owsley covered most of the impediments caused by the conflict but he failed to consider those occurring before the war. As a consequence, his historical outlook was limited

seriously; Spears appears in his bibliography, but there is no evidence that he employed him or any of the previously mentioned studies made of the pre-war origins of the decline. These omissions were unfortunate: for decades students of Civil War diplomacy would be encouraged to employ Owsley's work as a starting point.

George Dalzell created something of the same illusion in *The Flight From the Flag* (1940).¹⁸ A textwriter and lecturer on maritime law, Dalzell treated the exploits of the Confederate raiders in spicy and adventurous tones. Southern cruisers rendered a service to the Confederate cause completely out of proportion to their number by dealing the merchant marine of the North a blow from which it would never recover. Like Owsley, Dalzell was not concerned with documenting the pre-war condition of American shipping, thereby ignoring its ante-bellum decline. He did provide, however, a useful set of explanations for its failure to recover after the conflict. Some were familiar, but others were not. The less familiar included the absence of corporate ownership of vessels which made broad investments difficult; the deterioration of marine labor during the war; and the absorption of men and ships into the United States Navy. Dalzell emphasized the "diversion of capital and enterprise to internal development," such as railroads, mines, and manufacturing. He also believed that the postwar period called for the prompt bestowal of government subsidies, but allowed that the political environment had rendered that an impossibility.

Historical objectivity would have been better served had Owsley and Dalzell paid greater heed to a work published in 1930 by Emerson D. Fite.¹⁹ Fite's study of Northern social and industrial conditions during the Civil War covered in depth the unfortunate impact the conflict had on American shipping services, showing that at the war's end hardly an American flag could be found in the great East Coast shipping centers. But Fite knew that the war had not been the primary catalyst for shipping's decline. Great Britain had stolen the march twenty years earlier by subsidizing its merchant navy and perfecting steam propulsion and iron construction. The process of decline would have continued even had the war never been declared; the war hastened the process of decay and drew public attention to it. Fite had done his homework, while Owsley and Dalzell had not.

In the meantime, John Spears' analysis had secured for itself a distinguished endorsement from the eminent Harvard maritime historian, Samuel Eliot Morison. "I agree with John R. Spears," wrote Morison in his study of maritime Massachusetts, "that the decadence of American shipping was wholly due to natural causes — to conditions of national development ... that were unavoidable."²⁰ The Civil War merely hastened a process already under way of the substitution of steam for sail. Massachusetts lost her ancient superiority in ship construction by failing to keep pace with technological developments at sea. "Far better had the brains and energy that produced the clipper ships been put into the iron screw steamer," he lamented. After the War Between the States, national westward expansion and the protective tariff killed or maimed innumerable lines of commerce in which Massachusetts merchants had formerly thrived. Once the trans-Atlantic cable had been laid, these merchants had become "anachronisms."

Simultaneously, unimaginative and tradition-bound master shipbuilders, "reluctant to raise barnyard fowls where once they had reared eagles, dropped off one by one."

Then, in the span of eight years, three important maritime studies strengthened the Morison and Spears thesis. The first of these was published in 1932 by the United States Department of Commerce. Entitled, *Report on Shipping and Shipbuilding Subsidies*, it became better known as the Saugstad Report, for the economist who prepared it, Jesse A. Saugstad.²¹ This report is a massive and invaluable compendium of hard to secure data on the role played by navigation monopolies, discriminations, bounties, subsidies, or virtually any kind of government aid, in the protection of the world's assorted merchant shipping and shipbuilding industries. It also assesses the results, whether these had helped or hindered maritime growth and competitiveness. Saugstad argued that unlike the subsidy policies employed by other nations, those of the United States in the 1840s and 1850s had been based on mistaken principles. The government had defined poorly both the subsidy policy objectives and techniques to be employed and had not come near to matching the sounder aid policies administered by Great Britain. The result had been great inefficiency, loss of capital support, jealousy and obstruction on the part of non-subsidized interests and regions, and subsequent failure. Saugstad believed that in contrast to the United States, Great Britain reached its position of preeminence not because of state aid, but because it enjoyed competitive operating and construction advantages. Unfortunately, neither the United States government nor the American shipping industries had profited from the example. Saugstad argued that these mistaken policies had persisted through the nineteenth century and into the next, and that even as he wrote in 1932 the shipping and shipbuilding industries of the United States were still governed by principles which were not conducive to "orderly economic progress."

The second significant maritime study produced in the 1930s was a hard-hitting anti-subsidy, pro-free ships analysis, *American Shipping Policy* (1938), by a Princeton graduate, Paul M. Zeis.²² Influenced by the debate surrounding the Merchant Marine Act of 1936, Zeis set out to examine the merchant marine as a test of the impact of pressure groups in shaping national legislation. Under the tutelage of the naval scholar, Harold Sprout, Zeis deduced that the history of shipping legislation in the period following the Civil War exemplified nicely the methods by which virtually all national policies were developed. With few exceptions, national policies were designed to advance the welfare of particular economic or social groups. In most cases, the goals of the groups were promoted only by sacrificing the interests of other similar groups. In the case of the American merchant marine, the interests sacrificed had been those of the shipowners and shippers. Zeis remorsed over this; to him the protection lobby represented a politically narrow and sectional view, motivated less by national concern than by localized needs of the shipbuilding community. The low tariff and free ships interests, on the contrary, took a broader view, arguing for a merchant marine in consideration of its function not as a single industry but as an

instrument of broad national trade. Parochial, selfish interests had triumphed over national interests, with the merchant marine suffering most of all.

Zeis acknowledged his debt to other scholars of American maritime history. Highest grades for comprehensiveness he granted to Spears. Meeker's work he acknowledged as the standard study on the economic effects of subsidy, while Saugstad drew praise for having completed the best work on governmental aid to shipping. Zeis agreed with them that the age of American shipping supremacy had ended before the outbreak of war. The Civil War had merely converted what had been a process of gradual decay into a much speedier decline. But the war had also solidified control of the nation in the hands of the protectionist Republican Party which levied burdensome taxes on the merchant marine during the war and flailed it more with high tariffs. Although the anti-subsidy forces had been formidable, and had prevented the protectionists from securing subsidies for ocean shipping, the shipbuilders had been able to maintain their edge by virtue of their political power, the monopoly they had in construction for the coastal trades, and the navigation laws which forbade the use of foreign-built ships under the American flag. These navigation laws Zeis proclaimed as "probably the most important single cause for the continued decline of the merchant fleet." Overall, Zeis' forceful exposition gave strong moral and scholarly support to the economic policy of Franklin D. Roosevelt, who in his attempt to tear down protective barriers established around the world as the result of the Great Depression, promoted reciprocity and the lowering of tariffs.

The third of the trio of important books produced during the 1930s was David B. Tyler's *Steam Conquers the Atlantic* (1939).²³ Tyler, a Columbia University Ph.D. who did his work under the American business historian Allen Nevins, sought to discern why the United States, hardly a poverty-ridden and industrially-backward state, had forfeited control of Atlantic commerce to Europe. He based his study on the premise that the explanation lay in developments associated with the advent of steam power in the nineteenth century. Tyler covered the sixty-year period from 1820 to 1880 and concluded that European steamship and commercial hegemony on the Atlantic had been achieved by the latter date. In short, all the factors that distinguished the existence of European leadership in the 1930s were clear by the year 1880.

Covering all the now standard interpretations and developing more, Tyler argued that a "multiplicity of factors" explained the decline of the American merchant marine and the rise of European supremacy. He took particular concern to note advances in engineering and naval architecture, geographic in addition to financial facts, the personal initiatives of the important shipping leaders, and the role played by power politics and political favoritism. It was the most comprehensive analysis to that date of steamship development, and unlike the attempts of previous American analysts who focused their research on American records, Tyler sought his answers in archives on both sides of the Atlantic.

The new perspectives with which Tyler approached his subject led him to believe that "the principle cause of the decline of the American merchant marine was the scarcity of capital." English investors considered American-built

steamships inferior and were reluctant to invest in them, while American investors put their money into sailing ships and, more often, Western interior development. The failures of the early American steamship lines had strengthened support of the American sailing ship industry, and the 1857 panic and the Collins Line failure had capstoned the collapse of American steam competition.

Tyler argued that the weakness of the American Atlantic lines could be gauged by comparing the operations of the ill-fated Collins Line with those of its British rival, the Cunard Line. The Collins Line had competed successfully with Cunard only "while its vessels were new and fast and while it received an equal subsidy for performing only half the number of voyages performed by its rival." Tragically for the Collins Line, its subsidy was reduced just as two of its four steamers were lost at sea. The Collins Line had also been handicapped by its inability to secure unencumbered venture capital; high costs of construction, labor, fuel, and repairs; and the expense of lobbying to retain the subsidies it required to remain competitive with Cunard.

The success of the British Inman Line even more clearly brought out the Collins Line's problem. Inman had also lost vessels at sea, and had no subsidy at all. Yet, he had managed to keep his operation afloat with considerable success. Tyler believed, as had Spears and Lindsay before him, that Inman's achievements stemmed from his genius as an efficient and perceptive businessman, not from the presence or absence of governmental supports. His decision to enter the emigrant trade rather than lavish his resources on traveling elites, his ability to tap ready British capital, and his early adaptation to iron and the screw propellor, had been the factors guaranteeing his success on the North Atlantic.

Inman's success underwrote the important theme in Tyler's work that Great Britain had surged ahead in steamship competition "by giving birth to the industrial revolution," which fostered English prominence in the "Acquisition of mechanical knowledge, skills, and accumulation of capital." The adaptation to iron ship construction, and the development of the screw propellor and compound engine became the benchmarks of British maritime supremacy. Great Britain had also learned from its imperial experience and the wars of the 1840s and 1850s that a merchant marine was an indispensable auxiliary to the navy. Tyler believed that the importance of a merchant marine to the island kingdom was so critical that the development of its superiority had been virtually a foregone conclusion. In the years following 1880, with the exception of the Morgan enterprise, American indifference to its subordinate condition continued unabated until the advent of World War I.

As a product of the new discipline of business history in the United States, Tyler's work impressed his peers as "the first thorough and satisfactory explanation of the various considerations which led to the granting and withdrawal of subsidies."²⁴ Its development of ideas on the trans-Atlantic steam navigation business was received as a major contribution to maritime literature. With Saugstad and Zeis, Tyler had raised understanding to a level theretofore unattained.

What put it all together and furnished the keystone to the arch was John G.B. Hutchins' monumental 1941 publication, *The American Maritime Industries and Public Policy, 1789-1914*.²⁵ This irreplaceable and yet to be rivaled work covered in incredible detail both the rise and fall of American shipping and was hailed at once as the most up-to-day authority on the history of the American merchant marine from the nation's birth to the eve of the First World War.

Hutchins was not a maritime historian. Schooled under the Harvard economists Edwin F. Gay and Abbott Payson Usher, he spent the entirety of his academic career, save for a very short initial stint at Rutgers, in the Department of Economics at Cornell University. He did not move freely in maritime circles, nor did he write again as voluminously in maritime history.²⁶ Perhaps these circumstances and the nature of his disciplinary approach provided him with a detachment uncharacteristic of many previous accounts. While Hutchins did depend on the advice of other historians, citing Saugstad, Huebner and Zeis liberally in his footnotes, what was derived from their work and that of others took on a significance of its own.²⁷

Hutchins laid to rest all arguments favoring the impact of the Civil War as primal, believing that the previous decade of the 1850s had been crucial when the United States lost its competitive edge to the British. This trend was best symbolized by the repeal of the British navigation laws in 1849, and the conscious temporary subordination of the interests of the British shipbuilders to the creation of a more efficient and profitable global transportation system. The response of the United States had been poor and the proper adjustments had not been made. Instead, Americans moved to protect only one aspect of shipping, the shipyards, rather than meeting the British challenge with a free ships policy and the repeal of the American navigation monopoly. This was then exacerbated by the collapse of the California gold rush trade, the development of greater efficiency in British shipping, the introduction of steam navigation, the Civil War, and the collapse of the cotton trade and the general deterioration of the economic position of the United States square-rigged marine as a result of the war. In the process, Hutchins rejected the allegations of discrimination raised by Bates and Marvin as more hysteria than truth.

Hutchins thought the transition from sail to steam considerably more significant than that from wood to metal. Steam sailing required a more sophisticated engineering industry which Great Britain had acquired much earlier than the United States. On the eve of the development of North Atlantic mail steamship competition, the United States found itself far behind Great Britain with respect to capacity in technology, machines, machine tools, and engines.

Hutchins praised Great Britain for its perceptive decision to build a transportation network on economic rather than patriotic terms. He argued that where the British had subsequently eliminated foreign shipping competition, this had been "an incidental rather than primary object of the policy." He cited the Peninsular & Oriental Steam Navigation Company experience as his illustration. The United States, in contrast, had not responded on the same economic reasoning, having instead elevated national pride over service considerations.

Here Hutchins used the Collins Line failure as his case in point. Poor planning and poor management by both the United States government and the ship operators had caused the collapse of America's North Atlantic services. Once the collapse had become evident, no amount of cajoling could attract sufficient capital to these American enterprises. Presumably, had the American lines been more successful, they would have acquired adequate capital to keep themselves alive if not entirely competitive.

The United States sailing ship business had lingered, often successfully beyond the Civil War, but it too had fallen victim to the economies mustered by the British, and the subsidies secured by the French. Cost differentials became absolutely critical. Labor deteriorated and defected not so much because better opportunities existed elsewhere, but because American shipyards went into a terribly depressed state. Hutchins dated the absolute decline of the square-riggers from 1878 and doubted, considering the magnitude of the cost differentials, that a free ships policy would have remedied it. Moreover, such an enactment could not likely have been achieved due to the impregnable belief in the American policy of protection for the shipbuilders. Free traders in turn thwarted any efforts of the builders to acquire subsidization or bounties. Hutchins condemned the standoff as a tragedy of the first order. He believed that the correct approach should have been a combined policy of free ships and selective subsidies for the improvement of operations and the general extension of trade, such as had been granted the American railroads. He also favored bounties encouraging more construction and greater vessel efficiency. Again, interests sympathetic to remedies of this nature had been defeated with regularity.

Hutchins rendered an important service by carrying American steamship development through to 1914. Tyler had cut off his treatment in 1880, Zeis had viewed the economics only tangentially, and authors prior to the 1930s had either preceded the period or had been blinded by their closeness to it. Hutchins pointed out that economics, technological backwardness, and the pre-1880s absence of naval considerations in maritime matters, had prevented United States steamship development from maturing until the last decade of the century. But even the acquisition of the requisite construction and engineering skills after the 1880s had not brought about a competitive position for American steamshipping. Not until 1910 did American steel consistently sell for less than British. In addition, the protective tariff on steel had made it possible for the foundries to sell high at home and more cheaply abroad, at times dumping it as surplus, thereby directly aiding competitive foreign steel ship construction. Moreover, the "Pittsburgh basing point system" hampered shipbuilders by raising material transportation costs. Perhaps most important of all, the United States shipbuilding industries did not achieve sufficiently large scale organization to secure the necessary efficiency and economy in operation. The one American operation that did, J.P. Morgan's International Mercantile Marine Corporation, had failed because it was over-capitalized, the prices it had paid for its fleets were excessive, and the American registry laws had forced its focus on foreign ships. In the meantime, the growth of great foreign shipping monopolies and the adoption of what were viewed as unfair

business practices by America's competitors, furthered the inability of the post-1880s American steam fleet to rival the operations of its British and German counterparts. Hutchins justified concluding his study with 1914 and the outbreak of World War I because it marked the end of an era in international shipping with the introduction and institutionalization of massive governmental intervention and control.

Hutchins did all of this in such amazing detail and acknowledged accuracy as to virtually assure for himself acclamation as the new dean of American maritime analysts. Rave reviews accompanied publication of his study. "This book does for the merchant marine what Admiral Mahan did for the navy," piped its proud publisher.²⁸ Teachers of maritime history hailed it as a welcome relief to years of frustration with the more general and opinionated accounts of Spears and Marvin. Although Robert G. Albion of Princeton worried about Hutchins' failure to match Marvin's colorful style, he considered Hutchins' work a first-rate economic analysis that covered its subject "with intelligence, thoroughness . . . and amazing diligence."²⁹ Massachusetts Institute of Technology's Marion V. Brewington called it "an essential" for every student of American shipping and shipbuilding history: "never before has such a careful and thorough study of the subject found its way into print."³⁰ Possibly Herbert Heaton from the University of Minnesota said it best:

To survey American shipbuilding, ship operation, and public policy from the Revolution to the first World War is a job large enough to satisfy any writer or reader; but to throw in an almost equally detailed study of the British story, to acquire a working knowledge of German and French developments, to get a good running start by taking the tale back to the sixteenth century, and then to work on this mountain of material with the tools and tests of an economic theorist, that really is full measure, pressed down and running over.³¹

Other values were suggested by Hutchins' work. As Brewington put it, not only was Hutchins' study a "huge store of sound knowledge and thought with which all students of maritime history should be thoroughly acquainted," it prompted also the need for a series of detailed studies picking up themes, phases or regions developed by the author. The British economist C.R. Fay agreed. This was the definitive account; accomplishing for American shipping something England had on no similar scale.³² All concurred that Hutchins' masterpiece would serve as a foundation on which subsequent studies or maritime history would be built.

These aspirations have been realized but partially. On the one hand, Hutchins has become the major source, the "foundation" upon which subsequent analyses of the period must take shape. No noteworthy study since, either by an American or European author, has taken serious issue with his conclusions. Unlike the years prior to 1941, when comprehensive analyses appeared with regularity, only a few works can be said to add significantly to or strengthen his extraordinarily comprehensive guide to the decline of the American maritime industries. But several of these warrant description.

The publication in 1951 of Volume IV in the excellent *Economic History of the United States* demonstrates Hutchins' pervasive influence.³³ In *The Transportation Revolution, 1815-1860*, George Rogers Taylor strongly supported Hutchins' account of the deterioration of American shipping. Taylor believed that American trade policy through the 1840s had been effective, but that the government's effort to maintain America's edge through direct subsidy had been belated and unsuccessful. This had occurred because national pride, rather than sound economic justification, had prompted governmental aid. Like Hutchins, Taylor felt that the history of the British Inman Line was worthy of attention as an illustration of sound business enterprise without subsidy. Instead of working out a British type plan for an integrated shipping network, the United States had unwisely chosen to concentrate its response on the Atlantic. In the end, American subsidies had not been enough to overcome large and growing cost differentials and the strategy had failed. Taylor believed that both private enterprise and government had behaved foolishly.

Hutchins' coverage of the growth of huge international shipping monopolies received thorough attention in Daniel Marx, Jr.'s *International Shipping Cartels* (1953).³⁴ Combining history with economic analysis, Marx, a former member of the United States Maritime Commission, concluded that the services provided by cartels overrode the discriminatory impact many Americans alleged these had on United States shipping in foreign trade. Even if American shipowners suffered from the grip the agreements and conferences had on oceanic shipping, the elimination of cartels would guarantee a return to cutthroat competition of the most vicious sort. Cartels, moreover, served more than ships — the whole American export and import industry benefited from the services such agreements offered, including improved regularity, greater frequency of service, uniformity and stability in rates, the maintenance of parity in European and American rates to foreign markets, better distributions of sailings, economical service, and equal treatment for shippers through the elimination of secret arrangements and underhanded methods of discrimination. Employing official investigations and legislation, Marx demonstrated why American legislators starting in the last quarter of the nineteenth century consistently disregarded complaints of discrimination by the American shipping industry because of the broader benefits cartels conferred upon the greater conglomerate of industries comprising the nation's burgeoning international commerce.

David B. Tyler's second work on steam navigation drew acclaim following its publication in 1958.³⁵ In *The American Clyde*, an account of the history of iron and steel shipbuilding on the Delaware River from 1840 to World War I, Tyler amplified what he had developed earlier in *Steam Conquers the Atlantic*. Cost differentials and a consequent inability to compete with foreign-built and manned vessels in ocean commerce explained the decline of the American merchant marine. Construction costs and operating expenses simply could not be lowered to levels enjoyed by the nation's competitors. The reluctance of Delaware shipowners to abandon wood for more expensive and relatively unknown iron substitutes, and the paucity of adequate and costly special tools for working iron,

gave important impetus to decline. In the face of the heated controversy over free ships versus protection, Congress did nothing except debate and hold hearings. The costs exacted by the retention of high tariffs were so high that even efficiency in operation would not have overcome the differentials. This analysis of Delaware River shipbuilding corroborated in finer detail what Hutchins and Tyler had argued almost two decades previously.

About the same time, two economic historians contributed to the knowledge of how ocean freight rates affected American economic development. In 1958, Douglass North published the first of a series of studies documenting the importance of declining freight rates. Among other things this helped explain how constantly decreasing cargo rates encouraged the development of new agricultural enterprise in the American interior.³⁶ Such knowledge also helped to explain why sailing vessels, which experienced the greatest decline in rates, continued to be viable cargo carriers through to the end of the nineteenth century. Not only did large developing bulk trades keep sailing vessels at sea, but major improvements in ship's efficiency, increased knowledge of winds and current patterns, and improved technological changes allowed shipowners to balance out declining freight rate returns. North represented that school of interpretation arguing that international economies were most efficient and productive when unfettered by governmental regulations and control.

In *Industry Comes of Age, 1860-1897* (1961), Edward C. Kirkland made an additional point with respect to freight rates.³⁷ Developing what Meeker and Hanchett had stressed before him, Kirkland argued that payments for foreign services had provided the nation with an important means of achieving a balance of trade. The revenues of some \$560,000,000 paid out between 1874 and 1895, for example, had assisted the nation in maintaining a favorable balance of merchandise exports, and could not be charged with having accounted for the decline of the American merchant marine. Those who argued to the contrary were guilty of a narrow view of the needs of just one industry, and had not viewed it from the perspective of national, and even international, trade requirements.

These works notwithstanding, much remained to fill in the framework of the puzzle so ably provided by Hutchins. Louis M. Hacker was one who identified such needs at an early date. While Hacker lauded Hutchins' encyclopedic organizational thrust and content, and felt that Hutchins had touched upon many questions in great detail, he also maintained that other issues had been covered with "uneven emphasis," and yet others "only in passing." Hacker felt that Hutchins' evaluation of the wooden ship industry, his discussion of England's iron shipbuilding, and his description of changes in British public policy were superb; but he also allowed that much more work was necessary on maritime labor relations, and observed that Hutchins avoided grappling with the political and ideological roots of American shipping policy.³⁸

Twenty-five years after the publication of his monumental study, Hutchins himself lamented the lack of an adequate follow-up. American maritime literature had fallen far short of expectations, and was yet "insufferably nationalistic, lacking in economic analysis, too much industry oriented and too little transportation oriented, and too much involved in attacking or defending various

details of public policy."³⁹ Similiar are the observations of James Baughman, former editor of *Business History* and a noted maritime historian in his own right. In asking what tasks remained in light of what had been done through the mid-1960s, Baughman argued:

We know more about the drama and the technology of shipping than about its strategic or economic roles. We know more about foreign trade than coasting; more about lines than berth service or tramping; more about vessels than about support industries; more about the skills and rewards of mariners than those of maritime businessmen. We have much more description than systematic analysis and we know much more about individuals and specifics than about aggregates and norms.⁴⁰

Today, lacunae in these and other areas remain. The understanding of the naval-maritime relationship has only just been tapped, more work needs to be done relating tariff policy to the demise of shipping, and although some ground has been broken recently we are still waiting for comprehensive analyses covering American maritime labor and the ideological and socio-economic roots of the maritime debate. Moreover, many questions remain unanswered about where former maritime investments were diverted starting in the 1830s and sharply increasing after the Civil War. We need more histories of individual shipping companies; Baughman's work on companies that survived is commendable, but it is amazing indeed that so little has been done on J.P. Morgan's International Merchantile Marine. Although foreign trade has been featured prominently in maritime analyses, foreign policy as an integral factor in the determination of maritime policy has been broached only in very recent years. At the same time, historical objectivity has been adversely affected by new fears and phobias in the garb of two twentieth century world wars and the growing Soviet challenge. One can anticipate that so long as the Russo-American impasse continues, the Soviet ideological impact, coupled with Moscow's recent vigorous venture onto the high seas, will influence many accounts of our maritime past in ways never conceived before the last three decades.⁴¹

Despite the gaps, needs, untapped leads and diversions, much in fact has been learned about the whys and wherefores of American maritime developments from 1850 to 1914. Notwithstanding the assertion of one maritime historian that the causes of the decline are "difficult to trace and often more difficult to prove conclusively," and the reluctance of another to preface categories of causes except with a persistent "probably," certain general facts have emerged indisputably.⁴²

For one, the causes of the commencement of the decline of the American merchant marine in trans-oceanic service must be dated to a period before the outset of the Civil War. Some historians will take this all the way back to the 1830s or 1840s, but a mid-1850s designation will suffice. Consequently, the Civil War must be viewed not as the primary cause, but as an exacerbation, albeit catastrophic, of an already existing state of decadence.

The leaders of the American wooden sailing ship industries were extremely reluctant to make the transition from what had brought them preeminence in the

1840s and 1850s to unfamiliar, more costly, less graceful, harder to construct, iron screw-propelled ocean steamships. At the same time British initiatives, starting at least with the 1849 repeal of the British navigation laws, had an enormously unsettling and corrosive effect on the American merchant marine. The United States, rather than having adopted sound economic reasoning reflecting the requirements of its total national economy, responded to new British initiatives and economic advantages by adopting narrow patriotic and quite impractical rationalizations in the North Atlantic. The failure of the Collins Line was the critical example. In fact, anglophobia, real, contrived, or justified, was a genuine factor in emotionalizing and complicating the controversy over state aid to the American shipping industries. Realities were often far less significant than perceptions.

The caliber of maritime labor and officer competence in the American merchant marine declined disastrously long before the Civil War due to deteriorating on-board conditions and opportunities, and the overproduction of ships, the plethora of which outstripped the labor pool. This resulted in great loss of ships' efficiency and competitiveness.

The advantages accruing to the British with respect to metallic vessel construction and steamship development and propulsion, did not come primarily from state aid programs, but from geographic and technological developments bearing on the ready availability in Great Britain of cheap iron, coal, and labor, along with a twenty-year headstart in nautical engineering that had resulted from an earlier experience with industrializing processes. These the United States did not possess, and would not acquire until the 1880s.

A basic failure of the United States to prevent further decline after the Civil War was due to the rise to political power, as the result of the war, of the Republican Party and its allies, who institutionalized navigational and protectionist policies favoring but one segment of the total seafaring community — the shipbuilders. Virtually every post-1900 study agrees that the ability of the protectionists, a political minority in the nation, to thwart free-trade legislation was tragic. Despite various changes in attitude toward government aid over these years, the protectionists have not been resurrected historically, nor does it appear they will be.

The unwillingness of the American government to expand its navy following the Civil War further held back recovery. The modernization, technological improvements, and growth generally following from vigorous naval-mercantile relationships did not occur in the United States until the early 1880s. That unlike its European competitors, the United States saw little cause for war for almost two decades following the Civil War was also critical.

The national economy of the United States was sufficiently strong to weather the loss of its trans-oceanic fleets. Less impassioned observers argued correctly that the late-nineteenth century dependence on foreign carriage enabled the United States to maintain a good level of agricultural and merchandise exports through payments to foreign freight carriers which provided these services cheaply and well. Economy of transport was critical, and it was hard to persuade

most exporters and importers that subsidies to American shipbuilders would reduce their costs. This hurt American shipping, but was not a national tragedy.

The failure of the United States to become a major factor in international shipping competition, even though it had acquired by the 1890s the requisite technological, constructional, and engineering skills sufficient to match British capabilities, stemmed from America's inability to achieve competitive economies through large scale production and to organize corporate units large enough to counter those already in existence abroad.

Other factors are definable, but less certain. It appears that the debate over the importance of subsidies will never end. One school argues that the subsidy issue was irrelevant compared to more significant developments in technology and cost. Another school persists in maintaining to this day that the failure to subsidize American shipping heavily and continually both caused its decline and guarantees its diminution. But the issue is best resolved not by focusing upon it myopically, but rather by acknowledging that the British, in contrast to the United States, applied both subsidies and free ships policies creatively as incentives to the growth of shipping.

The jury remains out on the importance of foreign discrimination against American ships. While there is a unanimity of opinion that concern about foreign discrimination was a factor, just how real and vital discrimination was in discouraging and thwarting American shipping enterprise continues to be debatable. The same judgement can be applied to the importance of the Civil War. All agree that the Civil War was a definite cause of the decline, but there remains a considerable debate over its precise impact.

Finally, the cause of the transfer of capital investment from the shipping and shipbuilding industries into inland American development still provokes controversy. One view maintains that American capitalists abandoned the sea for higher profits in other industries, and would have done so regardless of the state of shipping; another holds that the maritime industries, particularly shipbuilding, had always attracted a stable, faithful, and basically immobile capital support, which was withdrawn only when the industries collapsed into a seriously depressed state. As suggested, much more work will be required to resolve this controversy.

All things considered, a set of acceptable conclusions has surely accumulated and perhaps it is not being too presumptuous to argue that the failure will improve our grasp of it. Let us assume so. The study of the history of the development of these conclusions says yet another thing as well — "that wisdom," as the noted American juror Learned Hand reminds us, "is to be gained only as we stand upon the shoulders of those who have gone before."

NOTES

1 Winthrop L. Marvin, *The American Merchant Marine: Its History and Romance From 1620 To 1902* (New York, 1902), Chapters 14, 16, 18; United States, Department of Commerce, *Report of the Commissioner of Navigation, 1914* (Washington, D.C., 1914), 79; Jesse A. Saugstad, *Report on Shipping and Shipbuilding Subsidies: A Study of State Aid to*

the Shipping and Shipbuilding Industries in Various Countries of the World (Washington, D.C., 1932), 28 and 179.

2 Other historians are more comfortable with the period 1850-1885, as those years encompass the transition from sail to steam.

3 The information for the following outline was culled from a number of sources, the most important of which were John G.B. Hutchins, *The American Maritime Industries and Public Policy, 1789-1914* (Cambridge, Mass., 1941); Marvin, *American Merchant Marine*; Henry Hall, *American Navigation: The Causes of its Recent Decay, and the Means by which its Prosperity May be Restored* (New York, 1880); and Robert G. Albion, William A. Baker, and Benjamin W. Labaree, *New England and the Sea* (Middletown, Conn., 1973). Hall's book reflected his experience as compiler of the shipping section of *The Tenth Annual Census* (1880), which also merits study.

4 Hall, *American Navigation*, 3-4.

5 United States Congress, House of Representatives, *Foreign Commerce and Decadence of American Shipping* by Joseph Nimmo, House Executive Document 111, 41st Cong., 2d sess., 1870.

6 United States Congress, House of Representative, *Causes of the Reduction of American Tonnage and the Decline of Navigation Interests*, House Report 28, 41st Cong., 2d sess., 1870. This is the Lynch Report. Government documents are a critical part of the record and served as the major source of evidence for early maritime historians. Congressional reports were issued in abundance, and hearings were held regularly both during the period under examination and after. The most comprehensive bibliography of sources of this kind can be found in Hutchins, *American Maritime Industries*.

7 John Codman, *Free Ships* (New York, 1881). *The New York Times* offered strong support to this camp.

8 John Roach, *The American Carrying-Trade* (New York, 1881); Hall, *American Navigation*. Cramp wrote many articles and was especially active at Congressional hearings.

9 J.D. Jerrold Kelley, *Question of Ships: The Navy and the Merchant Marine* (New York, 1884).

10 David A. Wells, *Our Merchant Marine, How it Rose and Declined* (New York, 1885). See also his, *The Question of Ships* (New York, 1890). W.S. Lindsay, *Our Merchant Shipping, its Present State Considered* (London, 1860), and his *History of Merchant Shipping* (4 vols., London, 1874), are important sources for British policy and British reflection upon American policy during the early years of decline.

11 William W. Bates, *American Marine: The Shipping Question in History and Politics* (Boston & New York, 1892).

12 Marvin, *American Merchant Marine*. Reflecting growing acceptance of methodological apparatus in history, Marvin included occasional footnotes in his work. These indicate his indebtedness to Bates, Wells, the United States Commissioner of Navigation, Henry Hall, and the British shipper-historian W.S. Lindsay.

13 The Chairman of the Merchant Marine Commission was Jacob H. Gallinger, Republican Senator from New Hampshire, whose private papers are located in the New Hampshire Historical Society, Concord. Correspondence between Gallinger and Marvin reveals Marvin's effort to make the Commission's work an endorsement for subsidy. The

Commission's final report documented that. See United States, Merchant Marine Commission, *Report of the Merchant Marine Commission* (3 vols., Washington, D.C., 1905).

14 Royal Meeker, *History of Shipbuilding Subsidies* (New York, 1905).

15 John R. Spears, *The Story of the American Merchant Marine* (New York, 1910).

16 Emory R. Johnson, T.W. Van Metre, G.G. Huebner, and D.S. Hanchett, *History of Domestic and Foreign Commerce of the United States*, Volume II (Washington, D.C., 1915). Maintaining that in 1915 there existed no formal bibliography concerning the history of American commerce, the authors attempted to fill the void. They did so commendably, including articles as well as books and reports.

17 Frank Lawrence Owsley, *King Cotton Diplomacy: Foreign Relations of the Confederate States of America* (Chicago, 1931).

18 George W. Dalzell, *The Flight From the Flag: The Continuing Effect of the Civil War Upon the American Carrying Trade* (Chapel Hill, N.C., 1940).

19 Emerson David Fite, *Social and Industrial Conditions in the North During the Civil War* (New York, 1930).

20 Samuel Eliot Morison *The Maritime History of Massachusetts, 1783-1860* (Boston, 1921).

21 Saugstad, *Report on Shipping and Shipbuilding Subsidies*.

22 Paul M. Zeis, *American Shipping Policy* (Princeton, 1938).

23 David Budlong Tyler, *Steam Conquers the Atlantic* (New York, 1939).

24 Robert G. Albion, review of Tyler, *American Historical Review*, XLV (January 1940), 386-387.

25 Hutchins, *The American Maritime Industries*.

26 Hutchins published a number of subsequent articles and essays in order to bring his story up into the modern period. See, for example, "The Declining American Maritime Industries, 1860-1940" *The Tasks of Economic History*, Supp. VI (1946), 103-122; "History and Development of Shipbuilding, 1776-1944," in F.G. Fassett, Jr. (ed.), *Shipbuilding Business in the United States of America* (2 vols., New York, 1948), I, chapter 2; "The Effect of the Civil War and the Two World Wars on American Transportation," *American Economic Review, Proceedings*, XLII (May 1952), 626-643; and "The American Shipping Industry Since 1914," *Business History Review*, XXVII (June 1956), 105-127.

27 Again, Hutchins' bibliography in *American Maritime Industries* is the most complete compiled on the subject. See pages 582-606.

28 Harvard University Press book jacket.

29 Robert G. Albion, review of Hutchins, *The Journal of Economic History*, II (May 1942), 100-101.

30 Marion V. Brewington, review of Hutchins, *The American Neptune*, II (July 1942), 260-261.

31 Herbert Heaton, review of Hutchins, *American Historical Review*, XLVIII (January 1943), 358-360.

32 C.R. Fay, review of Hutchins, *The Economic Journal*, LIII (April 1943), 94-96.

- 33 Henry David, Harold U. Faulkner, Louis M. Hacker, Curtis P. Nettles, & Fred A. Shannon (eds.), *The Economic History of the United States* (9 volumes, New York, 1945-); George Rogers Taylor, *The Transportation Revolution, 1815-1860* (New York, 1951).
- 34 Daniel Marx, Jr., *International Shipping Cartels: A Study of Industrial Self-Regulation by Shipping Conferences* (Princeton, 1953).
- 35 David B. Tyler, *The American Clyde: A History of Iron and Steel Shipbuilding on the Delaware from 1840 to World War I* (Newark, Del., 1958).
- 36 Doulass North, "Ocean Freight Rates and Economic Development, 1750-1913," *Journal of Economic History*, XVIII (December 1958), 537-555.
- 37 Edward C. Kirkland, *Industry Comes of Age: Business, Labor, and Public Policy, 1860-1897* (New York, 1961). This is a companion volume to Taylor, *Transportation Revolution*.
- 38 Louis M. Hacker, review of Hutchins, *American Economic Review* XXXIV (June 1944), 361-363.
- 39 Hutchins, "Untapped Sources and Research Opportunities in the Field of American Maritime History, The Twentieth Century," in *Untapped Sources and Research Opportunities in the Field of American Maritime History* (Mystic, Conn., 1967), 85-108. Hutchins' remarks seemed timed to cover the just-published work of Leonard A. Swann, Jr., whose 1965 biography of John Roach adopted all of Roach's Hibernian antipathy for the British and their "cut-throat tactics," his propensity for flag-waving, his complaints against the "revengeful" anti-subsidy Democrats, and his resentment over the millions of dollars "lost" in freight earnings to foreign carriers. See Leonard A. Swann, Jr., *John Roach: Maritime Entrepreneur, The Years as Naval Contractor, 1862-1886* (Annapolis, 1965). Two earlier works fitting a less anti-British mold, but suicidally ignoring Hutchins' work, were J.E. Otterson, *Foreign Trade and Shipping* (New York, 1945), and Allen Nevins, *Sail On: The Story of the American Merchant Marine* (New York, 1946). The euphoria created by America's mammoth World War II merchant ship construction program influenced interpretation in both of these well-publicized works.
- 40 James P. Baughman, "Untapped Sources and Research Opportunities in the Field of American Maritime History, 1815-1900," in *Untapped Sources and Research Opportunities in the Field of American Maritime History*, 49-63.
- 41 Compared with Great Britain, relatively little has been done to combine naval and maritime research; three good exceptions would be John Haskell Kemble, *The Panama Route, 1848-1869* (Berkeley, 1943); Swann, *John Roach*; and Benjamin F. Cooling, *Gray Steel and Blue Water Navy: The Formative Years of America's Military-Industrial Complex, 1881-1917* (Hamden, Conn., 1979). Maritime labor studies have concentrated for this period on the work of those instrumental in the passage of the La Follette Seamen's Act of 1915. See, for example, Joseph P. Goldberg, *The Maritime Story: A Study in Labor-Management Relations* (Cambridge, Mass., 1958); and Hyman Weintraub, *Andrew Furuseth: Emancipator of the Seamen* (Berkeley, 1959). James P. Baughman's contributions are *Charles Morgan and the Development of Southern Transportation* (Nashville, 1968); and *The Mallorys of Mystic: Six Generations in American Maritime Enterprise* (Middletown, Conn., 1972). Commencing in the 1960s, students of American commercial expansion have treated the maritime industries within their analyses. See, for example, William Appleman Williams, *The Roots of the Modern American Empire: A Study of the Growth and Shaping of Social Consciousness in a Marketplace Society* (New York, 1969); Edward P. Crapol & Howard Schonberger, "The Shift to Global Expansion, 1865-1900," in William Appleman Williams (ed.), *From Colony to Empire: Essays in the History of American Foreign Relations*

(New York, 1972), 135-202; and Jeffrey J. Safford, *Wilsonian Maritime Diplomacy, 1913-1921* (New Brunswick, N.J., 1978). A recent example where concern for Soviet maritime expansion has influenced maritime history is in Lawrence C. Allin, "The Civil War and the Period of Decline: 1861-1913," in Robert A. Kilmarx (ed.), *America's Maritime Legacy: A History of the U.S. Merchant Marine and Shipbuilding Industry Since Colonial Times* (Boulder, 1979), 65-110.

42 James M. Morris, *Our Maritime Heritage: Maritime Developments and Their Impact on American Life* (Washington, D.C., 1979), 190; Robert G. Albion, "Merchant Marine," *Dictionary of American History*, IV (revised edition, New York, 1976), 309-313.

4. THE BRITISH SHIPPING INDUSTRY, 1850-1914

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THE BRITISH SHIPPING INDUSTRY 1850-1914

Sarah Palmer

Between 1850 and 1911 the world merchant fleet increased from about 9.0 to 34.6 million net tons.¹ Allowing for the greater efficiency of steam tonnage, this represented a twenty-fold increase in the carrying capacity of sea transport. Throughout the period Britain dominated world shipping, accounting for about a third of world tonnage (see Table 1). At mid-century continued British predominance was not a foregone conclusion. Sailing tonnage of the United States amounted to 1.5 million tons against Britain's 3.4 million, but it seemed possible that with the ending of protection the American flag might make progress at the expense of the British. In the event, the gap between Britain and other maritime nations widened and despite increasing competition from the 1880s, when British tonnage grew more slowly than the world fleet, in 1911 Britain's then nearest rival, Germany, possessed a fleet only a quarter the size. In 1918 the Departmental Committee on Shipping and Shipbuilding summed up the situation in terms that were not exaggerated: "at the outbreak of war, the British Mercantile Marine was the largest, the most up to date and the most efficient of all the merchant navies of the world."² Eighty-five percent of British registered vessels in 1913 had been built since 1895,³ a fifth since 1910, and the preponderance of steam in the British fleet meant that almost half of world steam tonnage was on the British register.⁴

The aim of this paper is two-fold. First, to summarize what is known about the development of the British shipping industry between 1850 and 1914; and second, to attempt to identify the factors making for British success. It is a matter of considerable importance as to why a disproportionate share of shipowning was based in Britain. What special advantages did this industry possess which enabled it to take so large a part of world sea carriage? Given the length of the period and the variety of possible influences, no one answer is likely to satisfy. The conclusion may be that it was the failure of Britain's main rivals — Germany, the United States, and the Scandinavian countries — to challenge British shipping for much of the half century, rather than British success in thwarting competition, that is significant.

However, what is clear is that the British shipping industry deserves attention not only within the broad framework of world maritime history but also as part of Britain's own general economic development. Phyllis Deane and W.A. Cole estimate that net shipping earnings amounted to between four and five percent of National Income from 1860, with the major contribution in the years 1875-1884, when it exceeded five percent.⁵ This figure does not, of course, take into account the consequences for Britain's balance of payments had there not existed a domestically-based supply of shipping services. As it was, the foreign exchange income from shipping, along with insurance and other services, had a vital function in financing the United Kingdom deficit on foreign trade.⁶ While the role of such invisibles is widely acknowledged, it is striking how little attention has

TABLE 1
NATIONAL MERCHANT SHIPPING TONNAGES AND THEIR SHARE
OF THE WORLD FLEET, 1850-1911¹

(million net tons; percentages in brackets)

	1850	1860	1870	1880	1890	1900	1911
United Kingdom	3.57 (39.5)	4.66 (35.1)	5.69 (33.9)	6.58 (32.9)	7.98 (35.8)	9.30 (35.5)	11.70 (33.8)
British possessions	.67 (7.4)	1.05 (7.9)	1.46 (8.7)	1.87 (9.4)	1.71 (7.7)	1.45 (5.5)	1.83 (5.3)
United States	1.50 (16.6)	2.55 (19.2)	1.52 (9.1)	1.35 (6.8)	0.95 (4.3)	0.83 (3.2)	0.87 (2.5)
Germany	0.50 (5.5)	0.78 (5.9)	0.94 (5.6)	1.10 (5.5)	1.27 (5.7)	1.90 (7.2)	3.02 (8.7)
France	0.68 (7.5)	0.99 (7.4)	1.07 (6.3)	0.92 (4.6)	0.94 (4.2)	1.04 (4.0)	1.46 (4.2)
Norway	0.28 (3.1)	0.53 (3.9)	0.97 (5.7)	1.52 (7.6)	1.71 (7.7)	1.51 (5.8)	1.65 (4.8)
Sweden	0.20 (2.2)	0.28 (2.1)	0.35 (2.0)	0.54 (2.7)	0.51 (2.2)	0.61 (2.3)	0.77 (2.2)
Denmark	0.09 (0.9)	0.13 (0.01)	0.18 (1.1)	0.25 (1.2)	0.30 (1.3)	0.41 (1.6)	0.54 (1.6)
Netherlands	0.33 (3.6)	0.50 (3.8)	0.45 (2.6)	0.33 (1.7)	0.26 (1.2)	0.35 (1.3)	0.57 (1.6)
Russia	—	—	—	0.47	— (2.3)	0.63 (2.4)	0.74 (2.1)
Spain	0.24 (2.6)	0.41 (0.03)	0.36 (0.02)	0.65 (2.8)	0.62 (2.8)	0.77 (2.9)	0.79 (2.3)
Italy	—	—	1.01 (6.0)	0.99 (4.9)	0.82 (3.7)	0.95 (3.6)	1.11 (3.2)
Japan	—	—	—	0.09 (0.05)	0.15 (0.61)	0.86 (3.3)	1.8 (5.1)
World Total	9.03	13.29	16.80	19.99	22.27	26.21	34.63

¹United States totals exclude Great Lakes tonnage.

Source: B.R. Mitchell, *European Historical Statistics, 1750-1970* (New York, 1976), 613-623; Great Britain, Parliament, "Progress in Merchant Shipping of the United Kingdom and Principal Maritime Countries," *Parliamentary Papers*, LXXVI (1912-13), 48-51.

been paid in general economic histories of Britain to the industry which produced a third of these earnings. The industrialist, the merchant, and the banker are the stock characters in portrayals of Victorian enterprise; only rarely does the shipowner appear, despite a number of excellent business histories relating to shipping.⁷

But if we may castigate the economic history profession generally for neglect of the maritime dimension we cannot absolve ourselves of responsibility. There has been an unwillingness by maritime historians to tackle broad themes, and studies comparing Britain's experience with that of other nations are lacking. If ignorance of many vital aspects is a justifiable excuse, it has perhaps also served too much as an alibi. Thanks to the work of a number of scholars, we now know enough about British maritime development in the nineteenth century to begin to ask more general questions. If the answers provided by this paper necessarily prove speculative and open to contradiction, the attempt at generalisation seems nevertheless worthwhile.

The number and tonnage of vessels on the British register between 1850 and 1913 is shown in Table 2. Removals from the register reflect not only losses and breaking up of vessels but also transfers of second-hand tonnage to foreign registers. With the transition to iron and steam, most additions to the stock of shipping represent investment in new, British-built vessels. Predictably, investment by British shipowners in new tonnage reflected the general trade cycle, but the connection was "neither simple nor consistent."⁹ A lagged pattern of over-capacity and absorption was an endemic feature producing considerable problems for the shipbuilding industry and, through an influence on freight rates, an impact on shipowning profits. Between 1850 and 1914 there were nine major cycles in British registrations of new ships,¹⁰ calling forth from the shipping industry perennial complaints against speculative investment. In fact growth in shipping space was much in excess of that indicated by the registered tonnage statistics. The growing share of steam shipping in the merchant fleet meant increases in the number of voyages that could be undertaken over a given period, with one steam ton equalling three sail tons on the conventional reckoning. In addition, account must be taken of the increased productivity of sail tonnage. B.M. Deakin estimated, for example, that in the years 1873-1897 effective capacity increased by 5.3 percent per annum, while the rate of growth of registered tonnage was only 1.8 percent per annum.¹¹

At the start of the period, as shown in Table 2, the British merchant fleet consisted largely of sailing vessels, although the wooden paddle steamer was well established in some short distance trades where speed was at a premium. Iron accounted for sixty-one percent of steam construction in 1850, and over the next decade became increasingly significant as a shipbuilding material for both sail and steam, to be superseded in turn by steel. One effect of the transition from wood to metal construction was to remove the previous constraint on the size of vessels, with particular benefits for steam propulsion. The combination of screw propeller with iron hull in the 1840s ushered in a new era of steamship development, marked by a continuous search for economy and efficiency which led to the

TABLE 2
NUMBER AND TONNAGE OF UNITED KINGDOM REGISTERED VESSELS 1850-1914

Year	Number	Tons	Thousand		Thousand	
			Number	Tons	Number	Tons
1850	24,797	3,397	1,187	168	25,984	3,565
1851	24,816	3,476	1,227	187	26,043	3,663
1852	24,814	3,550	1,272	209	26,086	3,759
1853	25,224	3,780	1,385	250	26,609	4,030
1854	25,335	3,943	1,524	306	26,859	4,249
1855	24,274	3,969	1,674	381	25,948	4,349
1856	24,480	3,980	1,697	386	26,177	4,367
1857	25,273	4,141	1,824	417	27,097	4,559
1858	25,615	4,205	1,926	452	27,541	4,658
1859	25,784	4,226	1,918	437	27,702	4,663
1860	25,663	4,204	2,000	454	27,663	4,659
1861	25,905	4,301	2,133	506	28,038	4,807
1862	26,212	4,397	2,228	538	28,440	4,934
1863	26,339	4,731	2,298	597	28,637	5,328
1864	26,142	4,930	2,490	697	28,632	5,628
1865	26,069	4,937	2,718	824	28,787	5,760
1866	26,140	4,904	2,831	876	28,971	5,779
1867	25,842	4,853	2,931	901	28,773	5,754
1868	25,500	4,878	2,944	902	28,444	5,781
1869	24,187	4,765	2,972	948	27,159	5,714
1870	23,189	4,578	3,178	1,113	26,367	5,691
1871	22,510	4,375	3,382	1,320	25,892	5,694
1872	22,103	4,213	3,673	1,538	25,776	5,751
1873	21,698	4,091	3,863	1,714	25,561	5,805
1874	21,464	4,108	4,033	1,871	25,497	5,979
1875	21,291	4,207	4,170	1,946	25,461	6,152
1876	21,144	4,258	4,335	2,005	25,479	6,263
1877	21,169	4,261	4,564	2,139	25,733	6,400
1878	21,058	4,239	4,862	2,316	25,884	6,555
1879	20,538	4,069	5,027	2,511	25,565	6,580
1880	19,938	3,851	5,247	2,723	25,185	6,575
1881	19,325	3,688	5,505	3,004	24,830	6,692
1882	18,892	3,622	5,814	3,335	24,706	6,957
1883	18,415	3,514	6,260	3,728	24,675	7,242
1884	18,053	3,465	6,601	3,944	24,654	7,409
1885	17,018	3,457	6,644	3,973	23,662	7,430
1886	16,179	3,397	6,653	3,965	22,832	7,362
1887	15,473	3,250	6,663	4,085	22,136	7,335
1888	15,025	3,115	6,871	4,350	21,896	7,464
1889	14,640	3,041	7,139	4,718	21,779	7,759
1890	14,181	2,936	7,410	5,043	21,591	7,979
1891	13,823	2,972	7,720	5,307	21,543	2,279
1892	13,578	3,080	7,950	5,564	21,528	8,645

TABLE 2 (continued)

1893	13,239	3,038	8,088	5,740	21,327	8,779
1894	12,943	2,987	8,263	5,969	21,206	8,956
1895	12,617	2,867	8,386	6,122	21,003	8,988
1896	12,274	2,736	8,522	6,284	20,796	9,020
1897	11,911	2,590	8,590	6,364	20,501	8,953
1898	11,566	2,388	8,838	6,614	20,404	9,002
1899	11,167	2,247	9,029	6,917	20,196	9,164
1900	10,773	2,096	9,209	7,208	19,982	9,304
1901	10,572	1,991	9,484	7,618	20,056	9,608
1902	10,455	1,951	9,803	8,104	20,258	10,055
1903	10,330	1,869	10,122	8,400	20,452	10,269
1904	10,210	1,803	10,370	8,752	20,580	10,555
1905	10,059	1,671	10,522	9,065	20,581	10,736
1906	9,857	1,555	10,907	9,612	20,764	11,167
1907	9,648	1,461	11,394	10,024	21,042	11,485
1908	9,542	1,403	11,626	10,139	21,168	11,541
1909	9,392	1,301	11,797	10,285	21,189	11,586
1910	9,090	1,113	12,000	10,443	21,090	11,556
1911	8,830	981	12,242	10,718	21,072	11,699
1912	8,510	903	12,382	10,992	20,892	11,895
1913	8,336	847	12,602	11,273	20,938	12,120
1914	8,203	794	12,862	11,622	21,065	12,415

Source: B.R. Mitchell and P. Deane, *Abstract of British Historical Statistics* (Cambridge, 1962), 217-219.

compound engine of the 1850s and 1860s and the triple expansion engine of the 1880s.¹² However since Gerald Graham's seminal work it has been recognised that the steam revolution was not complete until late in the century, reflecting not entrepreneurial failure but a realistic appreciation of the relative economic benefits of sail and steam.¹³ The iron-hulled sailing ship with metal rigging and donkey engine proved a fair match for the steam cargo carrier in the oceanic trades and, despite the greater economy achieved for steam by the last quarter of the century, the still fairly marginal nature of its lead is indicated by the inverse pattern of sail and steam investment of the 1870s and 1880s. When freights were rising, orders were placed for steam, but in the downswing lower running costs made sail more attractive to shipowners.¹⁴ Nevertheless by the end of the century the ultimate fate of sail was sealed. Between 1890 and 1900 sailing tonnage on the British register declined by a third, and in 1913 amounted to only 847,000 tons.

The transfer from sail to steam over several decades can be characterised as "a gradual process of steam displacing sail on increasingly longer trade routes,"¹⁵ with improvements in marine engine efficiency as the major factor in altering the economic relationship between the two. But this should not be taken to imply that other factors were not significant, or that the merchant sailing vessel departed dramatically from the shorter routes. Thus P.L. Cottrell's study of Liverpool steam shipping shows how that city's shipowners remained attached to the sailing ship until the third quarter of the nineteenth century and, faced with the choice of a

switch to steam, "each owner considered the needs of the trades in which he was involved, their current state and the movement of freight rates."¹⁶ More generally, can be argued that emphasis on what were essentially incremental improvements in technology obscures the extent to which the prospects for steamship enterprise might be improved by other means. The opportunity to develop business for fast, if relatively expensive, services; changes in the volume of trade available as the result of perhaps related railroad developments which widened the market; the willingness of government to provide subsidy — all were capable of influencing the pace of change. Assuming that the ability to acquire steam technology was equal among maritime powers (an assumption which we should not adopt too readily, given legal restrictions, terms of trade and capital supply factors), then differences in the proportion of steam between national mercantile fleets should not be taken as signifying backwardness but rather as an indication of particular circumstances.¹⁷ Moreover, we must beware of making displacement of sail by steam, fast or slow, the pivot point of discussion of nineteenth century shipping developments. Not only were sail and steam obviously complementary in some areas, but, in providing transport for passengers, livestock and perishable goods, the more rapid steamship served new markets for shipping services not previously developed by the sailing ship.¹⁸

TABLE 3
STEAM TONNAGE, SELECTED FLEETS, 1850-1910¹

	United Kingdom		United States		Germany		Scandinavia	
	Thousand Tons	% of Fleet	Thousand Tons	% of Fleet	Thousand Tons	% of Fleet	Thousand Tons	% of Fleet
1850	168	(4.7)	28	(1.9)	4	(0.8)	2	(0.3)
1860	454	(9.7)	61	(2.3)	23	(2.9)	5	(0.5)
1870	1113	(19.5)	120	(7.9)	67	(7.1)	54	(3.6)
1880	2723	(41.4)	92	(6.8)	177	(16.0)	191	(8.3)
1890	5043	(63.2)	123	(12.9)	593	(46.5)	456	(18.1)
1900	7208	(77.5)	213	(25.7)	1319	(69.3)	1137	(45.2)
1910	10443	(90.4)	348	(40.0)	2883	(99.7)	1005	(35.8)

¹United States tables include Great Lakes tonnage.

Source: Mitchell, *European Historical Statistics* 613-623; Great Britain parl., "Report of the Departmental Committee on Shipping and Shipbuilding," *Parl. papers*, XIII (1918), 138.

The British fleet showed the impact of metal construction and steam well in advance of its competitors, although the gap narrowed towards the end of the century. Table 3 shows the total tonnage of steam vessels on the registers of the United Kingdom, United States, Germany and Scandinavian countries. The initial disparity between British shipping technology and that of other maritime nations is shown in Table 4. In 1866 wooden sailing ship tonnage was only 13.2 percent of the total, while metal-hulled steamers contributed over half of Britain's tonnage. But perhaps the most distinctive feature of the 1886 fleet shown in Table 4 is the high proportion of metal-hulled sailing vessels. By the first decade of the twentieth

century, the impact of the steel steamship was evident in the majority of fleets and Britain was among a number of countries having a high proportion of this type of tonnage.

For contemporary observers, Britain's early development of steam technology was a prime factor in ensuring for that country the dominant position in sea carriage. Noting the revival in the share of British vessels in United Kingdom trade in the 1860s, John Glover commented:

When improvements in machinery had once made it clear that steamers could carry common cargoes as cheaply as sailing vessels, the disadvantages which had been prevailing against our flag were completely reversed. Other nations might produce wooden ships cheaper than we could, none could produce an iron steamer so cheap. ¹⁹

In the late 1860s the Lynch Committee in the United States investigating the decline of the American merchant marine reached much the same conclusion when they detected a close association between Britain's lead in shipbuilding and its maritime power.²⁰ The more recent history of world shipping shows however that there is no necessary connection between a nation's ability to build ships and success in shipowning, provided that vessels can be bought and sold freely in the world market.²¹ The British shipyards built for both foreign and domestic demand directed toward this world market. But exports of both new and second-hand British ships were significantly lower before 1880 than was the case later. In 1900-1913, exports of new vessels averaged twenty-four percent of output, whereas in the period 1869-1883 the proportion was twelve percent.²² Sales of second-hand vessels likewise rose towards the end of the century. Two-thirds of tonnage removed from the British register immediately before the War was transferred to other flags.²³ Thus in the decades when only Britain possessed a shipbuilding industry capable of producing large numbers of iron hulled and steam powered vessels cheaply, British shipowners took the greatest advantage of this capacity.

In any case the development of British shipbuilding cannot be considered separately from the industry which it existed to serve. As Robin Craig's recent study clearly shows, the spur to technical change in shipping was not experimentation for its own sake, but the growth of opportunities for shipowners, the "widening web of commerce."²⁴ These opportunities increased remarkably for British shipowners in the mid-nineteenth century, the decades of the "Great Victorian Boom", at least as far as trade was concerned.²⁵ Foreign shipowners shared in the growth of the 1850s, when tonnage entries of vessels in United Kingdom foreign trade increased by seventy percent; but the demise of Britain's closest competitor, the United States, ensured for British shipowners the benefits of continued growth in the 1860s.²⁶ The upward trend of demand for shipping services, taken in conjunction with the impact on shipowning profits of periodic over-capacity, produced a combination of long-term optimism and short-term uncertainty very conducive to the encouragement of cost-reducing innovation in ships. The fact that the association between shipowner and shipbuilder in Britain tended to be close no doubt furthered this tendency. In 1859, for example, sixty-four percent of William Denny's assets were held in shipping concerns; while in

TABLE 4
TONNAGE CLASSIFIED ACCORDING TO CONSTRUCTION MATERIAL FOR THE
MAJOR MARITIME NATIONS, 1886 and 1910¹
(thousand net tons; percentage of national fleet in brackets)

(A) 1886

	SAIL				STEAM				TOTAL NET TONNAGE
	Wood	Composite	Iron	Steel	Wood	Composite	Iron	Steel	
United Kingdom	946 (13.2)	90 (1.2)	2132 (29.8)	79 (1.1)	13	0.1	3548 (49.6)	334 (4.6)	7,142
British possessions	1315 (82.3)	6	53 (3.3)	1	45 (2.8)	2	141 (8.8)	33 (2.0)	1,596
United States*	1579 (81.2)	—	7	—	129 (6.6)	—	228 (11.7)	1	1,944
Germany	674 (55.5)	8	122 (10.0)	1	0.3	0.1	392 (32.3)	16 (1.3)	1,213
96 France	277 (34.2)	0.9	39 (4.8)	0.2	0.6	0.3	463 (47.2)	28 (3.4)	809
Norway	1348 (92.9)	0.4	1	1	16 (1.1)	—	79 (5.4)	6	1,451
Sweden	329 (74.4)	—	1	—	11 (2.4)	10 (2.2)	80 (18.0)	— (2.4)	422
Denmark	125 (56.8)	0.1	0.6	—	1	0.6	87 (39.5)	6 (2.7)	220
Netherlands	188 (52.8)	19 (5.3)	20 (5.6)	—	—	2	113 (37.7)	14 (3.9)	356
Russia	270 (72.0)	—	0.6	—	1	0.1	86 (22.9)	18 (4.8)	375
Spain	153 (38.6)	0.8	4 (1.0)	—	8 (2.0)	0.2	221 (55.8)	9 (2.3)	396
Italy	703 (85.1)	—	1	—	0.8	— (14.4)	119	3	826
Japan	31 (24.8)	—	0.3	—	14 (11.2)	1	30 (24.0)	49 (39.2)	125

(B) 1910

United Kingdom	63	0.8 (1.9)	209 (4.3)	475	6	1 (4.5)	503 (88.5)	9,692	10,949
British possessions	149 (15.5)	5	27 (2.8)	21 (2.1)	52 (5.4)	6	113 (11.8)	584 (61.0)	957
United States (excl. Great Lakes tonnage)	984 (50.0)	—	38 (1.7)	96 (4.3)	131 (5.9)	0.8	189 (8.6)	749 (34.2)	2,187
Germany	13	0.4	43 (1.5)	315 (11.3)	—	0.08	85 (3.0)	2,330 (83.6)	2,786
France	72 5.6)	—	17 (1.3)	343 (27.0)	1	—	161 (12.7)	673 (53.0)	1,267
Norway	175 (12.1)	1	285 (19.8)	120 (8.3)	17	3	139 (9.6)	698 (48.5)	1,438
Sweden	119 (19.9)	2	6	6	3	11	169 (28.3)	280 (46.9)	596
Denmark	47 (10.3)	—	4	13 (2.8)	1	0.3	36 (7.8)	355 (77.8)	456
Netherlands	2	2	4	23 (3.6)	0.5	—	21 (3.2)	585 (91.8)	637
Russia	141 (23.6)	3	34 (5.7)	17 (2.8)	1	0.6	78 (13.1)	321 (53.9)	595
Spain	14 (2.9)	0.5	2	0.7	0.2	0.1	105 (22.1)	353 (74.3)	475
Italy	125 (13.4)	—	149 (16.0)	57	0.5	—	172 (18.5)	425 (45.8)	928
Japan	2	—	—	—	47 (6.4)	3	136 (18.7)	539 (74.1)	727

¹Great Lakes tonnage is excluded from United States sail figures, but is included in those for steam.

Sources: *Lloyd's Universal Register, 1886* (London, 1886); *Lloyd's Universal Registrar, 1910-11* (London, 1911).

the 1880s William Gray, the Sunderland shipbuilder owned shares in many vessels as an investment.²⁷ Similarly, Alfred Holt's direct contribution to the improvement of the marine engine is well known.²⁸

We may see Britain's maritime leadership as it developed after mid-century as a corollary of its general industrial advance, which provided both the motive and means for shipping development. The exports and imports of the United Kingdom rendered it the greatest market for shipping services in the world, to which the technological skill of engineers and shipbuilders could respond. But why was this response so much more effective after 1850 than before? To some extent technical developments from which shipbuilding benefited occurred independently, for example improvements in metallurgy, and advances in hull construction and boiler-making waited upon the solution of certain technical problems. But indubitably the pace of innovation quickened in the 1850s and 1860s irrespective of these developments. For the Free Trade Lobby the new vitality of British shipbuilding and shipping seemed, like the growth of trade itself, to be confirmation of the wisdom of ending protection.²⁹ Faced with competition, a previously slothful industry became more efficient. However, as with the general question of the impact of tariff reduction,³⁰ closer investigation of the effects of the abolition of the Navigation Acts makes such an association between freer trade and economic progress somewhat doubtful. Although the Navigation Acts and their abolition remain a much neglected area of study, it seems clear that the Reciprocity Treaties dating from the 1820s substantially eroded protection for British shipowners, so that 1849 is a less decisive date in British maritime history than it might appear. Certain European countries, such as Norway, undoubtedly responded to the new opportunities offered by the general opening of British trade, but their greater share of business must be taken within the context of overall expansion from which British shipowners also gained. Moreover, in the formerly most protected trade — that with the colonies — Britain held her own. It is difficult, then, to see 1849 as the year when a competitive threat goaded the British shipping industry into new life. In any case, even if the Navigation Acts had operated to protect shipowners fully in the decades before their abolition, there was no absence of competition between British vessels within the industry to ensure efficiency.

To dismiss the abolition of the Navigation Acts as a specific spur to development of new shipping technology in Britain in the 1850s and 1860s is not to say that there was no connection between general trade conditions and progress in shipbuilding. New types of hulls and engines were the product of the ingenuity of shipbuilders, no doubt anxious to demonstrate the superiority of their yards over those of their rivals, responding to the general demands of shipowners for vessels with lower running costs. But that ingenuity, fostered by competition between shipbuilders, could only develop when the iron hull and the steamship were not oddities and demand was sufficient to encourage specialisation by shipbuilders. The generally depressed state of the industry between 1820 and 1846 acted as a brake on innovation which was only released when prospects improved.³¹ With demand for shipping services increasing in the late 1840s, less risk was attached to investment in steamships even in their still typically primitive

form, while the greater number of steamships laid down allowed the "new" shipbuilding industry to reach a sufficient size to encourage experiment and to benefit from experience.

Did government play any part in fostering these changes? For certain contemporary observers Britain's early lead in marine steampower was a consequence of state assistance:

I think that English statesmen have been wiser than ourselves in subsidising largely, in the first instance, all their ocean liners, until they have trained their mechanics perfectly in the creation of steamships.³²

This was the fairly representative view of an American witness to the Lynch Committee, which reported in 1870, in reference to the mail contracts awarded by the British government to such companies as P & O, the Royal Mail and, of course, Cunard. While it has been convincingly argued that these subventions were important in establishing a British presence early on in oceanic trades when non-assisted services would not have been economically viable given the state of steamship technology, it is not always possible to make a direct link between the protection afforded by these payments and technological innovation. In the case of Cunard, F.E. Hyde's study suggests the opposite.³³ It was the Inman Line which first adopted the iron screw ship on the Atlantic route, not Cunard — which with an annual subsidy of £190,000 in the 1850s had little incentive to experiment and was perhaps actively discouraged by the Admiralty's suspicion of screw propulsion. But the North Atlantic is not the best example because here a subsidy was necessary to the provision of a service for only a very short period, if indeed at all. The recipient of the most obviously politically motivated subsidy, the Pacific Steam Navigation Company, trading on the West coast of America where coal supplies were scarce and expensive was the first to adopt the compound engine in 1856. On the long haul to the East, P. & O. with similar fuel problems followed suit with the *Mooltan* in 1861 and five years later had ten vessels with compound engines in service.³⁴ Nevertheless, we would not be justified in concluding from these examples that government supported companies were technologically a "leading sector." Rather, they shared in the general drive to economy and improvement in which a number of shipping enterprises played a part. It was Holt's Ocean Steam Ship Company which perfected the compound engine,³⁵ and, as Craig's study amply demonstrates, changes in the structure of the small, unspectacular, merchant cargo steamer were ultimately of equal significance in ensuring Britain's world-wide maritime dominance.³⁶

II

Turning from the growth of the British mercantile marine to its employment, we immediately come up against the problem of information as 1911, the only year for which there exists a detailed analysis of the composition of the fleet in terms of regions served, is at the end of our period. In this year, as Table 5 shows, eighty-two percent of steam tonnage in the foreign trades was involved in trades outside Europe, thirteen percent in the Mediterranean and a mere five percent in Europe itself. Steamers in the coasting trade, not shown in the table, in this year

amounted to 296,000 tons or three percent of total steam tonnage. Although the Registrar General of Shipping produced an annual series from 1849 which distinguished vessels according to employment, the categories used (home trade, partly home and foreign) are not particularly helpful. Nevertheless, this series, summarised in Table 6, does enable us to discern the general balance between employment in near and distant trades, including coasting, and shows the differing share of sail and steam tonnage. The bias in British shipping towards distant trades was evidently rather less marked at the beginning of the period than at the end, and sail maintained its share of total tonnage longer in the home trade than in the foreign.

The importance of oceanic business for British shipping is confirmed by looking at participation in trade as indicated by entrances and clearances at ports throughout the world. Although there were some significant changes in the proportion of British ships active in the business of some countries' ports, with the exception of Canada a marked feature was the large share of United Kingdom ships in colonial business. At the outbreak of war, it was estimated that British ships accounted for ninety percent of United Kingdom/Empire trade; fifty-three percent of United Kingdom/Foreign trade; eighty percent of trade within the Empire; fifty percent of Empire/Foreign trade and twenty-five percent of trade between foreign countries.³⁷ Thus much of Britain's share of international carriage not touching on the United Kingdom was also associated with the Empire.

Apart from the long haul, the other type of business dominated by British owned vessels was the coasting trade. Until the early twentieth century coasting traffic provided the bulk of business for British ports, although the tonnage of coasting vessels grew much more slowly than was the case for foreign-going; it doubled between 1850 and 1914 but non-coasting tonnage increased five-fold.³⁸ In 1875-9 entries by foreign owned vessels in cargo and ballast were 2.5 percent of the total and increased to 6.3 percent over the next quarter century.³⁹

Figures compiled by D.H. Aldcroft of entries into world ports, reproduced in Table 7, also show the declining share of British tonnage in some regions towards the end of the century, but because of their incomplete nature mask the contrary tendency discernable between 1860 and 1880, when the British share advanced. This pattern is evident in Table 8, which gives the share of British and foreign vessels in entries to United Kingdom ports in the decades between 1820 and 1910. Even before the removal of protection, twenty-nine percent of entries were accounted for by foreign-owned vessels, of which American ships comprised a third. In the decade following the ending of the Navigation Acts, foreign owners took good advantage of the new opportunities to enter the British Shipping market. As the Hamburg consul noted in 1855:

The repeal of the Navigation Laws has given a new impulse to the shipping trade of Hamburg and a large business in chartering vessels has been established. Swedish, Norwegian and Danish owners of vessels have their correspondents in Hamburg, through whom their vessels are chartered by merchants for foreign parts.⁴⁰

TABLE 5

BRITISH STEAM TRADES, 1911

(A) PROPORTION OF BRITISH REGISTERED TONNAGE ENGAGED IN FOREIGN TRADES ON 3rd April 1911

Trade	Sail (400,000 net tons) % total	Steam (8,890,000 net tons) % total
Europe		4.7
	6.0	
Mediterranean		13.4
Africa	—	3.3
America	48.0	39.4
Australasia	39.0	10.6
East	—	28.6

(B) NUMBER OF BRITISH REGISTERED STEAMSHIPS ENGAGED IN VARIOUS TRADES ON 3rd APRIL, 1911, AND THEIR AVERAGE TONNAGE

Trade	Number of Steamships	Average Net Tonnage
Coasting	1565	189
European	708	590
Mediterranean	717	1660
Ocean Trades	2723	2670

Source: Great Britain, Parliament, "Report of the Departmental Committee" (1918), 80.

TABLE 6

TONNAGE AND SHARE OF U.K. REGISTERED VESSELS IN VARIOUS TRADES, 1850-1910¹

(thousand net tons; percentages in brackets)

	HOME TRADE		HOME AND FOREIGN		FOREIGN		TOTAL
	Sail	Steam	Sail	Steam	Sail	Steam	
1850	667 (21.2)	54 (1.7)	222 (7.0)	5 (.01)	2143 (68.3)	45 (1.4)	3137
1860	821 (19.3)	92 (2.1)	227 (5.3)	30 (.7)	2805 (65.9)	277 (6.5)	4252
1870	767 (13.8)	171 (3.0)	284 (5.1)	109 (1.9)	3469 (62.4)	760 (13.7)	5559
1880	694 (10.9)	263 (3.6)	133 (2.0)	69 (1.0)	2924 (46.1)	2289 (36.1)	6345
1890	575 (7.2)	325 (3.1)	51 (.6)	134 (1.6)	2267 (28.6)	4563 (57.6)	7915
1900	379 (4.0)	508 (5.4)	16 (.2)	202 (2.1)	1595 (17.0)	6696 (71.3)	9395
1910	259 (2.3)	658 (5.8)	6 (.01)	518 (4.5)	629 (5.6)	9233 (81.7)	11303

¹Home Trade is defined as voyages on the coasts of the United Kingdom and to the continent of Europe between the Elbe and Brest. Percentages calculated by the author.

Source: William Page (ed.), *Commerce and Industry, Tables of Statistics for the British Empire from 1815* (London, 1919), 157.

TABLE 7
BRITISH AND NATIONAL SHARE OF ENTRANCES AND CLEARANCES IN FOREIGN
TRADE AT PORTS IN CERTAIN COUNTRIES (WITH CARGOES AND IN BALLAST)

		1850			1860			1870			1880		
		Nat.	Br.	Other	Nat.	Br.	Other	Nat.	Br.	Other	Nat.	Br.	Other
UK	(all)		65.1			56.4			68.8			70.4	29.6
	(steam)		81.6			84.3			88.5			83.2	16.8
Norway	(all)				74.5	2.0	23.5	70.0	11.6	18.4	68.2	11.8	20.0
	(steam)							25.2	53.0	21.8	40.8	26.6	32.6
Sweden	(all)				40.3			31.8			37.2	13.5	49.3
	(steam)										39.8	23.3	36.9
Germany	(all)							35.9			39.1	38.1	22.8
	(steam)							15.0			34.4	49.2	16.4
Holland	(all)				39.5	37.2	23.3	28.4	53.8	7.8	30.9	49.8	19.3
	(steam)				31.2	68.1	0.7	19.1	77.9	3.0	29.0	61.6	9.4
Belgium	(all)				11.4	34.3	54.3	6.4	56.8	36.8	11.6	59.4	29.0
	(steam)				18.4	68.6	13.0	9.3	78.9	11.8	14.3	65.8	19.9
France	(all)				41.4	29.8	28.8	31.5	39.8	28.7	30.0	40.6	29.4
	(steam)				40.0			32.1			35.6		
Italy	(all)							36.5	25.8	37.7	34.8	34.4	30.9
	(steam)							19.7	36.0	44.3	23.3	43.3	33.4
US	(all)				70.8	23.9	5.3	38.1	50.5	11.4	20.4	51.7	27.9
	(steam)							33.1	46.1	20.8	15.5	67.7	16.8
Chile	(all)										0.7	79.9	19.4
	(steam)										1.0	89.7	9.3
Argentina	(all)										11.1	37.8	51.1
	(steam)										12.6	44.2	43.2
Japan	(all)										21.7		
	(steam)										27.9		
Canada	(all)											65.4	34.6
	(steam)											61.3	38.7
New	(all)					71.7	28.3		92.6	7.4		88.0	12.0

TABLE 7 (continued)

Zealand (steam)												
Denmark (all)										52.1	11.4	36.5
(steam)										61.0	16.3	22.7
Portugal (all)							11.8	66.7	21.5	6.5	63.0	30.5
(steam)							5.2	86.9	7.9	3.1	72.5	24.4
Spain (all)										26.6		
(steam)												
South Africa (all)											85.6	14.4
(steam)												
India (all)										9.1	79.1	11.8
(steam)										0.6	92.6	6.8
British Poss. (all)				84.8	15.2			88.5	11.5		87.1	12.9

Source: Great Britain, Board of Trade, "Progress of Merchant Shipping," as cited in D.H. Aldcroft (ed.), *The Development of British Industry and Foreign Competition, 1875-1914* (London, 1968), 362-363.

		1890			1900			1905			1911		
		Nat.	Br.	Other	Nat.	Br.	Other	Nat.	Br.	Other	Nat.	Br.	Other
UK	(all)		72.7	27.3		63.7	36.3		63.3	36.7		58.9	41.1
	(steam)		79.5	20.5		66.8	33.2		65.5	34.5		60.0	40.0
Norway	(all)	64.8	14.6	20.6	67.8	10.9	21.3	56.7	12.6	30.7	52.7	9.8	37.5
	(steam)	51.3	21.4	27.3	60.0	15.2	24.8	52.0	14.9	33.1	50.7	10.7	38.6
Sweden	(all)	33.7	20.5	45.8	41.6	9.9	48.5	48.5	6.7	48.8	49.8	5.4	44.8
	(steam)	30.3	27.8	41.9	39.0	11.1	49.9	47.5	7.7	44.8	49.4	5.9	44.7
Germany	(all)	43.9	35.4	20.7	49.0	26.9	24.1	48.7	27.1	24.2	50.3	23.0	26.7
	(steam)	44.2	38.3	17.5	50.2	28.6	21.2	48.9	28.7	22.4	50.4	24.0	25.6
Holland	(all)	28.8	52.3	18.9	25.3	41.7	33.0	27.9	34.7	37.4	26.6	30.5	42.9
	(steam)	28.5	55.0	16.5	25.2	42.3	32.5	28.0	35.2	36.8	26.5	31.1	42.4
Belgium	(all)	19.0	53.2	27.8	16.3	44.6	39.1	11.5	47.2	41.3	13.0	44.1	42.9
	(steam)	20.0	53.4	26.6	16.9	44.3	38.8	11.8	47.1	41.1	13.2	44.4	42.4
France	(all)	31.9	44.0	24.1	26.1	40.6	33.3	27.3	35.2	37.5	24.0	36.1	39.9
	(steam)	33.0			25.6	42.1	32.3	26.7	36.1	37.2	23.6	36.6	39.8
Italy	(all)	24.4	49.4	26.2	49.8	19.7	30.5	26.0	29.7	44.3	27.0	28.7	44.3
	(steam)	18.2	55.9	25.9	48.6	20.3	31.1	23.5	30.9	45.6	25.4	29.4	45.2
US	(all)	22.1	52.8	25.1	16.9	52.8	30.3	15.8	50.5	33.7	13.5	50.1	36.4
	(steam)	18.5	59.0	22.5	15.0	55.6	29.4	15.7	51.7	32.6	12.7	50.7	36.6

TABLE 7 (continued)

Chile	(all)	14.8	47.1	38.1	8.6	50.1	41.3	6.5	48.6	44.9	6.1	50.7	43.2
	(steam)	18.9	41.3	39.8	11.1	50.9	38.0	7.4	49.4	43.2	6.4	53.4	40.2
Argentina	(all)	27.1	42.2	30.7	33.4	29.3	37.3	35.5	32.4	32.1	43.4	33.5	23.1
	(steam)	29.1	45.6	25.3	31.9	31.2	36.9	34.3	33.9	31.8	40.1	36.4	23.5
Japan	(all)	22.2			34.9	38.9	26.2	12.9	47.0	40.1	47.2	30.5	22.3
	(steam)	22.7			35.0	38.9	26.1	12.5	47.3	40.2	47.0	30.6	22.4
Canada	(all)		51.6	48.4		61.0	39.0		66.1	33.9		69.9	30.1
	(steam)		53.1	46.9		64.8	35.2		68.4	31.6		73.6	26.4
New Zealand	(all)		87.4	12.6		91.8	8.2		84.6	15.4		96.8	3.2
	(steam)		88.0	12.0		94.7	5.3		85.9	14.1		98.8	1.2
Denmark	(all)	58.2	11.5	30.3	56.1	7.8	36.1	54.9	6.7	38.4	54.2	5.1	40.7
	(steam)	51.5	13.7	24.8	60.1	9.0	30.9	58.1	7.4	34.5	56.4	5.5	38.1
Portugal	(all)	7.0	53.5	39.5	5.4	56.8	37.8	2.8	51.3	45.4	2.0	47.6	50.4
	(steam)	6.3	56.7	37.0	4.7	58.1	37.2	2.5	42.3	45.2	1.8	47.8	50.4
Spain	(all)	43.8			47.4	27.6	25.0	43.1	26.8	30.1	37.7	26.2	36.1
	(steam)	44.5			47.8	28.0	24.2	43.3	27.1	29.6	37.8	26.4	35.8
South Africa	(all)		87.9	12.1		89.8	10.2		85.7	14.3		80.0	20.0
	(steam)		96.4	3.6		94.3	5.7		88.5	11.5		81.3	18.7
India	(all)	5.6	82.4	12.0	3.3	79.0	17.7	1.4	80.6	18.0	3.0	76.6	20.4
	(steam)	0.0	89.9	10.1	0.8	81.9	17.3	0.0	82.3	17.7	2.1	77.5	20.4
British poss.	(all)		88.6	11.4		90.5	9.5		91.9	8.1			

But in the 1860s and 1870s British owners made up lost ground and by the 1880s took the same share of entries as when still protected in the 1830s. However, Britain's leading position in many trades was increasingly challenged by the development of national fleets, particularly the German which effectively competed with Britain for trade in third markets. By the early twentieth century German shipping was operating on all major routes and was a serious menace to British interests in the North Atlantic and in Africa.⁴¹

TABLE 8
ENTRIES TO U.K. PORTS
(thousand net tons)

	British	Proportion of Total	Foreign	Proportion of Total
1820-9	18,931	74.7	6,404	25.3
1830-39	24,667	72.7	9,275	27.3
1840-49	40,044	70.9	16,451	29.1
1850-59	56,543	60.0	37,584	40.0
1860-69	94,386	65.0	50,918	35.0
1870-79	154,623	67.7	73,937	32.3
1880-89	228,983	72.4	87,454	27.6
1890-99	293,377	71.6	116,354	28.4
1900-09	355,733	62.8	211,098	37.2

Source: Page, *Commerce and Industry*, 162.

World seaborne trade increased perhaps seven-fold between 1840 and 1887. New, more distant sources were found for traditional trade products like wool and wheat, while novel commodities including petroleum and metallic ores moved across the oceans to meet demand from the industrialising powers.⁴² But as late as 1914 no less than forty percent of seaborne trade still touched on Britain. The industry benefited from the unprecedented increase in the value of United Kingdom trade between 1847 and 1872 and, although less impressive in terms of volume, the world-wide expansion enhanced demand for shipping services over long distances. The slower growth in British exports in the last quarter of the century had no obvious impact on this demand, for shipping benefited from Britain's developing import dependence, which was in turn in part maintained by invisible earnings from sea carriage.

British official statistics of trade unfortunately relate to value, not volume. Volume is the measure which, together with distance, governs demand for shipping services and some idea of the relative importance in terms of volume of the components of British trade can be gauged from the estimates in Tables 9 and 10. Grain and timber were the most important bulk imports, approaching half the total of 1913, while coal and coal products averaged eighty-five percent of exports in the 1890s. Sixty percent of imports, mostly timber, came from Europe and the Mediterranean, while grain, raw materials and high value foodstuffs came from

extra-European sources.⁴³ In turn Europe took seventy-five percent of coal up to 1870, after which the proportion became even higher, reaching eighty-four percent by the end of the century.⁴⁴

TABLE 9
BRITISH EXPORTS BY VOLUME
(thousands of tons)

Year	Total	Coal/Coke	Textiles	Iron/Lead/Zinc	Other
1878	24,481	19,512	990	2,520	1,456
1879	26,622	20,843	1,018	3,101	1,658
1880	30,943	23,628	1,269	4,115	1,930
1881	32,232	24,819	1,361	4,225	1,826
1882	34,994	26,533	1,443	4,739	2,277
1883	37,504	29,171	1,444	4,467	2,420
1884	37,652	29,958	1,466	3,850	2,376
1885	37,650	30,448	1,415	3,497	2,288
1886	37,506	29,983	1,506	3,742	2,274
1887	39,750	31,323	1,536	4,523	2,366
1888	42,615	34,089	1,551	4,362	2,611
1889	45,309	36,710	1,532	4,661	2,405
1890	46,751	38,226	1,535	4,518	2,471
1891	47,128	39,620	1,471	3,724	3,313
1892	45,909	39,057	1,431	3,214	2,205
1893	43,817	37,171	1,271	3,161	2,212
1894	49,371	42,362	1,454	2,916	2,638
1895	49,892	42,519	1,515	3,286	2,570
1896	52,193	44,199	1,541	4,028	2,423
1897	55,675	47,557	1,428	4,152	2,536
1898	55,480	47,810	1,453	3,747	2,469

Source: Address by John Williamson, *Report of the 22nd Annual Meeting of the Chamber of Shipping* (London, 1889).

TABLE 10
BRITISH IMPORTS BY VOLUME, 1913

	Million Tons
Grain and flour	10.9
Other foodstuffs	6.0
Iron and other ores	9.2
Wood and timber	11.6
Stones, slates, fertilisers & c.	2.8
Textile materials	1.8
Oleaginous products	1.8
Petroleum	1.7
Metals and machinery	2.9
Other	2.5
Total	51.2

Source: Great Britain, *Report of the Departmental Committee on Shipping and Shipbuilding*, 76.

As we have seen, while British ships monopolised the distant trades, they carried no more than half of the coal shipped to Europe. The implication of this is straightforward: British shipping was pre-eminent in the business which offered more employment to shipping, since proportionately more capacity was needed on long routes than short. But to identify more precisely the area of British shipping success is not to explain it, although this does move the argument away from some generalized notion of superiority to success over certain identifiable routes. This suggests that managerial factors may be worthy of investigation.

Looking at the development of the British shipping industry over the previous fifty years, the Departmental Committee on shipping and shipbuilding, reporting in 1918, identified three factors as significant: Britain's position as a strong industrial power, the existence of a world-wide empire with well distributed coaling stations, and the coal export trade.⁴⁵ The first of these has been considered in part while discussing Britain's ability to develop more sophisticated ships in advance of other countries and in noting the strong import/export propensity of the economy which rendered Britain the world's largest market for shipping services. Britain had no exclusive right to these benefits, but it is possible to argue that an early lead gave British shipowners a long-term advantage by establishing commercial connections broken only with difficulty by outsiders and control over port facilities not achieved to the same degree by latecomers. With regard to the importance of empire, it needs to be stressed that by no means all of the long-haul trades were imperial as only half of British tonnage on oceanic routes was employed in empire trades. Any advantage here enjoyed by British shipowners was of an informal nature, however. The power of established connection was presumably cemented more firmly on routes which had been reserved to British ships before 1849. Ease of establishment of coaling stations was another benefit of world-wide territorial possession, encouraging the adoption of steam by British shipowners, but this benefit was not of course reserved to British vessels. The coal trade itself was undoubtedly the most important of all trades as far as a large section of the shipping industry was concerned. Coal exports, judged by W.S. Jevons to be the "Alpha and Omega of our trade"⁴⁶ employed a large section of the British shipping industry as a cargo in its own right, and incidentally contributed to the terms on which other goods could be carried by providing a source of return on the outward, otherwise ballast, leg of the voyage from Britain. The bulk of coal went to European markets, carried in non-British vessels, but its carriage over the oceanic routes was undertaken by British registered ships. The importance of this initial cargo in developing and sustaining Britain's shipping industry must be judged to be considerable. Certainly the collapse of the international coal export trade after the First World War had disastrous consequences for British shipowners.

III

In considering the organisation of the British shipping industry the appropriate starting point is the change in the nature of services offered which occurred as a result of the introduction of steam. Some scheduled services had

been provided by sailing vessels in the coastal trade and on the North Atlantic, but steam offered the possibility of even greater regularity. Indeed, until the development of the cargo steamer, virtually all sea-going steamers worked on regular routes because this was the only profitable mode of operation, given high capital and running costs. However, once the shift to more economically viable steamers was underway, the industry divided into two functional sections, liner and tramp. The former provided a timetabled service for those wishing to send goods not making up a full cargo and the latter was available for charter, when and where required.

The relative share of liner and tramp vessels in the British mercantile marine is difficult to ascertain. Taking speed as an indicator, with the capability of maintaining twelve knots at sea as a measure, liners amounted to perhaps forty percent of the fleet and tramps sixty percent at the end of our period.⁴⁷ This is a very rough measure, which does not take account of vessels used in both capacities as occasion demanded. However the general division between liner and tramp business is a feature which may be judged to be fairly distinctive. Liners predominated in the German marine and tramps in the Norwegian, with the economic conditions of operation very different for the two types of business. The fact that British shipowners were involved in both was a factor influencing national success.

The introduction of the steamship in Britain was associated with the development of corporate enterprise, although the connection was less between a particular mode of investment and steam than between it and certain types of steamship services. Certainly the recent work by Cottrell and by Stephanie Jones on Whitby shipping does not support my contention in an earlier article, based on the case of London, that high capital costs of steam shipping, coupled with unusual risk of failure, led to a clear and logical association between joint stock enterprise and steam shipping.⁴⁸ In both Liverpool and Whitby the traditional 64th partnership system proved extremely resilient. Joint stock enterprise accounted for only about forty percent of Liverpool steam tonnage in 1871.⁴⁹

If the development, not the steamship itself, is considered it is apparent that the liner business which required a fleet of vessels and established port facilities was generally the province of companies. Ownership in the liner sector of the industry was fairly concentrated with twenty-seven liner companies owning 2.05 million gross tons of British shipping in 1891.⁵⁰ The amalgamation movement, which by 1925 had brought a quarter of all British tonnage under the control of five company groups, began in earnest about the turn of the century with the creation of Union Castle, and Blue Funnel's acquisition of China Mutual.⁵¹ This tendency to create larger operations was inherent in the regularisation of services from the beginning and the liner trade, dominated by relatively few companies, was highly organised with competition controlled but not annihilated by conference arrangements. Whatever the implications of liner conferences for the shipping industry generally, it is not possible to argue that such restrictions of competition favoured British against foreign owners, for the tendency was to admit outsiders of any nationality to the arrangement if they could not be repulsed by established conference members.⁵²

In marked contrast to the liner conferences, in the tramp sector many thousands of operators competed for available cargo in a free market situation. Private ship partnerships remained the commonest form of ownership for tramps, sail and steam, until the 1880s when a new corporate form, the single ship company, gained popularity. Established partnerships as well as new concerns formed companies to own single vessels, apparently to obtain the advantages of limited liability and limitation of insurance claims while remaining small concerns.

Oddly enough, we probably know less about the occupational background and geographical distribution of investors in shipping in the latter half of the nineteenth century than in the previous three decades. But Cottrell's study of Merseyside steam shipping, taken together with information available in business histories, suggests that there was less contrast between shipping finance in the age of sail and in the age of steam than might be supposed. Much of the capital invested in shipping under the 64th system came from within the industry itself, with merchants, shipbuilders, shipowners and shipbrokers commonly holding shares. The introduction of the joint stock company and single ship companies potentially took shipping finance out of the narrow circle of port acquaintance, widening the pool from which investors might be drawn. In practice, however, far from being the "servant girls and small green-grocers" featured in the industry's demonology, shareholders continued to come from the shipping world. Almost half of the investors, in both single ship and fleet companies in Liverpool between 1856 and 1881 described themselves as shipowners.⁵³ This is consistent with what we know of shareholding in certain individual companies, where, typically, care was taken to maintain a tightly knit family holding.⁵⁴

It is evident that the British shipping industry did not suffer from any shortage of capital; on the contrary, many leading shipowners were convinced that over-investment was the cause of considerable difficulty. This contrasts with the situation elsewhere in the world where capital shortage and institutional barriers hindered mercantile marine development. In the long term, expansion and updating of the British fleet could only continue because the return on capital was adequate; but the fact that investors were drawn from the industry itself assisted the maintenance of momentum through a willingness to take bad years with the good, which might not have been the case had the industry been forced to rely on external sources of finance. By the early twentieth century, however, the situation was changing. In 1908 the President of the Chamber of Shipping drew the following contrast in his annual address:

In years gone, shipowning was its own principal competition, and the capital for expansion was mostly provided out of shipowners' own earnings. Now, however, an entirely different kind of competition exists. We have to contend with the resources of banks and financial syndicates, which we have made use of to raise long and unduly extended payments for new ships...⁵⁵

One other notable feature of the British shipping industry deserves mention; the part played by individual initiative. Hyde has listed some of the great shipowners and their contribution,

Alfred and Philip Holt so improved the design of the steamship that it became possible to open up a vast market in the Far East; Alfred and Charles Booth using ships to Holt's specification did much the same for South America; Alfred Jones, by virtue of his remarkable foresight and business acumen, secured for his shipping companies a dominant position in the economies of West African countries; John Samuel Swire was a master and initiator of practice designed to eliminate competition among rival shipping companies.⁵⁶

As a sceptic on the contribution of entrepreneurship to economic growth, I would not want to suggest that British shipping was uniquely endowed with managerial talent which other countries' shipowners lacked, although in view of the suggestion that later nineteenth century Britain in general was uniquely deficient in this respect, it might be salutary to do so. Nevertheless, it is clear that the industry did produce some outstanding businessmen. Biographical information on shipowners is inevitably selective, as well as biased toward the successful; but what information is available shows that it was possible to rise to prominence from relatively non-monied, though hardly humble, circumstances. Alfred Jones, whose father was a currier, came from a respectable middle class background, but of no great social elevation, as his entry into shipping as a cabin boy suggests; the Harrisons came from farming stock; the Williamsons were master mariners; Alfred Holt's background was fairly wealthy, but his early success in the West Indian and South American trade before the foundation of the Ocean Steamship Company owed little to this.⁵⁷ Such men were reasonably educated, and well-connected in trade, but for them, and for the thousands of shipowners whose names appear in the shipping registers, entry to the industry presented no problem in terms of capital required. Not only was shipping open to generations of bright, and not so bright, young men, eager to make their mark, but the still fluid state of shipping technology set against the background of expanding trade, brought returns from initiative and the exercise of personal judgement which gave much personal satisfaction as well as financial reward. For S.G. Sturmeay individual enterprise was contingent on the maintenance of competition. As this was reduced through amalgamation and conferences so, in his view, "shipowners became more remote from ships and the smell of the salt than were their predecessors. Coincident with these changes shipowners became more clearly important figures, the purchasers of land and recipients of titles."⁵⁸ We may fairly dispute the inference that the ("smell of salt") was an ingredient of shipping success in the later nineteenth century. Indeed the shift of emphasis from quayside to office, from ship's account to balance sheet, which Sturmeay deprecates, is an indication of greater professionalism from which the industry benefited, and in any case the charge of a transition from "players to gentlemen" cannot be directed against the tramp sector. Nevertheless, it is clear that the liner business was becoming increasingly family dominated by the end of the century

and less open to outside talent, but this can be seen to be as much the product of the generally less optimistic circumstances in which the industry found itself as the cause. Conversely, if we must acknowledge the very great contribution which certain individuals made to the development of certain trades as British, we must set this within the general context of a growing market for sea carriage.

IV

What can be concluded from this brief survey of the British shipping industry between 1850 and 1914? First, there is no mystery as to why British shipowners took the lion's share of sea carriage. Quite simply, for much of the period they had better ships. Although other nations could in theory have purchased similar vessels, in practice they did not do so; the British mercantile monopoly was monopoly by default. Much of the explanation for the failure of other countries to challenge Britain lies in their domestic circumstances; their later industrialisation, differing factor endowments, and distinctive demands on national resources. But it must be recognised that the mere fact of British presence on certain routes discouraged intervention by outsiders. The power of established connection, or less grandly, inertia, operated against the acceptance of new carriers, making attempts to capture trade extremely risky. The wheels of nineteenth century commerce were oiled by personal contacts, forming a network of business relationships which favoured Britain, the imperial power and first-comer. The question for shippers was not "Why use a British vessel?" but "Why *not* use a British vessel?"

NOTES

1. W.A. Kirkaldy, *British Shipping* (London, 1914), Appendix XVII.
2. Great Britain, Parliament, "Report of the Departmental Committee on Shipping and Shipbuilding," *Parliamentary Papers*, XIII (1918), 53.
3. *Ibid.*, 56.
4. *Ibid.*, 53.
5. Phyllis Deane and W.A. Cole, *British Economic Growth 1888-1939* (Cambridge, 1962), 236.
6. See A.H. Imlah, *Economic Elements in the Pax Britannica* (Cambridge, Mass., 1958). The Report of the Committee on Invisible Exports, Chapter II, Historical Analysis, contains a useful summary and a reworking of Imlah's figures to produce a more accurate breakdown of shipping earnings; Financial Advisory Panel on Exports, Committee on Invisible Exports, *Britain's Invisible Earnings* (London, 1968), 15-24.
7. See F.E. Hyde, with J.R. Harris, *Blue Funnel* (Liverpool, 1957); F.E. Hyde, *Shipping Enterprise and Management 1830-1939* (Liverpool, 1967); F.E. Hyde, *Cunard and the North Atlantic 1840-1973* (London, 1975); F.E. Hyde and S. Marriner, *The Senior: John Samuel Swire 1825-1898* (Liverpool, 1967); P.N. Davies, *The Trade Makers* (London, 1973); D.R. MacGregor, *The China Bird* (London, 1961); M. Murray, *Union Castle Chronicle 1853-1953* (London, 1953); B. Cable, *A Hundred Year History of the P and O* (London, 1937); G. Blake, *The Ben Line* (London, 1956); W.J. Oldham, *The Ismay Line* (Liverpool, 1961).

8. Ralph Davis and recently Robin Craig have been outstanding exceptions. See, for example, Robin Craig, *The Ship: Steam Tramps and Cargo Liners 1850-1950* (London, 1980), a broad study which successfully relates technical development to shipping economies within a short space.

9. A. Slaven, "The Shipbuilding Industry," in Roy Church (ed.), *The Dynamics of Victorian Business; Problems and Perspectives to the 1870's* (London, 1980), 114.

10. Slaven, "Shipbuilding"; and Sidney Pollard and Paul Robertson, *The British Shipbuilding Industry 1870-1914* (Cambridge, Mass., 1979), 26.

11. B.M. Deakin, *Shipping Conferences* (Cambridge, 1973), 21.

12. Craig, *The Ship*, 11-17; Pollard and Robertson, *British Shipbuilding*, 9-24; and K.T. Rowland, *Steam at Sea: A History of Steam Navigation* (Newton Abbot, 1970), 81-152.

13. Gerald S. Graham, "The Ascendancy of the Sailing Ship, 1855-1885," *Economic History Review*, IX (1956), 74-88; Charles K. Harley, "The Shift from Sailing Ships to Steamships, 1850-1890: A Study in Technological Change and its Diffusion," in Donald N. McCloskey (ed.) *Essays on a Mature Economy: Britain after 1840* (London, 1971), 215-234.

14. Slaven, "Shipbuilding," 114.

15. Harley, "Sailing Ships to Steamships," 223.

16. P.L. Cottrell, "The Steamship on the Mersey, 1815-80: Investment and Ownership," in P.L. Cottrell and D.H. Aldcroft (eds.), *Shipping, Trade and Commerce: Essays in Memory of Ralph Davis* (Leicester, 1981), 143.

17. The point of particular circumstances is nicely demonstrated relative to Scandinavian shipping in the article by H. Nordvik in this volume.

18. See P. Bagwell, "The Post Office Steam Packets, 1821-1836, and the Development of Shipping on the Irish Sea," *Maritime History*, I (1971), 4-28; C.H. Lee, "Some Aspects of the Coastal Shipping Trade: The Aberdeen Steam Navigation Company, 1835-1880," *Journal of Transport History*, New Series, VIII (1975), 94-107, Sarah Palmer, "The Most Indefatigable Activity — The General Steam Navigation Company, 1824-50," *Journal of Transport History*, Third Series, III (1982), 1-22.

19. John Glover, "Tonnage Statistics of the Decade 1860-70," *Journal of the Royal Statistical Society*, XXXV (1872), 220.

20. United States, House of Representatives, *Causes of the Reduction of American Tonnage and the Decline of Navigation Interests*, House Report 28, 41st Cong., 2nd Sess. (1870), ii-iii.

21. See S.G. Sturmeay, *British Shipping and World Competition* (London, 1962), 9.

22. Pollard and Robertson, *British Shipbuilding*, Appendix B, Table B.8., 250-251.

23. Great Britain, "Report on Shipping," 527.

24. Craig, *The Ship*, 18.

25. See R.A. Church, *The Great Victorian Boom 1850-1873* (London, 1975), 59-65.

26. John Glover, "On the Statistics of Tonnage during the First Decade under the Navigation Law of 1849," *Journal of the Statistical Society*, XXVI (1863), 4.

27. Pollard and Robertson, *British Shipbuilding*, 93; and Robin Craig, "William Gray and Company, a West Hartlepool Shipbuilding Enterprise, 1864-1913," in Cottrell and Aldcroft, *Shipping, Trade and Commerce*, 173.
28. See below, Footnote 34.
29. See, for example, Glover's comments in Glover, "Statistics of Tonnage," 2.
30. See R.P. Thomas and D.N. McCloskey, "Overseas Trade and Empire 1700-1860," in Roderick Floud and Donald McCloskey, *The Economic History of Britain since 1700* (Cambridge, 1981), I, 87-102.
31. For further exploration of this point, see Sarah R. Palmer, "Experiment, Experience and Economics: Some Factors in the Development of the Early Merchant Steamship," in Keith Matthews and Gerald Panting (eds.), *Ships and Shipbuilding in the North Atlantic Region* (St. John's, 1977), 231-247.
32. United States, *Causes of the Reduction*, 45.
33. F.E. Hyde, *Cunard and the North Atlantic, 1840-1973* (London, 1975), 26-34.
34. Craig, *The Ship*, 11.
35. Hyde, *Blue Funnel*, 13-19.
36. See Craig, *The Ship*, 11-17.
37. Great Britain, "Report on Shipping," 73-74.
38. D.H. Aldcroft, "The Eclipse of the Coastal Shipping Trade, 1913," *Journal of Transport History*, VI (1963), as reprinted in D.H. Aldcroft, *Studies in British Transport History* (Newton Abbot, 1974), 144.
39. Great Britain, Parliament, "Statistical Abstracts for the United Kingdom," *Parliamentary Papers*, CII (1903), 803.
40. Great Britain, Board of Trade, *Consular Reports*, LVII (1856), 192.
41. D.H. Aldcroft, "The Mercantile Marine" in D.H. Aldcroft (ed.), *The Development of British Industry and Foreign Competition, 1875-1914* (London, 1968), 330.
42. See Craig, *The Ship*, 18-29, for discussion of the impact of new trades on shipping; see also S.B. Saul, *Studies in British Overseas Trade 1870-1914* (Liverpool, 1960); and David Alexander and Rosemary Ommer (eds.), *Volumes Not Values: Canadian Sailing Ships and World Trades* (St. John's, 1979).
43. Great Britain, "Report on Shipping," 76-77.
44. Sarah Palmer, "The British Coal Export Trade, 1850-1913" in Alexander and Ommer, *Volumes Not Values*, 335.
45. Great Britain, "Report on Shipping," 145.
46. W.S. Jevons, *The Coal Question* (London, 1866), 276.
47. Great Britain, "Report on Shipping," 54.
48. Stephanie Jones, *A Maritime History of the Port of Whitby 1700-1914* (Unpublished Ph.D. Thesis, University of London, 1982), 154-195; Sarah Palmer, "Investors in London Shipping 1820-1850," *Maritime History*, II (1972), 52.

49. Cottrell, "Steamship on the Mersey," 145.
50. "Steamship Lines," *Encyclopedia Britannica* (Eleventh Edition, London, 1911), 859.
51. D.H. Aldcroft, "The Depression in British Shipping 1901-11," *Journal of Transport History*, VII (1965), reprinted in Aldcroft, *British Transport History*, 112.
52. A recent study of conferences is K.A. Moore, *The Early History of Freight Conferences* (National Maritime Museum Monograph No. 51, Greenwich, 1981); see also Deakin, *Shipping Conferences*.
53. Cottrell, "Steamship on the Mersey," 155.
54. See Hyde, *Blue Funnel*; and Hyde, *Shipping Enterprise and Management* (Liverpool, 1967). Cunard was the exception; see Hyde, *Cunard and North Atlantic*.
55. *Report of the 31st Annual Meeting of the Chamber of Shipping*, February 14th, 1908.
56. Hyde, *Shipping Enterprise and Management*, 98.
57. See P.N. Davies, *Sir Alfred Jones: Shipping Entrepreneur par Excellence* (London, 1978); Hyde, *Blue Funnel*; Hyde, *Shipping Enterprise and Management*; and Hyde, *Cunard and North Atlantic*.
58. Sturmeay, *British Shipping*, 395-396.

5. DISCUSSION FOLLOWING THE PAPERS OF SAFFORD AND PALMER

FISCHER asked how the decision by British shipowners to invest massive sums in new technology in the 1850s might be explained.

PALMER replied that in her view the most logical explanation would be the development and specialization of the British economy.

FISCHER questioned the role of the new economic liberalism in such a movement.

PALMER argued that while economic liberalism was indeed important it was not by itself a decisive factor in Britain.

SAFFORD suggested that the experience in the United States was very different. That nation embraced protectionism at precisely the time that her merchant marine began to decline. It is arguable that so long as the United States was avowedly protectionist there could not have been a viable merchant marine.

FISCHER asked why the United States decided to protect its coastal trade in the post-Civil War era while at the same time allowing open competition in her deep-sea trades.

CRAIG reminded participants that the American coastal trade was an extremely large one. It is a mistake to think of it simply as trade along the Atlantic and Pacific coasts or in the Gulf of Mexico. Indeed, it also embraced trade from one coast to another around the Horn.

FISCHER raised the question of the role of technology in the British and American fleets.

CRAIG replied that American shipping was technologically well-advanced. The best example of this is the fleet of bulk carriers built for the Great Lakes trades.

SAFFORD pointed out that despite an early lead in steam technology, America did in fact lag behind Britain technologically for at least the first half of the nineteenth century. This was true especially in technology applied to the deep-sea trades.

HARLEY suggested that one factor which mitigated against the American shipbuilding industry was the U.S. iron tariff. This allowed American producers to build up lucrative markets abroad while maintaining high prices at home. As iron and steel vessels became the rule, American shipbuilders were placed at a decided disadvantage.

SAFFORD agreed, but also pointed out the political dimension of this problem. While the protectionists were always in a minority they were able to manipulate government to maintain high tariff levels.

HARLEY argued that the role of technology needed more emphasis in studying the rise of the British shipping industry. In particular, he pointed to changes in boiler technology as being crucial in the timing of the transition from sail to steam.

PALMER agreed, but re-affirmed her belief that shifts in demand rather than technological change was the crucial factor. Shipowners were more inclined to invest in steam in the 1850s because of the integrated nature of the market rather than because of some new developments in steam technology.

FISCHER asked whether it would be fair to conclude that Britain's success in the second half of the nineteenth century was the result of the failures of other nations or the inability of competitors to compete adequately.

SAFFORD pointed out that Americans at the time did not view it that way. Instead, they believed that while they were capable of competing, the British were able to discriminate against them in a variety of ways.

PALMER disagreed, pointing out that there is no evidence of any systematic national policy to oppose competition. This did not, however, rule out discrimination by individual British shipowners, when they were in a position to do so.

SAFFORD re-iterated his contention, pointing to the fact that at the Paris Economic Conference in 1916 the premiers of various Commonwealth nations openly called for discriminatory policies against American shipping. This suggests that in fact the machinery for establishing and enforcing discrimination did exist.

CRAIG pointed out that all of the complaints voiced by Americans about the British were echoed by British shipowners against the Germans. But it should be remembered that every nation that finds itself at a commercial and economic disadvantage tends to cry foul play. While some discrimination might be possible in the liner trades, it would be impossible to do so in the tramp and the bulk carrying trades of the late nineteenth century.

NORDVIK pointed out that control of information and possession of the proper contacts were probably much more important than any forms of discrimination in determining who dominated a particular trade.

SAGER asked whether ownership in either the British or American fleets was as concentrated as it appears to have been in the Canadian fleet.

PALMER suggested that qualitative evidence seems to show a high degree of concentration in the British fleet, but we really do not have any quantitative studies of this phenomenon.

HARLEY indicated that ownership was probably highly concentrated in the American fleet as well, but it is difficult to compare the degree of concentration with the Canadian experience.

6. THE SHIPPING INDUSTRIES OF THE
SCANDINAVIAN COUNTRIES, 1850-1914

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THE SHIPPING INDUSTRIES OF THE SCANDINAVIAN COUNTRIES, 1850-1914

Helge W. Nordvik

I. INTRODUCTION

This paper attempts to describe and explain the growth and development of the Scandinavian shipping industries from 1850 to 1914. Norway, Sweden and Denmark taken together represented a significant component of total world merchant tonnage. Throughout the period, their share of world tonnage fluctuated between five and ten percent. At the peak of their prominence in the age of sail, they had close to fifteen percent of total world sail tonnage on registry. The Norwegian statistician, A.N. Kiaer, Director of the Norwegian Central Bureau of Statistics, who was responsible for compiling both the extensive Norwegian statistics and the international shipping statistics published by the Bureau in the latter part of the nineteenth century, estimated that the three Scandinavian countries accounted for nine percent of total world tonnage in 1879.

The Scandinavian countries did not play equal roles in international maritime transport. Norwegian shipping was much more important than Swedish or Danish. Norwegian tonnage was significantly greater, and was employed chiefly in international seaborne trade, while a considerable part of Swedish and Danish tonnage was employed in domestic coastal transport. In 1879 Norway accounted for 5.6 percent of world tonnage, but the Swedish share was only 2.3 percent, and Denmark held but 1.2 percent of total world tonnage.¹

Consequently this paper will focus on trends and developments in Norwegian shipping, while the Danish and Swedish shipping industries will be treated more briefly. In many respects, the three Scandinavian countries show broadly similar development patterns, although there were significant differences in some fields.

The paper is organised in five parts. After a short review of the situation around 1850, the growth in fleet size and structure is considered in more detail. This is followed by a discussion of the patterns of ownership and finance, a section on the transition from sail to steam and a final discussion of the trade routes and profitability of the national fleets.

II. SCANDINAVIAN SHIPPING AROUND 1850

The Scandinavian countries had long-established shipping industries based upon their positions as major exporters of important raw materials and their roles as major European maritime powers. In the eighteenth and nineteenth centuries the focus of their maritime activities was the Baltic, although their fleets also engaged in trade both to the Mediterranean and to the countries of Western Europe and America. However, it is fair to say that the fundamental basis for their shipping industries in 1850 was as follows:

1. the exports of foodstuffs and raw materials to Western Europe (Norwegian and Swedish timber to Britain, France and the Netherlands, Swedish iron to Western Europe);

2. inter-Scandinavian trade (Norwegian herring to Sweden and Denmark, Danish and Swedish foodstuffs to Norway, Norwegian and Swedish timber to Denmark);

3. Baltic trade (Norwegian herring to Prussia and Russia, bringing return cargoes of rye); and

4. domestic (coastal) shipping.

Although ships from all Scandinavian countries took part in international shipping, their role was insignificant in most trades. However, there were some important exceptions. Sweden maintained quite an extensive shipping involvement in the South American and Dutch East Indies trades, not only because of the large growth in imports of coffee and sugar to Sweden in the years 1830-50 but also because these trades could be combined with exports of either Swedish iron or timber or cargoes from European countries. Swedish ships carried salt and wine from Portugal and the Mediterranean, coal from England and piece goods from London, Hamburg and Antwerp to Brazil, Sweden's main trading partner in South America.²

Although Danish shipping was concentrated in the Baltic and British trades, Danish vessels were fairly well-represented in the South American trade as well. In contrast to Sweden and Norway, Denmark had no bulk exports, and this hampered the development of their merchant marine in the period after the Napoleonic Wars.

Norwegian shipping played a major part in the Swedish export trade. About a third of all tonnage clearing from Swedish ports consisted of Norwegian-registered vessels in 1849. But in the 1840s, Norwegian shipping gradually expanded into the international carrying trade. Thus, whereas in 1837 the Norwegian carrying trade amounted to 33,407 commercial lasts (1 Norwegian commercial last = 2.1 net registered tons) from Sweden and 16,572 lasts from other countries, the corresponding figures for the year 1849 were 58,944 and 67,405 lasts respectively. Although Russia (22,000 lasts) and England (18,400 lasts) were the countries which next to Sweden accounted for most of this new trade, there were also many Norwegian vessels in the Mediterranean trade, and some even traded with the United States and other American countries.³

Several developments connected with changes in British trade policy in the 1840s combined to improve the possibilities for increased growth in the shipping industries of the Scandinavian countries. The reduction in the British timber duties, starting in the 1840s and continuing in the 1850s, meant improved opportunities for Scandinavian timber in the British market and a larger demand for tonnage in this trade. Second, the reduction of agricultural protection meant increased possibilities for Danish agricultural products in the British market. Most important of all, the repeal of the British Navigation Acts in 1849 meant that Scandinavian vessels could now, if they were competitive, enter trades that

previously had been closed to them, such as the British North American timber trade. Thus, in a very real sense, the changes in British commercial policy around 1850 can be said to have led to the "golden age of sail" for Scandinavian, and in particular Norwegian, shipping.

III. THE GROWTH AND STRUCTURAL CHANGES IN THE SCANDINAVIAN MERCHANT MARINES, 1850-1914

In the thirty years from 1850 to 1880 the total registered tonnage in the Scandinavian countries increased from 575,600 tons to 2,309,400 tons. At the beginning of the period, most of the tonnage was sail, but by 1880 all three fleets, especially the Danish, contained a fair proportion of steamers. We are thus immediately faced with a common problem: how do we convert the raw tonnage figures into a common format in order to gain an idea of the relative importance of steam versus sail? In the scholarly literature as well as in statistical compilations, a conversion factor is often employed to permit direct comparisons. There are several pitfalls to this procedure, not least the fact that both steam and sail tonnage efficiency (in a technical sense) changed over time at unequal rates.⁴

However, despite the conceptual difficulties, we cannot fail to adjust in some way for the increasing importance and efficiency of steam tonnage. Total tonnage figures give a disproportionate weight to countries with a large sailing tonnage (Norway) and underestimate the tonnage growth in countries which adapted more rapidly to steam (Denmark). A.N. Kiaer, solved the problem by computing what he called "estimated tonnage" for all major shipping nations in the nineteenth century. Although he later revised this, Kiaer devised the common procedure of using a conversion factor of three. Thus, total estimated tonnage may be calculated by taking the sailing tonnage, multiplying the steam tonnage by three and adding the two figures. This procedure dramatically increases the carrying capacity of various fleets (see Table 1): Norwegian tonnage is increased by 460 percent, Danish tonnage by 297 percent and Swedish by 258 percent.

TABLE 1

REAL AND ESTIMATED TONNAGE IN THE MERCHANT MARINES OF THE UNITED KINGDOM, DENMARK, NORWAY AND SWEDEN, 1850-1886¹
(Thousands of tons)

Year	U.K.		Denmark		Norway		Sweden	
	R	E	R	E	R	E	R	E
1 January								
1850	3159.6	3458.2	90.6	92.5	288.6	289.5	196.4	203.4
1851	3231.5	3546.5	94.6	97.6	299.8	300.6	205.8	213.8
1852	3320.0	3669.1	101.5	105.1	314.9	316.3	208.5	216.5
1853	3408.4	3799.8	106.4	111.0	338.6	340.1	212.2	222.2
1854	3654.8	4122.5	107.2	111.9	360.5	362.7	210.3	221.3
1855	3854.3	4427.0	118.5	122.9	397.7	400.8	215.9	227.9

TABLE 1 (continued)

1856	4063.9	4810.0	126.6	131.0	427.2	432.7	231.3	247.3
1857	4183.4	4987.2	134.7	139.4	479.0	486.3	254.4	272.4
1858	4467.9	5369.6	141.4	147.6	520.5	528.9	270.9	290.9
1859	4614.4	5600.7	145.7	153.4	539.2	548.2	276.7	297.7
1860	4669.0	5638.8	148.4	157.4	551.8	561.3	289.1	312.1
1861	4713.2	5731.0	142.0	151.1	558.3	567.8	283.6	307.6
1862	4867.6	6001.7	141.2	150.5	576.8	586.7	282.3	308.3
1863	4998.9	6203.8	140.4	149.2	592.8	602.7	274.2	301.2
1864	5399.7	6736.7	142.5	152.1	628.8	638.9	276.9	306.9
1865	5711.2	7273.1	141.6	152.0	663.0	673.8	281.3	311.3
1866	5859.1	7703.9	152.8	166.8	743.0	756.4	268.1	299.5
1867	5884.4	7846.0	164.5	183.2	820.2	834.2	287.5	321.2
1868	5862.1	7880.5	168.2	189.4	862.2	879.8	304.8	342.1
1869	5888.8	7909.9	179.7	202.3	931.4	953.4	304.7	343.7
1870	5827.5	7951.8	179.9	203.3	960.4	984.2	338.7	380.1
1871	5824.3	8317.3	182.9	209.8	1004.0	1032.7	349.9	411.3
1872	5852.5	8808.4	191.0	226.0	1043.4	1085.3	368.7	441.4
1873	5935.9	9381.1	199.9	248.2	1101.1	1164.8	393.0	498.9
1874	6010.8	9849.7	215.9	277.2	1224.2	1306.5	446.4	604.2
1875	6203.3	10393.5	229.1	295.0	1316.5	1403.9	501.9	683.0
1876	6385.9	10744.0	248.8	337.0	1395.2	1487.1	517.0	702.9
1877	6504.0	10996.0	259.5	357.2	1436.3	1528.2	534.8	717.7
1878	6656.6	11448.3	257.5	358.5	1493.0	1586.8	539.9	726.2
1879	6833.1	12022.0	256.8	361.2	1526.7	1630.0	551.0	735.5
1880	6881.3	12506.5	257.9	367.3	1510.7	1620.3	540.8	728.2
1881	6901.3	13001.9	255.7	372.1	1518.7	1634.9	552.4	733.9
1882	7052.5	13781.5	260.8	398.4	1520.4	1651.6	537.5	711.9
1883	7357.1	14827.9	264.0	419.6	1530.0	1695.0	531.8	715.6
1884	7689.6	16041.0	271.3	443.1	1547.2	1732.2	519.6	710.2
1885	7882.6	16717.8	277.0	467.4	1583.4	1794.6	529.6	745.2
1886	7906.9	16807.5	274.3	462.9	1563.0	1791.2	517.1	737.4

¹R denotes "real tonnage;" E represents the "estimated tonnage" (see text).

Source: International skibsfartsstatistik, *Tabeller vedkommende handelsflaaderne i aarene 1850-1886* (Kristiania, 1887), Table 9.

The growth in Norwegian tonnage was thus significantly larger than in the Danish and Swedish fleets. A.N. Kiaer, writing in 1882, compared the growth in the estimated tonnage of the Scandinavian countries to the growth in the world fleet (most countries in Europe, the United States and British possessions) and discovered that the Scandinavian countries increased their share of world tonnage substantially in this period (see Table 2). Norway not only had a growth rate significantly larger than the average rate for "world tonnage", which included all the major shipping nations, but also a much more rapid growth than the other two Scandinavian nations, at least in the 1850s and 1860s. The growth in Swedish and Danish tonnage in the 1870s, on the other hand, outstripped Norwegian expansion, solely due to the fact that steam tonnage in 1870 was

greater in Denmark and Sweden. Thus, although steam tonnage in the three countries grew very fast in the 1870s (16-17 percent annually), while sail tonnage increased by 4.38 percent in Norway, 3.47 percent in Sweden and 1.91 percent in Denmark, the net result was that the total annual growth rate for Norway was less than for the other two countries.

TABLE 2

ANNUAL GROWTH RATES OF WORLD AND SCANDINAVIAN
TONNAGE BY DECADE, 1850-1879¹

Period	"World tonnage"	Norwegian tonnage	Swedish tonnage	Danish tonnage
1859-59	5.00%	6.85%	4.37%	5.45%
1860-69	2.74	5.78	1.99	2.59
1870-79	3.53	5.11	6.72	6.09

¹In this calculation, one steam ton is taken as equal to one sail ton.

Source: A.N. Kiaer, "De skandinaviske landes skibsfart," *Nordisk tidskrift* (1882), 444.

The distribution of the Scandinavian fleets by tonnage class is set out in Table 3. As is evident from the Table, Scandinavian steam tonnage at the end of the 1870s was largely made up of vessels below five hundred tons. Steamships above two thousand tons accounted for a sixth of total British tonnage in 1879, but the largest Scandinavian ship was a Danish steamer of 1,766 tons. The explanation is of course that Scandinavian steam shipping at the time was mainly coastal and limited to trade between the Scandinavian countries.⁵

Scandinavian sailing ships were particularly well represented in the 200-499 tonnage class, with more than twenty percent of the tonnage in this class belonging to Scandinavian owners. The many Norwegian timber ships engaged in the Baltic and Norwegian timber trade explains the large Norwegian share here. Norwegian vessels also accounted for 12.3 percent of the world fleet in the 500-999 tonnage category. These ships were mainly employed in the trans-Atlantic trade, carrying timber, petroleum and other bulk cargoes.

Looking at ports of registry, we find that the Norwegian, and to a certain extent the Swedish shipping industries were widely distributed geographically, while the Danish industry was heavily concentrated in Copenhagen. In Denmark, eighty percent of actual tonnage and almost ninety percent of estimated tonnage in sail equivalent tons were registered in the islands of Sjaelland and Funen. The second ranking Danish shipping town, Svendborg, had only twenty-three percent of Copenhagen-registered tonnage. Practically all Danish steam tonnage was registered in Copenhagen.

Sweden had several important shipping regions, but Gothenburg and Stockholm dominated both in sail and steam. Although Gothenburg stood out as Sweden's major shipping town, there were a number of other important ports of registry on the Baltic, such as Gefle and Sundsvall. Stockholm had more steam

TABLE 3

SCANDINAVIAN STEAM AND SAIL TONNAGE BY TONNAGE CLASS,
AS A PERCENTAGE OF WORLD TONNAGE IN EACH CLASS,
JANUARY 1, 1879

Tonnage Class	Steam tonnage				Sail Tonnage			
	Norway	Sweden	Denmark	Total	Norway	Sweden	Denmark	Total
20- 49	3.21	4.67	1.07	8.95	6.89	2.99	1.81	11.69
50- 199	2.75	4.80	2.03	9.58	5.32	3.90	3.45	12.67
200- 499	3.81	4.87	1.38	10.06	16.54	3.67	1.16	21.46
500- 999	0.50	2.06	1.68	4.24	12.30	2.58	0.31	15.19
1000-1499	0.33	0.10	1.17	1.60	2.70	0.76	0.15	3.61
1500-1999	0.51	—	0.29	0.80	—	—	—	—
2000+	—	—	—	—	—	—	—	—

Source: See Table 2

tonnage on registry than Gothenburg, but played a secondary, and indeed quite insignificant role in the trans-Atlantic trades, which required fairly large sailing ships.

The major Norwegian shipping towns, with the exception of Bergen and Stavanger, were concentrated along the coast from Kristiansand in the South to Kristiania (now Oslo) in the East. Many of the small towns along this coast had fleets of over 40,000 tons, and some of the rural parishes had well over 20,000 tons on registry. The largest Norwegian shipping town, Arendal, was in fact a very small town with about four thousand inhabitants in 1875; at the same time, local residents owned about 350 ships. And the crews on these ships added up to well over four thousand men, slightly larger than the entire population of Arendal. The ten largest ports of registry in Norway all had fleets of over 40,000 tons; eight other ports had fleets between 20,000 and 40,000 tons; and another seven had fleets of over 10,000 tons. In Sweden, only six towns had registered tonnage of over 20,000 tons, while in Denmark only two towns had fleets of over 20,000 tons.⁶

This meant that a ranking of the largest shipping towns in Scandinavia, including all towns with a registered estimated tonnage over 50,000 tons, included only one Danish and two Swedish towns. Because of its large steamship fleet, Copenhagen topped the list, but Arendal was not far behind, in spite of the virtual absence of steam tonnage there.

The Table below illustrates clearly the extent to which the Norwegian shipping ports, with the exception of Bergen, had by the beginning of the 1880s failed to start the transition to steam. It is evident also that the towns with significant steam tonnage were major commercial and trading centers. Subsequent developments would show that the change from sail to steam led to the demise of the typical shipping town. The shipping industry gradually became a business where the favourable locational factors shifted from access to raw materials for shipbuilding and a steady local labour force, to access to larger

capital markets, proximity to centres of communication and trade, organizational expertise and reliance on a well-educated, national labour force.

TABLE 4

MAJOR SCANDINAVIAN PORTS OF REGISTRY, JANUARY 1, 1881
(ACTUAL AND ESTIMATED TONNAGE)

Port of Registry	Steamships		Sailing Ships	Total	
	Actual tonnage	Estimated tonnage	Actual tonnage	Actual tonnage	Estimated tonnage
Copenhagen	48,950	146,850	35,150	84,100	182,000
Arendal	766	2,298	168,163	168,929	170,461
Bergen	28,585	85,755	55,792	84,377	141,547
Göteborg	25,187	75,561	61,674	86,861	137,235
Stavanger	4,663	13,989	113,288	117,951	127,277
Kristiania	5,467	16,401	93,074	98,541	109,475
Drammen	1,479	4,437	92,243	94,243	97,201
Stockholm	16,565	49,695	11,832	28,397	61,527
Tonsberg	1,363	4,089	55,714	57,077	59,803
Kragerø	330	990	53,921	54,251	54,911

Source: Kiaer, "De skandinaviske landes skibsfart," 376.

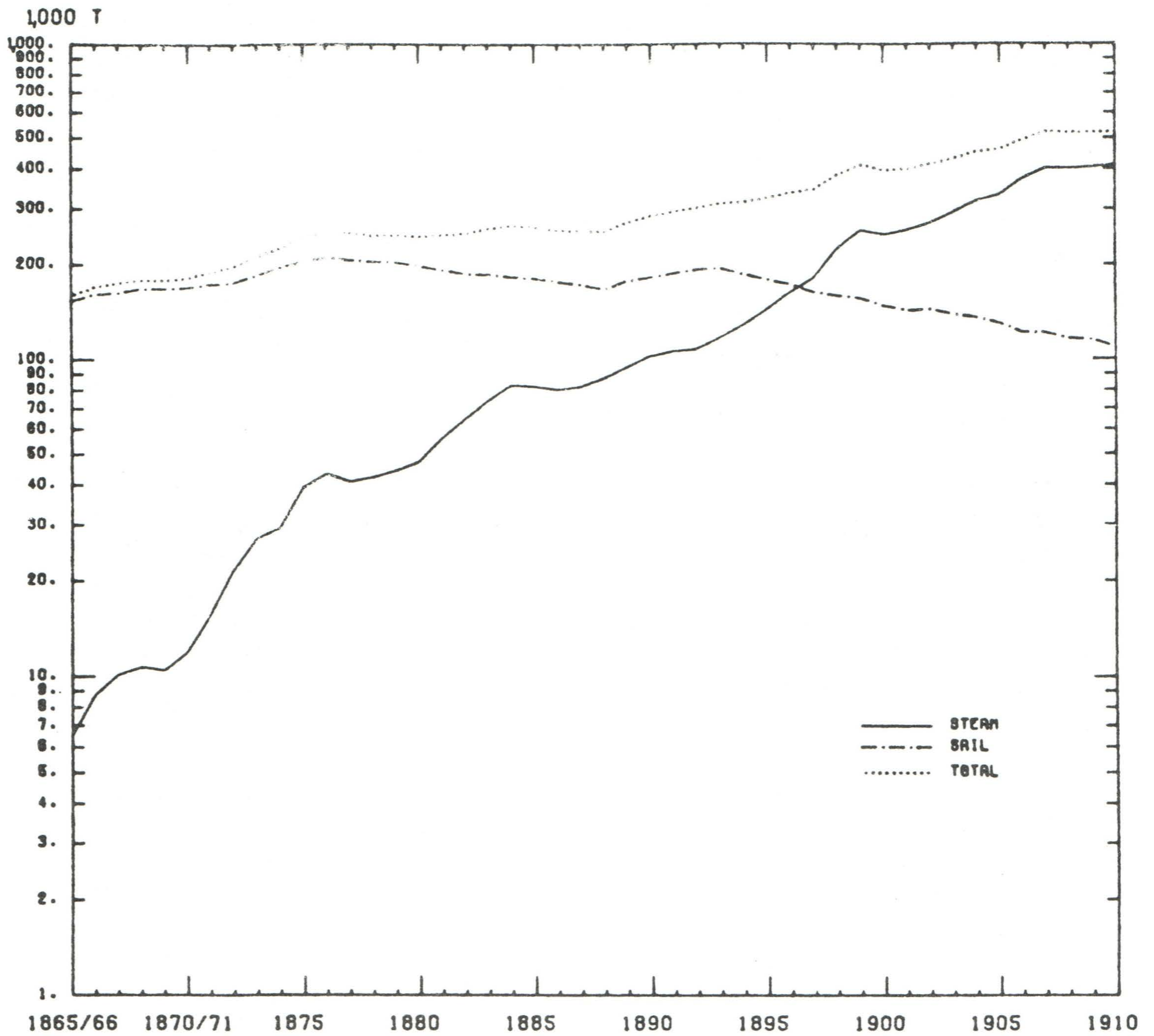
Figures 1-4 depict the growth of the Scandinavian fleets up to 1914. The growth in both Norwegian and Swedish tonnage slackened sharply in the 1880s, and in spite of a considerable increase in tonnage during the years 1888-89, the years from 1878 to 1895 were in general years of slow progress for the Scandinavian fleets. However, the Danish fleet expanded strongly in this period, chiefly due to the rapid growth in steamship tonnage. The growth in Danish tonnage was largely the result of the expansion of Copenhagen-registered shipping, just as the growth of the steam fleet was strong in Bergen. The very slow growth in the Swedish fleet was due to the same influences as in Norway: the combined effects of a loss of comparative advantage in the building and owning of sailing vessels and the relatively slow rate of expansion in steam tonnage during the 1880s.⁷

After 1895, the Danish and Swedish fleets expanded quite rapidly, maintaining their relative position in an increasingly diminishing world sailing fleet, but increasing their share of world steam tonnage. The same was true for the Norwegians. Norway's relative position vis-a-vis the other two Scandinavian countries improved somewhat up to 1910, but the expansion in the years immediately preceding the First World War was clearly faster in Norway than in the other two Scandinavian countries.

In summary, there is every reason to stress the fact that the Scandinavian countries, after going through a difficult period in the 1880s, successfully defended their position in world shipping up to the First World War. Their fleets kept up with technological developments, and though they did not initiate

FIGURE 1

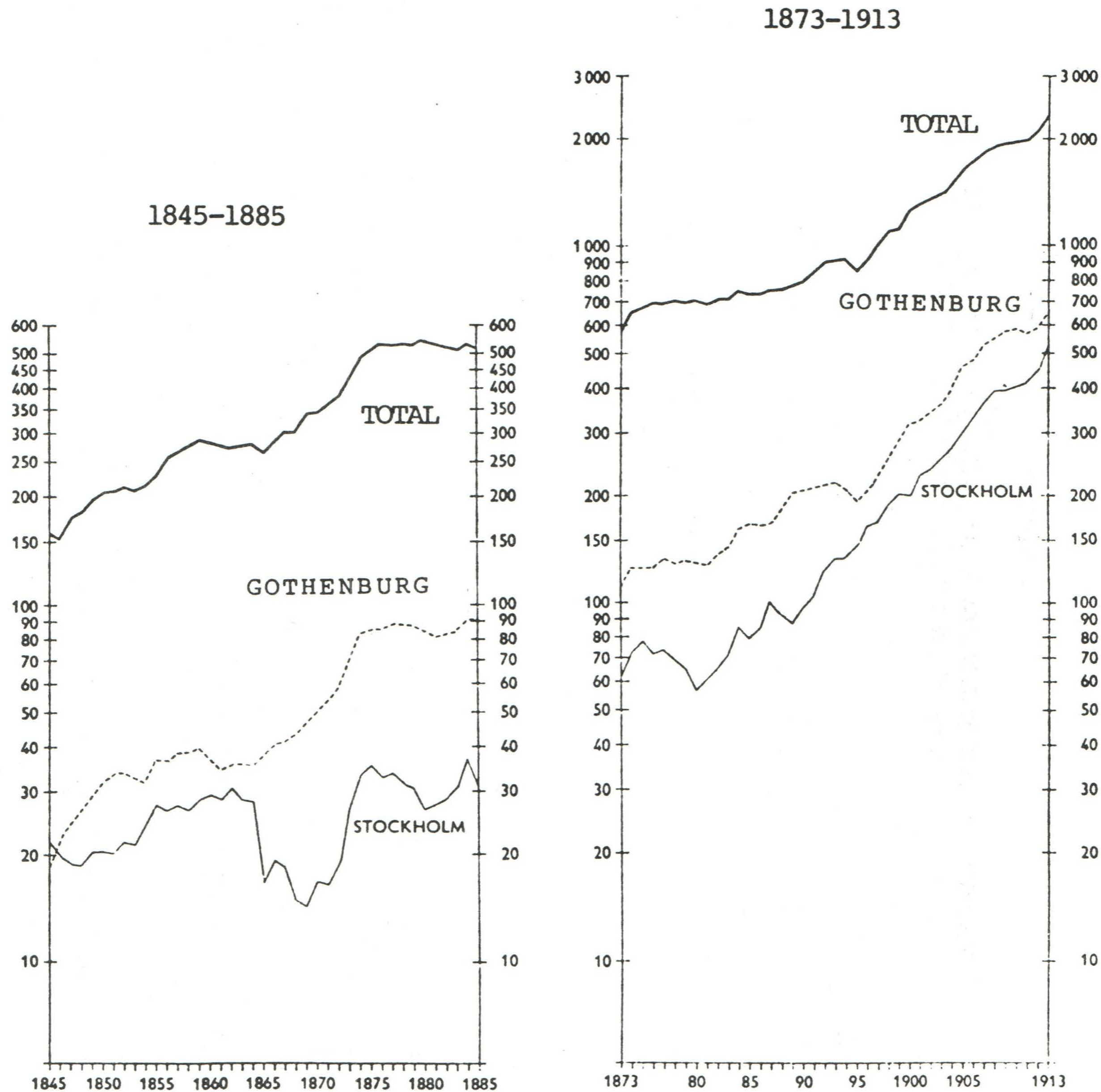
THE GROWTH OF THE DANISH MERCHANT MARINE, 1865-1910
(NET REGISTERED TONS, LOGARITHMIC SCALE)



Source: O. Hornby and C.-Å. Nilsson, "The Transition from Sail to Steam in the Danish Merchant Fleet, 1865-1910", *Scandinavian Economic History Review*, XXVIII, No. 2 (1980), 114.

FIGURE 2

THE GROWTH OF THE SWEDISH MERCHANT MARINE 1845-1885 AND 1873-1913
(LOGARITHMIC SCALE, THOUSAND REGISTERED TONS)

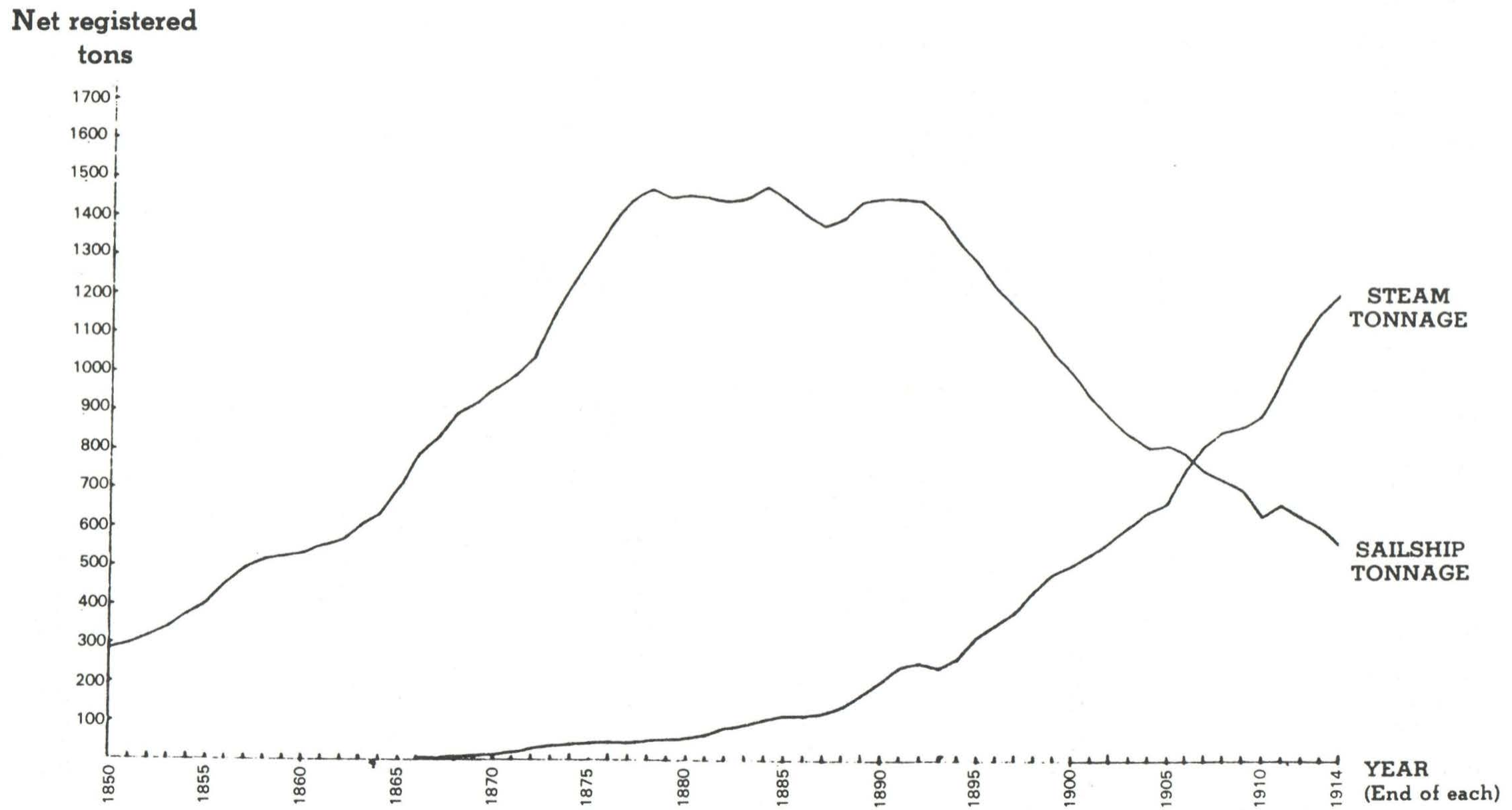


¹Steam tonnage converted into sail tons using a conversion factor of three.

Source: I. Hammarstrom, *Stockholm i Svensk ekonomi 1850-1914* (Stockholm 1970), 139, 180.

FIGURE 3

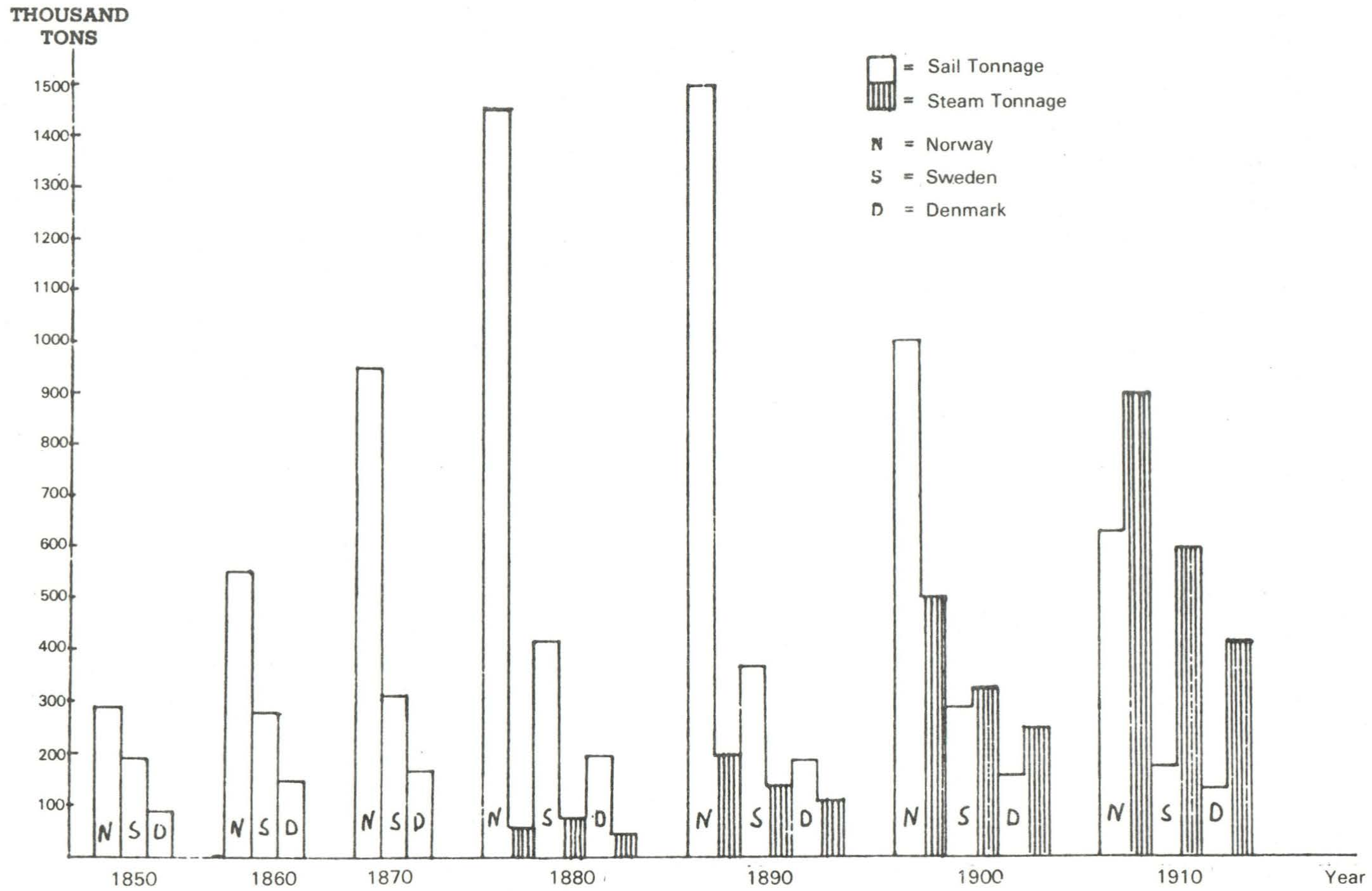
THE GROWTH OF THE NORWEGIAN MERCHANT MARINE 1850-1914
(THOUSAND NET REGISTERED TONS)



Source: *Statistike Oversikter*, Nos. X 178 (1948), 241-242.

FIGURE 4

SCANDINAVIAN TONNAGE IN SELECTED YEARS 1850-1910



Source: *International Skibsfartsstatistik* (Kristiania 1887), Tabeller vedkommende Handelsflaaderne 1850-1886; W.A. Kirkaldy, *British Shipping* (London 1914), Appendix XVII.

technological change (perhaps with the exception of Denmark and her substantial fleet of modern motor-ships), Scandinavians managed to cling to the position they held in world shipping at the end of the 1870s (see Table 5).

TABLE 5
PERCENTAGE OF WORLD TONNAGE HELD BY SCANDINAVIAN COUNTRIES IN SELECTED YEARS, 1880-1910

	1880		1890		1900		1910	
	Sail	Steam	Sail	Steam	Sail	Steam	Sail	Steam
Norway	10.0	1.1	12.5	2.0	10.0	3.1	7.5	3.4
Sweden	2.9	1.5	3.1	1.4	2.9	2.0	2.1	2.3
Denmark	1.4	1.0	1.6	1.1	1.6	1.5	1.6	1.6

Source: Computed from W.A. Kirkaldy, *British Shipping* (London 1914), Appendix XVII.

In 1910, the three Scandinavian countries owned 7.3 percent of world steam tonnage and 11.2 percent of sailing capacity. A substantial part of their steam tonnage consisted of fairly modern and up-to-date ships, although the Scandinavian fleets did not play a significant part in the liner trades, but continued to be employed mainly in tramp shipping.

An examination of the Norwegian fleet, which was by far the largest, shows that sailing ships still played a considerable role in the national shipping industry. However, as shown by Table 6, the fleet of steam vessels exceeding five hundred tons was by no means inferior to the fleet of other shipping nations. No less than twenty-eight percent of the total tonnage consisted of vessels less than five years old, and almost half of the tonnage was less than ten years old. Although the number of vessels above 2,000 tons was fairly small in comparison to the total this did not necessarily mean that the structure of the fleet was unsatisfactory in a broader sense. The structure of the fleet reflected the trades in which Norwegian owners had specialized, and the Table clearly illustrates that Norwegian owners were rapidly building up their investment in modern, large vessels over 4,000 tons.

IV. PATTERNS OF OWNERSHIP AND FINANCE

The main form of ownership in all Scandinavian countries during the age of sail was the partnership, or part-ownership. Although there are examples of both limited liability companies and single-ownership, the shipowning partnership (or *partsrederi*) was dominant in both Norwegian and Swedish shipping, and to a somewhat lesser extent in Denmark. This system of joint ownership evolved from the practice of merchants pooling their resources in order to raise sufficient capital and distribute risks.

The partnership was usually limited to one particular vessel, although many of the same partners could of course have shares in several vessels. When the ship was sold, lost at sea or scrapped, the partnership was dissolved. Several ships

TABLE 6

NORWEGIAN STEAM TONNAGE AT THE END OF 1914 (GROSS TONS)

A. NORWEGIAN TONNAGE EXCLUDING BERGEN

Age group (years)	Less than 5 years old		5-9 years		10-14 years		15-19 years		20 years or more		Total	
	No.	Tons	No.	Tons	No.	Tons	No.	Tons	No.	Tons	No. (%)	Tons (%)
Size (tons)												
500- 999	23	16.959	31	22.478	34	27.339	26	19.406	107	75.672	221 (28,4)	161.854 (12,)
1000-1999	82	122.410	94	127.807	94	126.013	36	46.209	101	141.951	407 (52,2)	564.390 (44,)
2000-2999	8	20.648	18	43.581	9	22.799	9	20.543	20	49.801	64 (8,2)	157.372 (12,)
3000-3999	6	21.878	12	42.892	13	47.336	6	20.371	5	16.907	42 (5,4)	149.384 (11,)
4000-4999	13	58.798	8	34.930	4	17.084	3	13.038	—	—	28 (3,6)	123.850 (9,7)
5000-5999	6	33.335	—	—	—	—	—	—	—	—	6 (0,8)	33.335 (2,6)
6000-	11	82.524	—	—	—	—	—	—	—	—	11 (1,4)	82.524 (6,5)
Total	149	356.552	163	271.688	154	240.571	80	119.567	233	284.331	779	1.272.639
in %	19,1	28,0	20,9	21,3	19,8	18,9	10,3	9,4	29,9	22,3		

B. BERGEN-REGISTERED TONNAGE

500- 999	5	4.370	13	11.845	14	11.248	8	6.399	25	18.145	65 (24,2)	52.007 (11,)
1000-1999	27	35.424	32	37.624	41	51.967	21	22.999	14	17.382	135 (50,2)	165.396 (36,)
2000-2999	—	—	2	4.669	3	7.620	2	4.718	11	27.361	18 (6,7)	44.368 (9,7)
3000-3999	—	—	10	37.331	8	28.485	11	36.300	8	24.650	37 (13,7)	126.866 (27,)
4000-4999	1	4.255	4	17.063	2	8.715	—	—	—	—	7 (2,6)	30.033 (6,5)
5000-5999	2	10.518	2	10.344	—	—	—	—	—	—	4 (1,5)	20.862 (4,5)
6000-6999	3	19.752	—	—	—	—	—	—	—	—	3 (1,1)	19.752 (4,3)
Total	38	74.319	63	118.976	68	108.035	42	70.416	58	87.538	269	459.284
in %	14,1	16,2	23,4	25,9	25,3	23,5	15,6	15,3	21,6	19,1		

Sources: This table is compiled on the basis of figures given in the Norwegian *Veritas* Registry for 1915 (including supplements), as well as the official shipping statistics (Norges Handelsflåte - Norwegian Merchant Fleet) for 1914 and 1915. I thank my colleague, Atle Thowsen, Research Fellow at the Bergen Maritime Museum, for making these figures available. They will be published in his *Bergen Shipping History, 1914-1939* (forthcoming).

were often administered collectively by one or more of the partners, but the ownership structure frequently made this complicated. Joint ownership in fact meant that the captain of the ship played a much more important role than the owners in terms of actually making decisions that affected profitability. The role of the captain was of course enhanced by the fact that communication remained costly and cumbersome long after the advent of the telegraph.

Many Scandinavian shipping firms or partnerships were controlled and owned by a very small group of individual merchants. Many of these merchant houses continued to take an active interest in shipping after 1850. In Norway, the growth in shipping after 1850 was made possible by capital accumulated in the timber trade (southern coastal towns), the herring trade (Stavanger), and the saltfish and stockfish trade (Bergen).

Nevertheless, there are many examples of fairly wide distribution of ownership. In a study of the Stavanger shipping industry in the 1870s, the author found that four hundred persons owned shares in one or more ships.⁸ Still, in terms of value the ownership of the fleet was highly concentrated: in the case of Stavanger, one third of the owners controlled four fifths of the capital value. But the fact remains that investment in shipping was open to a considerable number of people who by no means belonged to the wealthy merchant class.

The system of joint ownership through the *partsrederi* or partnership meant that financial resources could be mobilized from a surprisingly large part of the population. Investment in shipping was for many Scandinavians a realistic alternative to other types of financial investment, such as savings accounts, government bonds, and personal loans. This was possible because shipping was integrated into the local economy, and knowledge about shipping matters was widespread among a wide segment of the local population. This generalization is particularly true for Norwegian shipping towns in the age of sail. The local coastal economy was dominated by exports from the forestry and fishing sectors, as well as by shipbuilding and shipping. For example, a farmer who sold timber to a shipbuilder, could be persuaded to take shares in the ship as payment. The timber merchant, shipbuilder, ropemaker, sailmaker, and captain could all pay for their parts in a vessel by accepting this form of payment for their goods and services.

A crucial element in the successful expansion of the Scandinavian, and particularly the Norwegian, shipping industry during the period 1850-1880 was the close co-operation between shipowners and shipbuilders. Shipbuilding was by no means concentrated in a few large shipyards in the major towns. In the fjord districts in the west and along the coast of southern Norway, shipyards were a vital part of the local, rural economy. At the height of the Norwegian shipbuilding industry in 1875, two hundred yards employing 5,741 workers were reported in the industrial statistics.⁹ The comparatively cheap Norwegian and Swedish raw materials, together with the low labour costs in shipbuilding, meant that Scandinavian owners could obtain newly-built sailing tonnage at very competitive prices, often without having to finance the entire cost of the vessel if the shipbuilder took shares.

The joint owners of a sailing vessel usually chose a "corresponding shipowner," generally a merchant, to take care of the accounts and administration of the vessel. However, the position of the corresponding shipowner declined in importance as Scandinavian vessels increasingly were employed in the cross-trades. During the 1860s and 1870s the propensity to utilize vessels in this manner increased as the relative importance of shipping local exports decreased. At the same time, the position of the corresponding shipowner declined while the role of the captain on Scandinavian sailing vessels assumed a new importance. The enhanced role of the captain was reflected in the very substantial remuneration paid to masters on Norwegian vessels. The captain often had a share in the ship, but even if he did not, the owners secured his best efforts by paying him a share of the gross freight earnings in addition to a fixed salary. In turn, this made it possible for many captains to accumulate considerable savings, and many became shipowners through the investment of their surplus.¹⁰

In spite of the very real advantages of the shipping partnership, there were serious drawbacks to this form of ownership, which became more evident as steam displaced sail from the short and intermediate trades after the 1870s. The *partsrederi* was a simple and flexible form of ownership as long as the vessel could be managed efficiently by the captain and continuity of operations could be secured through reinvestment of profits by the individual shareholders. The profits were distributed in their entirety to the individual owners at the end of the voyage or accounting year. No provisions were made by the partnership to cover depreciation, future losses or a slump in the freight markets. Many partnerships did not insure their vessels, and thus it was up to the individual shareholder to insure his part separately. Dispensing with insurance meant that the reward for risk-taking accrued entirely to the shareholders, but so, of course, did the losses when they came.

The decentralised ownership and loose administrative structure of the *partsrederi* became a serious problem as the rise of specialised brokers and a fall in cable costs dictated more rapid decisions. In this new situation there was an obvious need to reorganize the shipping industry on lines that permitted both business flexibility and a coherent organizational structure, while continuing to secure the necessary financial resources. The solution was the establishment of new shipping companies, with limited liability and a managing director to make daily decisions. This solution was chosen very early by the Swedish companies such as Stockholms Angfartygs Rederibolag, Rederiaktiebolaget Svea, Transatlantiska Angskeppsbolaget (all established in the early 1870s), as well as the Danish Det forenede Dampsibsselskab (DFDS), founded in 1866 by the Danish financier Tietgen, who merged a number of smaller steamship companies.¹¹ These new concerns soon came to dominate Swedish and Danish shipping; by the early 1890s, DFDS had over fifty percent of total effective Danish tonnage. A wave of new shipping companies established after 1890 was responsible for the rapid expansion of the Danish and Swedish fleets prior to 1914.¹²

The close relationship between the large merchant houses and shipping

started to dissolve in Norway, with Bergen in the lead, during the late 1860s. In the Norwegian shipping industry, however, the partnership showed a surprising resilience, and although management techniques showed some evolution, the introduction of limited liability shipping companies came very late. Partnerships dominated through the 1890s, although single ship limited liability companies gradually assumed new importance as the change from sail to steam gathered momentum after 1900.¹³

This development was not, however, dispersed evenly. While vessels continued to be owned by both partnerships and single-ship limited liability companies, partnerships retained a larger percentage of steam than sail tonnage. This was due to the fact that sailing ships had almost disappeared from the fleets of western Norwegian towns, while partnerships remained important there in the steam tonnage on registry. Table 7 gives details of the ownership structure for sail and steam, respectively, by the end of the period.

The main problem for many Norwegian shipowners in the 1890s was to raise capital to finance the building or purchase of vessels. The limited liability company did not in itself solve this problem. It was of course possible to reach a wider circle of potential investors, but this could also be done by permitting a much greater sub-division of the shares in the partnership. In the 1860s and 1870s, parts of 1/4 or up to 1/16 were dominant, but in the 1880s and 1890s one could buy 1/100 of a vessel. However, it proved very difficult for many shipowners to obtain mortgages secured by the vessels, since these indentures were not protected by Norwegian law. The Shipping Registry Act of 1901 changed this anomalous situation.¹⁴

Many of the small Norwegian firms operating steam tonnage in the tramp market did not feel the need to alter significantly their organizational and management structures. In many instances partnerships were retained, although sometimes supplemented by single-ship limited liability companies. This was particularly true in western Norway, in towns such as Bergen, Haugesund and Stavanger. The situation was different in the eastern part of the country, where shipowning after 1900 became increasingly concentrated in Kristiania. Here many smaller companies had amalgamated, and single-ship limited liability companies had been consolidated under joint ownership and management. In many instances ingenious ways were found to overcome the problem of raising capital. Some shipowners managed to obtain credit from shipbuilders, both domestic and British. Others used their foreign business connections to finance ship construction, the loan being transferred to a bank upon delivery of the vessel. In other cases, the shareholders managed to obtain loans on the security of their respective shares, perhaps with the additional security of a guarantee from a shipowner or industrialist of recognized standing.¹⁵

By 1914 the transition to limited liability companies was almost completed in Denmark. The twenty steamship companies quoted daily on the Copenhagen Stock Exchange controlled two-thirds of Danish steam tonnage. Geographical concentration of ownership was also very pronounced. Five-sixths of Danish steam tonnage was registered in Copenhagen, with the DFDS company alone controlling twenty-five percent.¹⁶

TABLE 7

**NORWEGIAN SAIL AND STEAM TONNAGE BY FORM
OF OWNERSHIP, 1914**

Sailing vessels:

	No. of ships	Deadweight Tonnage	Percent
Partnerships	26	51,100	6.0
Single-ship limited liability companies	359	651,800	76.7
Private ownership	13	26,300	3.1
Ships and limited liability companies of various names	5	12,400	1.4
Limited liability shipping companies	42	108,000	12.8
Total	445	850,000	100.0

Steam vessels:

Partnerships	213	466,900	17.8
Single-ship limited liability companies	392	911,900	34.8
Private ownership	32	48,200	1.8
Ships and limited liability companies of various names	25	101,100	3.9
Limited liability shipping companies	365	1,086,900	41.7
Total	1,027	2,615,000	100.0

J. Schreiner, *Norsk skipsfart under krig og hoykonjunktur 1914-1920* (Oslo, 1963), 19-20.

The ownership structure in the Swedish sailing fleet was very similar to that existing in Norway. On the other hand, the partnership played an insignificant role in the ownership of sailing vessels, and the single-ship limited liability company was much less common (see Table 8). The large steamship companies in Gothenburg and Stockholm played a dominant role in both tramp and liner shipping. By 1914, the Brostrom group of companies in Gothenburg controlled a fleet of 37 vessels with a total deadweight tonnage of 193,700.¹⁷

The expansion of the large Swedish companies established to compete in the expanding iron ore and liner trades after 1900 was financed largely through assistance from the banking system and the government, and by reinvestment of retained profits from the existing companies. The Wallenberg financial group,

through the Stockholm Enskilda Bank and associated companies, played a major part in the financing of liner companies such as the Svenska Ostasiatiska Kompaniet and the bulk fleet of Axel Johnson in Stockholm. Although external finance played a crucial role in many cases, the major part of the expansion in Swedish shipping after 1900 was financed through reinvestment of retained profits. The iron ore trade in particular had proved so profitable that the companies involved could participate both in the formation of other companies and the financing of their own expansion. The Tirfing and Ferm companies belonging to the Brostrom group had assets of 12.8 million kronor in 1914, and over eighty percent of total assets were financed by their own capital.¹⁸

TABLE 8
SWEDISH STEAM AND SAILSHIP TONNAGE BY FORM
OF OWNERSHIP, 1908

	No. of ships	Deadweight Tonnage	Percent
Sailing vessels:			
Private ownership	584	36,383	17.0
Partnerships	1,062	152,096	71.3
Trading companies	3	597	0.3
Limited liability shipping companies	41	19,936	9.3
Other limited liability companies	61	4,412	2.1
Total	1,751	213,424	100.0
Steam vessels:			
Private ownership	104	31,184	5.5
Partnerships	62	21,118	3.7
Trading companies	9	848	0.2
Limited liability shipping companies	912	502,106	89.0
Other limited liability companies	100	9,044	1.6
Total	1,187	564,300	100.0

Source: *Konsulatberetninger*, Ukeutgaven no. 30/1910, 169.

External finance played a minor role in the expansion of the Norwegian fleet after 1900, although reliance on credit from both domestic and foreign banks played an increasing part in the steamship companies in Bergen and, to a lesser extent, in Oslo. Total assets in the Bergen fleet in 1914 amounted to ninety-five

million kronor. Although it is difficult to estimate the share of owners' funds, likely it was well over eighty percent. The Norwegian Ship Mortgage Bank, established by private interests in 1906, participated in the financing of Norwegian shipping investments, and Norwegian brokers could arrange foreign finance from Dutch and British banks. Generally speaking, the Norwegian banks hesitated to get involved in shipping finance, believing that it represented too high a risk. The expansion of Norwegian shipping was thus largely financed by recourse to the private non-banking credit market and the reinvestment of profits by existing companies.¹⁹

V. THE TRANSITION FROM SAIL TO STEAM

The shift from sail to steam during the late nineteenth century can be analysed either in Schumpeterian terms or as a process of gradual technological diffusion. In the latter case, the rate of change is governed by the changing costs of the two competing technologies, and by fluctuations around the long-term trend in the respective cost functions due to external shocks or rapid technological breakthroughs. In the Scandinavian countries, and particularly in the Norwegian case, the available evidence indicates that the second approach is the more fruitful.²⁰

In the older literature on Scandinavian shipping history, there is a tendency to explain the slow introduction of steam by reference to the alleged conservatism of shipowners. Norwegian shipowners in particular were accused of being backward, failing to notice that the era of white sails was rapidly ending. Many contemporaries, both shipowners and outside observers, pointed to the developments in the British merchant fleet, and advised their compatriots to follow the example of their British competitors if they wanted to survive. A leading Bergen shipowner voiced a common opinion when he accused the southern Norwegian shipowners of having invested their money in "heavy wooden boxes" that would cause their ruin.²¹ As it happened he was proved correct, but this did not mean that the investments were irrational at the time. The shipowners of southern Norway had been in the forefront of Norwegian shipping in the 1860s and early 1870s, taking advantage of new market opportunities by improving their organizational efficiency and introducing faster clipper-type ships as the transoceanic trades became increasingly important. Up to the mid-1870s, it was perfectly rational for the Norwegian shipping industry to concentrate on the trades where their cheap and efficient sailing ships gave them a comparative advantage. It was precisely this specialization that made possible the unprecedented growth in Norwegian shipping and secured Norway's position as the third largest shipping nation in the world at the end of the 1870s.²²

Another explanation of the slow shift to steam much favoured in the literature has been its high cost relative to sail, combined with the alleged difficulty of financing due to the underdeveloped state of the Norwegian capital market. There may indeed be some truth in this explanation in certain instances, but as a general explanation it has limited validity. The spectacular growth in Norwegian tonnage up to the end of the 1870s was accomplished without serious difficulties in terms of

finance, and in the 1870s the capital market in the major shipping towns was fairly well developed. Drawing on the combined resources of local savings banks, emerging private commercial banks and insurance companies, but first and foremost on private capital, in an environment that offered limited scope for alternative investments, there seems little reason for Norwegian shipping entrepreneurs not to be able to raise the necessary capital if they wanted to shift to steam.²³

The so-called "scarcity of capital" certainly did not pose any problem in the town of Bergen, where thirty-six percent of the total tonnage in 1881 consisted of steam vessels. The main problem for Norwegian, and to some extent Swedish, shipping was simply that it did not appear profitable to invest in steam as long as shipowners could find profitable employment for their sailing vessels. The sailing ship industries of southern Norway and northern Sweden were extremely well integrated into the local and regional economies. Many shipowners had extensive interests in sawmilling and the timber trade, and they continued building wooden sailing vessels as long as these ships could find profitable employment. In many trades where Scandinavian sailing vessels held a predominant position, such as the Norwegian and Swedish timber trades and the transoceanic trade in bulk commodities, the sailing ship competed very successfully with steamers.²⁴

The situation was different in many respects in some of the major shipping centres, such as Bergen, Stockholm, Gothenburg, and Copenhagen. Bergen was predominant in the fish trade from Norway to European markets. This was important for the local shipping industry, and the early introduction of steamships in the Bergen fleet can be explained by the requirements of speed and regularity in the fish trade. The expertise acquired in the handling of perishable commodities could then in turn be transferred to other trades: it is thus no accident that Bergen shipowners were pioneers in the use of steamships in the Mediterranean fruit trade in the 1870s. In the 1880s, this ability was again exploited in the trade to North America in West Indian fruit; Bergen steamship owners secured a strong foothold in this trade by 1900.²⁵

As major commercial centers, these cities were well supplied with both entrepreneurs and capital. They were not only export centres but also major ports for import. In addition, their expanding engineering industries gradually laid the foundations for a viable steamship-building industry that could supply ships for coastal steamship services and gradually steamers of intermediate size for the European tramp trade.

In spite of these positive developments, the slow shift from sail to steam in all three countries, at least outside the few major commercial cities, is very apparent. In the major shipping region of southern Norway, the depression of the early 1880s meant that by the end of the decade, capital had indeed become a serious problem. The wooden shipbuilding industry collapsed after 1880, and a series of local financial crises discouraged investment in shipping. In this situation, the partnership, with its need for consensus, proved to be an obstacle to rapid changes in investment strategy and hence to renewed growth in the shipping industry.

Nevertheless, the decline of the older shipping regions should not be allowed

to obscure the fact that the rate of investment in shipping continued at a fairly high level after the late 1880s. This was mainly due to a substantial increase in steamship investment after 1890, since after a temporary boom around 1890, the investment in sailing vessels was substantially below the level necessary to maintain existing tonnage.²⁶

The most recent contribution to the debate on the shift from sail to steam in the Norwegian fleet has explained the process as the result of a rational, pragmatic and conscious strategy. But given the high level of sail tonnage in the 1870s, an analysis of the process based on the share of steam tonnage in the Norwegian fleet may be misleading. Sales, scrapping, and marine disasters had an important effect on the capital stock. A better indication of the speed of the transition may therefore be obtained by looking at gross investment patterns for the two types of vessels. Figures 5 and 6 show that the share of steam tonnage increased quite rapidly from the 1870s, although the growth was interrupted in the 1880s. From the early 1890s, however, the growth in steam tonnage was both strong and sustained.

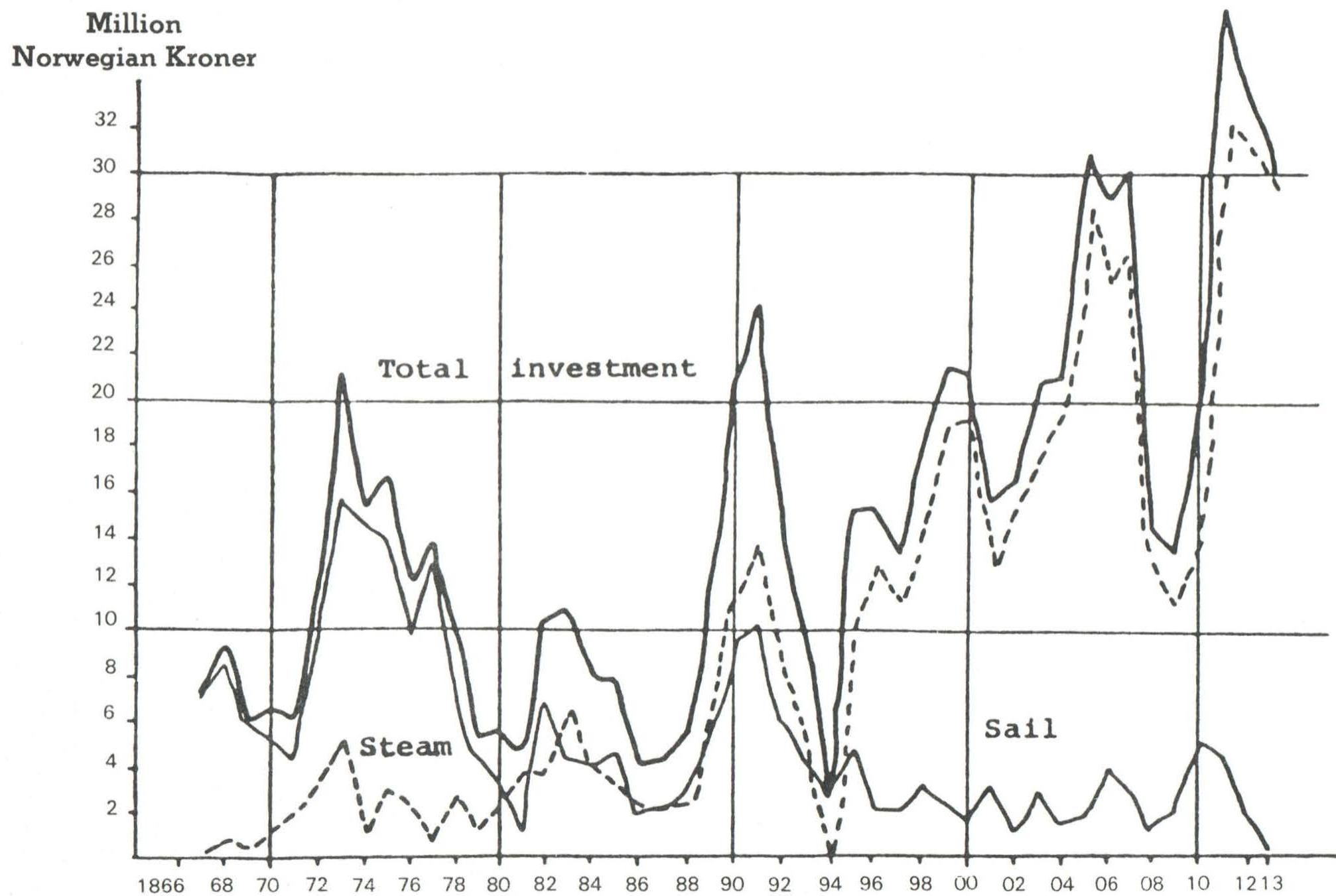
Viewed in this perspective, the alleged slowness of Norwegian shipowners in shifting from sail to steam appears less striking. The pace of the change was governed by short-run variations in the relative profitability of the two types of investment, and by the long-term increase in the efficiency of steamships. The profitability of sail continued to be higher for Norwegian owners right up to the early 1890s. This can be explained largely by the rapidly falling prices for second-hand tonnage. The short amortization period for this type of investment meant that it was perfectly sensible for many Norwegian owners to put off the shift to steamships, particularly when taking into account the rapid technical obsolescence of steam vessels before 1890.²⁷

The transition from sail to steam in Sweden offers many parallels to the developments in eastern Norway. Bulky products such as timber, and from the 1890s iron ore, dominated the export trade with Great Britain and Western Europe. The Norrland sailing fleet reached its maximum in the 1880s, but the growth of steam tonnage in the major shipping ports of Gothenburg and Stockholm was slow in the 1870s and 1880s. The rapid growth in the iron ore trade accelerated the concentration of ownership in Stockholm and Gothenburg. The Gothenburg companies of Axel Brostrom seized the opportunities offered by the rapidly expanding iron ore trade from Northern Sweden and the ice-free port of Narvik, and built up a fleet of large, modern steamships. In 1914, the largest company in the Brostrom-controlled group, the Tirfing Steamship Company, controlled a fleet of twenty vessels totalling 113,780 tons. The expansion in the Swedish steam fleet, like the Norwegian, was based to a considerable extent on the purchase of second-hand British tonnage. In 1899, the absolute steam tonnage surpassed that of sail.²⁸

The Danish shipping industry, on the other hand, exhibited two striking differences compared to the other Scandinavian countries. The rate of renewal for steamships was considerably higher than in Sweden and Norway up to the 1890s, and in this period Danish shipyards built about half the tonnage acquired. From

FIGURE 5

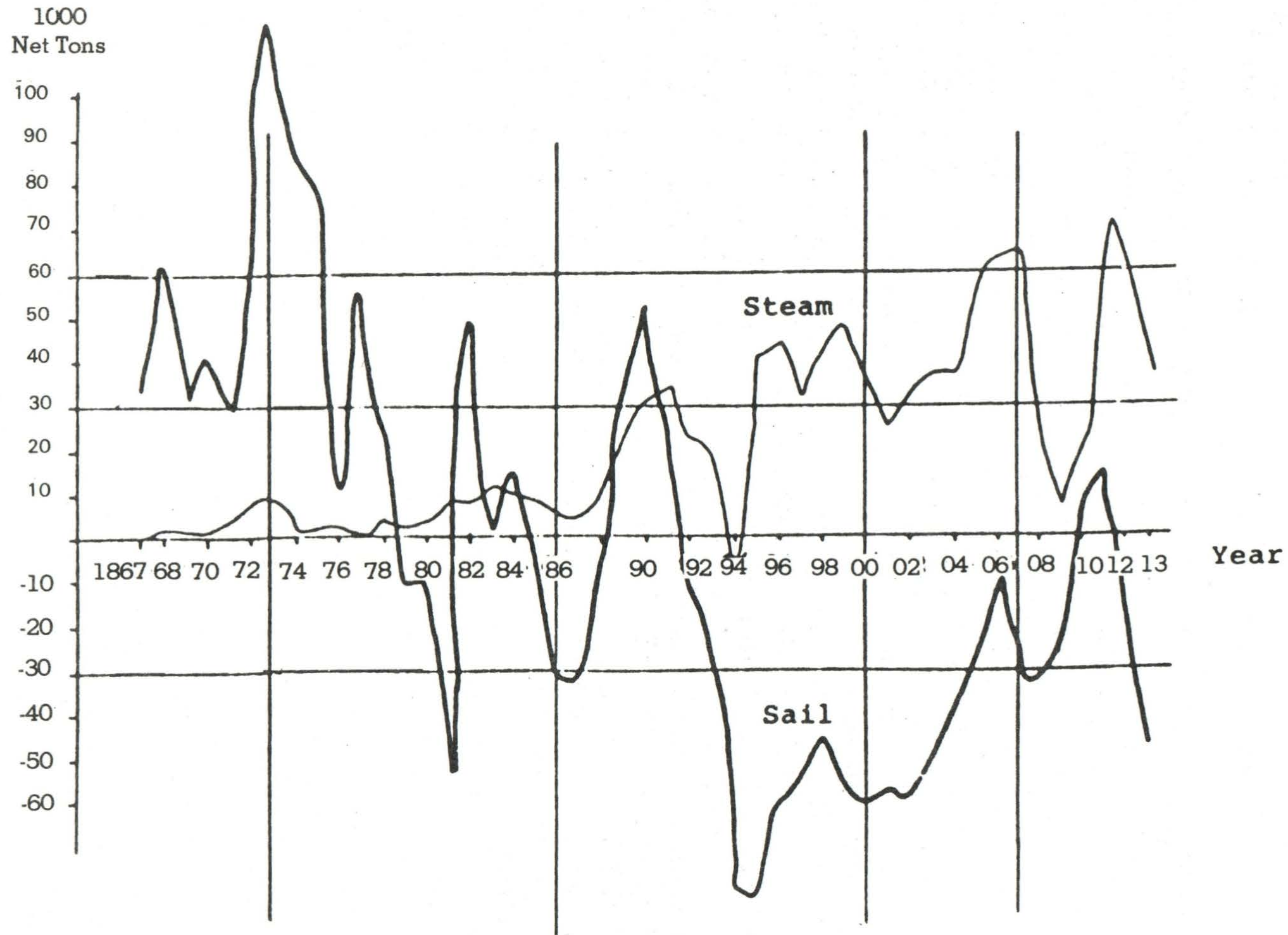
GROSS INVESTMENT IN NORWEGIAN SHIPPING 1867-1913
(CURRENT PRICES)



Source: O. Gjolberg, "Okonomi teknologiog historie: Analyser av skipsfart og okonomi, 1866-1913" (Unpublished Ph.D. thesis, Norwegian School of Economics and Business Administration, 1979), 186.

FIGURE 6

ANNUAL NET TONNAGE GROWTH OF THE NORWEGIAN
MERCHANT MARINE, 1867-1913



Source: Sjolberg "Okonomi, teknologi og historie," 194.

the 1890s, the Danish share of the market fell substantially, and the renewal of the steamship fleet after the turn of the century was accomplished chiefly by selling off older, relatively large Danish-built ships, and importing new, still larger vessels. This was supplemented by importing smaller second-hand ships and by continuing to build some large steamships at Danish shipyards.²⁹

VI. TRADE ROUTES AND PROFITABILITY IN SCANDINAVIAN SHIPPING

In the era of sail up to 1880 the merchant marines of the Scandinavian countries gradually expanded their employment from intra-Scandinavian and local trades to an increasing dependence on carrying freights between other foreign countries. The intra-Scandinavian trades remained important for all three national fleets and provided them with a platform from which they could expand into international shipping. Norway and Sweden were large exporters of bulky commodities which required substantial tonnage. Thus, the Swedish and Norwegian timber trades, both of which expanded rapidly after 1850, were important sources of employment for both fleets. In fact, Norwegian tonnage accounted for 43.5 percent of all tonnage cleared from Swedish ports in 1864, and the tonnage of Norwegian vessels cleared with cargoes from Sweden was larger than that of Swedish vessels in all years from 1861 to 1872.

The Russian and Finnish ports in the Baltic were also important for Norwegians. From under 100,000 tons cleared with cargo per year in the quinquennium 1861-65, Norwegian shipping in the region rose to 412,000 tons in 1876-80. Even more important was the United Kingdom. From around 443,000 tons per year in 1861-65, Norwegian shipping to the U.K. increased to 2,200,000 tons per year by 1876-80. The outward trade also increased. From the United Kingdom, Norwegian tonnage with cargo increased from a yearly average figure of around 200,000 tons in 1861-65 to 530,000 tons in 1876-1880. A substantial increase also occurred in the French and Dutch trades, with 440,000 Norwegian tons entering French ports in 1876-80 and 288,000 tons in Holland and Belgium.

The most spectacular increase, however, took place in the trade to the United States. Taking the ingoing and outgoing Norwegian tonnage together, 1,400,000 tons of Norwegian shipping with cargoes took part in the U.S. trade in 1880. The doubling of the general navigation of the United States in the period 1871-1880, due chiefly to a substantial expansion in lumber, grain and petroleum exports, provided a strong demand for Norwegian sailing ships that were gradually being displaced from European trades. Norwegian sailing vessels were particularly well suited to this trade in bulk cargoes, and were able to secure a growing share of the expanding market.

The Swedish and Danish fleets relied more heavily on the purely European trades. Both Danish and Swedish tonnage played more minor roles in the crosstrades, although Danish shipping managed to gain a foothold in the Asian trades in the 1880s. Generally speaking, the Danish and Swedish fleets were principally employed on short European coastal voyages, while Norwegian vessels were more extensively employed in transoceanic trade.³⁰

The period from 1880 to 1914 was a period in which the traditional bulk cargo trades gradually lost some of their former importance for Scandinavian, and particularly Norwegian, shipping. Norwegian shipping continued to depend on the carrying trade for income, and tramp shipping was dominant, although some liner services were introduced after 1900. The developments in Danish and Swedish shipping confirmed that the Scandinavian fleets increasingly became more similar in their employment, as a steadily diminishing share of freight income now came from trade between Denmark/Sweden and foreign countries. This was linked with the establishment of modern liner companies, a significant development in both countries after 1900.³¹

Although Norwegian vessels, in common with other tramps, handled every conceivable cargo, it is possible to speak of trades that were of special importance to Norwegian shipowners, or where Norwegian shipping had a significant share of the market. The timber trade had been a Norwegian speciality during the age of sail, and approximately fifty percent of total freight earnings at the end of the 1870s were earned in this trade. In the 1880s other trades gradually gained in importance as the growth in timber exports stagnated, and steamships from non-Scandinavian countries started to compete effectively in this trade. In the mid-1890s, as Norwegian steam tonnage started to grow more rapidly, the Norwegians again captured an increasing share of the Baltic and White Sea timber trade to Britain. However, the trade continued to be seasonal, due to the freezing of ports. The return cargoes were mainly coal and coke. One of the expanding trades for Norwegian ships in the 1880s was the West Indian and Central American fruit trade. High speed, specially-built and well-ventilated steamships, built first in Britain and later on by Norwegian yards, were employed in this trade in increasing numbers during the 1890s. Another important trade along the American Atlantic seaboard was the Cuban sugar trade.³²

Swedish shipping companies rapidly established a predominant position in the growing iron ore trade from Northern Swedish ports to Europe. From 1902, when the Ofoten railway from Northern Sweden to the Norwegian ice-free port of Narvik opened for traffic, the iron-ore trade really came into its own. The expanding trade both from Narvik and from the Norwegian port of Kirkenese also proved profitable for Norwegian companies. Scandinavian carriers also found steady employment in iron trades from North Africa, Spain and Newfoundland to British, German and North American ports.³³

The Scandinavian shipping companies were latecomers to the expanding oil trade, despite Norwegian prominence in the 1870s, when oil was transported in barrels and wooden tanks from the United States to Europe. The first Norwegian steam tanker was not deployed until 1907; by 1914, the Norwegian tanker fleet consisted of eleven vessels, amounting to only three percent of total world tanker tonnage.³⁴

Another area of expansion for Norwegian vessel owners was the coastal traffic of East Asia and especially of China. Although dominated by the British, Norwegians found openings after 1890. Norwegian ships continued to operate in this trade right up to 1914, mostly on time-charter to British companies.³⁵

The establishment of trans-oceanic liner companies came late in all the Scandinavian fleets, particularly in the Norwegian merchant marine. The first Norwegian venture was the Mexico-Gulf Line in 1908. This was followed by the Norwegian-American Line, which commenced in 1913. The same year also saw the establishment of the Norwegian South American Line. The Danes and Swedes were somewhat quicker off the mark, establishing many lines after the turn of the century. Companies were established to trade both with South America, where the Rederiaktiebolaget Nordstjernen led by Axel Johnson by 1911 had six large steamers engaged in liner service to Brazil and the Argentine, and with East Asia. The Swedish East Asia company, led by Dan Brostrom was financed by the Wallenberg banking group, and started its operations in 1907. Gothenburg became the centre for Swedish liner operations, with the Rederiaktiebolaget Transatlantic operating liner services to North America, South Africa and Australia. In Denmark the founding of the Ostasiatisk Kompagni in 1897 meant that a regular shipping route was established between Copenhagen and the Far East. This company soon founded a series of subsidiaries that ran lines to the Far East originating from Russia and France; it also operated services from Copenhagen to South Africa.³⁶ Although Scandinavian liner companies established before the First World War were important, particularly in contrast to the previous exclusive reliance on tramp shipping, the truly important expansion in overseas liner traffic came in the inter-war period.

How profitable was Scandinavian shipping? This question can be answered only in fairly general terms for most of the period under review. There are unfortunately very few studies that have tried to look directly at changing levels of profitability. Although there are several studies of local shipping industries or individual shipowners that give useful information on the profitability of shipping investments, no studies of the national fleets have tried to measure this over time.

The most common definition of profitability is the rate of return on capital invested for a given time period. To calculate this we should ideally have profit and loss statements for a representative sample of Scandinavian shipping companies over the entire period 1850-1914, as well as an estimate of the capital stock for the sample for the same period. In the absence of such information we have to fall back on scattered evidence and indirect approaches to gain an idea of the level and development of profits.

The rapid growth of the Scandinavian fleets in general, and the Norwegian fleet in particular, during the golden age of sail is of course evidence of fairly high profit levels. Without reasonable profits in comparison with alternative investment opportunities, it is impossible to explain the high sustained rate of investment in Scandinavian shipping in this period. Several studies of the shipping industries of the leading Norwegian shipping towns confirm the generally high rate of return earned in shipping during the age of sail. A study of the Stavanger shipping industry during the mid-1870s, based on a large sample of the total tonnage registered in 1875 (282 vessels and eighty percent of total tonnage) found that the rates of return on capital invested varied between 11.5

and 22.8 percent depending on the type of vessel. The average rate of return for the whole sample was 18.1 percent.³⁷

The profit and loss statements of a sample of Norwegian companies operating sailing vessels in the period 1867-1869 were examined by A.N. Kiaer in an investigation carried out in 1871. He concluded that the net profits in the Norwegian industry in this period averaged 16.2 percent of gross freight earnings in a sample of 159 ships. Unfortunately Kiaer did not estimate the return on capital invested in this sample, but a comparison of the return per net ton of shipping in Kiaer's sample and that of the Stavanger fleet in 1875, indicates that the rate of return on capital must have been around ten percent. This compares very favourably with the rate of return obtainable on financial assets such as bank deposits.³⁸

Investments in shipping became generally less profitable in the 1880s and early 1890s. During these years Scandinavian shipowners gradually lost their shares in many markets, and the rate of net investment decreased. But from the end of the 1890s the rate of investment increased markedly, and there is strong evidence of increasing profitability in the period up to the First World War. As we have seen, Scandinavian shipowners increased their market shares in this period, and there was a tendency to invest in fairly modern steamship tonnage, although many owners continued to find profitable investment opportunities in sailing vessels bought at rapidly falling prices. Two recent studies of the Bergen shipping industry in this period confirm that the rates of return on capital invested in shipping were substantially higher than those obtainable by investing in financial assets or in other industries.³⁹

VII. CONCLUSION

The Scandinavian shipping industry managed with considerable success to keep up with developments in the world shipping industry in the period 1850-1914. During the golden age of sail up to the end of the 1870s, Norwegian tonnage growth was substantially greater than either Swedish or Danish, both of which broadly kept pace with the growth of world tonnage. In the period up to 1880, Norwegian owners, through their sustained investments in sailing tonnage, secured a place for Norway among the major shipping nations. For a nation of less than two million inhabitants this must be considered a major achievement. The shift from sail to steam in world shipping, which gathered pace in the 1870s, meant that the Scandinavian position diminished in the 1880s and 1890s. All Scandinavian countries did, however, manage the transition to steam successfully before 1914. Economic factors determined the reaction of the Scandinavian shipping industry to the new technology. Denmark adjusted most easily, while the rapid increase of sailing tonnage in the 1870s in both Sweden and Norway slowed down the process in these countries.

The export and import trades of all three nations provided the platform upon which each based the expansion of their shipping industries. But in Norway, and to a lesser extent in Sweden and Denmark, the shipping industry rapidly outgrew the limitations imposed by their export sectors after 1860. Scandinavian vessels

entered the crosstrades and became carriers of the products transported by the international shipping industry.

The tramp trades provided the bulk of shipping earnings in all three countries before 1914. After 1900, liner shipping grew in importance, and in the years immediately before the First World War there was a definite attempt to break into the expanding liner trade, as well as a tentative move into tankers. By the outbreak of the First World War, Scandinavian shipping companies had secured and consolidated a position of importance in the world shipping industry.

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7. THE SHIPPING INDUSTRY
IN GERMANY, 1850-1914

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A problem in dealing with the German shipping industry in the period 1850-1914 is a definition of what is to be considered German.¹ For the purposes of this paper the Germany within the frontiers of 1871 to 1918 is used for the entire period. This Germany includes the duchy of Schleswig belonging to Greater Denmark up to 1864 and omits Trieste, the former main port of the Habsburg Empire, belonging to the German Federation up to 1866. The population of this Germany increased from about thirty-five million in 1850 to about sixty-five million in 1914; even though six million had emigrated to the United States and several hundred thousands to Canada, Brazil, Chile and Australia.² As of 1850, in most of Germany there was enough bread and meat to support these thirty-five million. Over and above this, several provinces of Prussia as well as Mecklenburg and Schleswig-Holstein exported agrarian products such as corn and cattle. Indeed in 1837-1839 corn had become the second largest German export.³ By 1914 however, the agricultural production in Germany was no longer sufficient to nourish sixty-five million. Wheat, rice, corned beef, frozen meat and oilfruits had to be imported and to be paid for. This was accomplished through a general increase in trade.

From 1850 to 1900 the countries on both sides of the North Atlantic succeeded in increasing their trade five-fold. In the case of Germany the increase was from two to ten billion marks.⁴ This was made possible through greatly expanded exports of manufactured goods, in part made up of woolen and cotton goods, but more particularly of iron wares, machines, electrical equipment, and chemical products. Germany was obviously industrializing in this period. For example, German annual production of black coal went from 34 M. tons in the period 1871/75 to 109 M. tons in 1900.⁵ As shown in Table 1, other indicators of industrialization were similar and impressive in comparison.

TABLE 1
SOME STATISTIC ON GERMAN INDUSTRIALISM

Steel	Production		(Mio.t.) ⁶
	1880	1900	
Great Britain	1.3	4.9	
United States	1.3	10.7	
Germany	0.6	6.6	
Railway Lines (km.) ⁷	1840	1870	1900
France	420	17,500	42,400
Germany	470	18,500	51,000

One phenomenon of industrialization was specialization, which led to more foreign trade between the countries within Europe and on both sides of the North Atlantic. Another phenomenon was the increased demand for raw materials and foodstuffs from overseas, paid for with industrial goods. Both phenomena resulted in a huge expansion of shipping.

In the case of Germany the union of Prussia and twenty-four small and middle states into the Reich in 1871 might have had an additional effect on shipping. Henceforth the German ships sailed under the new common black-white-red flag made up of the Prussian black-white and the Hanseatic white-red. The new flag strengthened self confidence.

In any event, a German merchant fleet developed with certain characteristics of size and structure in the period of 1850 to 1914. In 1850, fifty-eight percent of the total was registered in Baltic ports. One third of this Baltic registered fleet was from the East coast ports in Schleswig, Holstein, Lubeck, and Macklenburg; the other two-thirds were from ports in Prussia. These Baltic registered ships primarily traded to other Baltic ports and to Western Europe as seen in Table 2.

TABLE 2
PRUSSIAN SHIP DESTINATIONS — 1845

Destinations	Number of Ships
Russian and Scandinavian ports	125
The Netherlands and Belgium	159
Great Britain	1,381
France	115
Spain, Portugal and the Mediterranean	83
North America	16
India	1

These Baltic ships transported corn and wood to the West and, homebound, carried coal or went in ballast. They were wooden sailing vessels without copper — or Muntz-metal — plates on the hull and thus unfit for the tropics. Their owners had no experience in the overseas trade and could not compete with their colleagues in Bremen and Hamburg.

Figure number one shows the rise and decline of German shipping, registered in the Baltic ports. Figure two refers to the whole German fleet.

The major overseas trade was thus carried out in ships from Bremen and Hamburg. Between 1840 and 1870 Bremen, and even to a greater degree Hamburg, developed into the main centers of foreign trade and overseas shipping in Germany. One reason was geographic: their location near the North Sea and at the mouths of the rivers Weser and Elbe, the latter one with a hinterland with growing industries in Saxony, Bohemia and Silesia.

One of the more important trades for ships from these ports was the transportation of emigrants to North America (See Table 3). These ships on their return voyages carried cotton, tobacco, and rice to Europe.

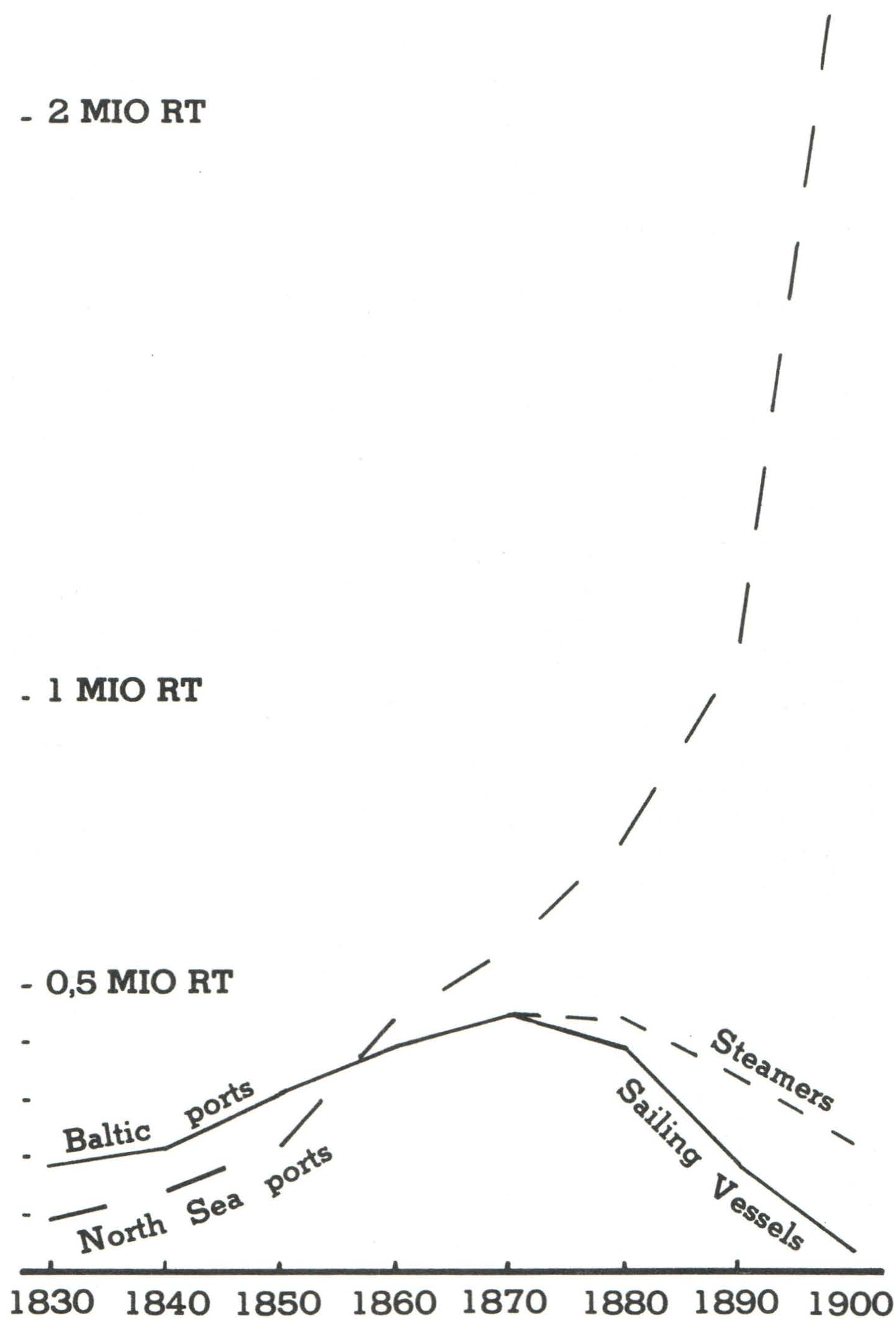
TABLE 3
GERMAN EMIGRATION (Thousands)⁹

	1851/55	1856/60	1861/65 via Bremen	1866/70
to U.S.A.	256	158	306	203
to Brit. North America	4	1	1	7
to Brazil	—	1	—	—
to Australia	—	2	—	—

TABLE 3 (continued)

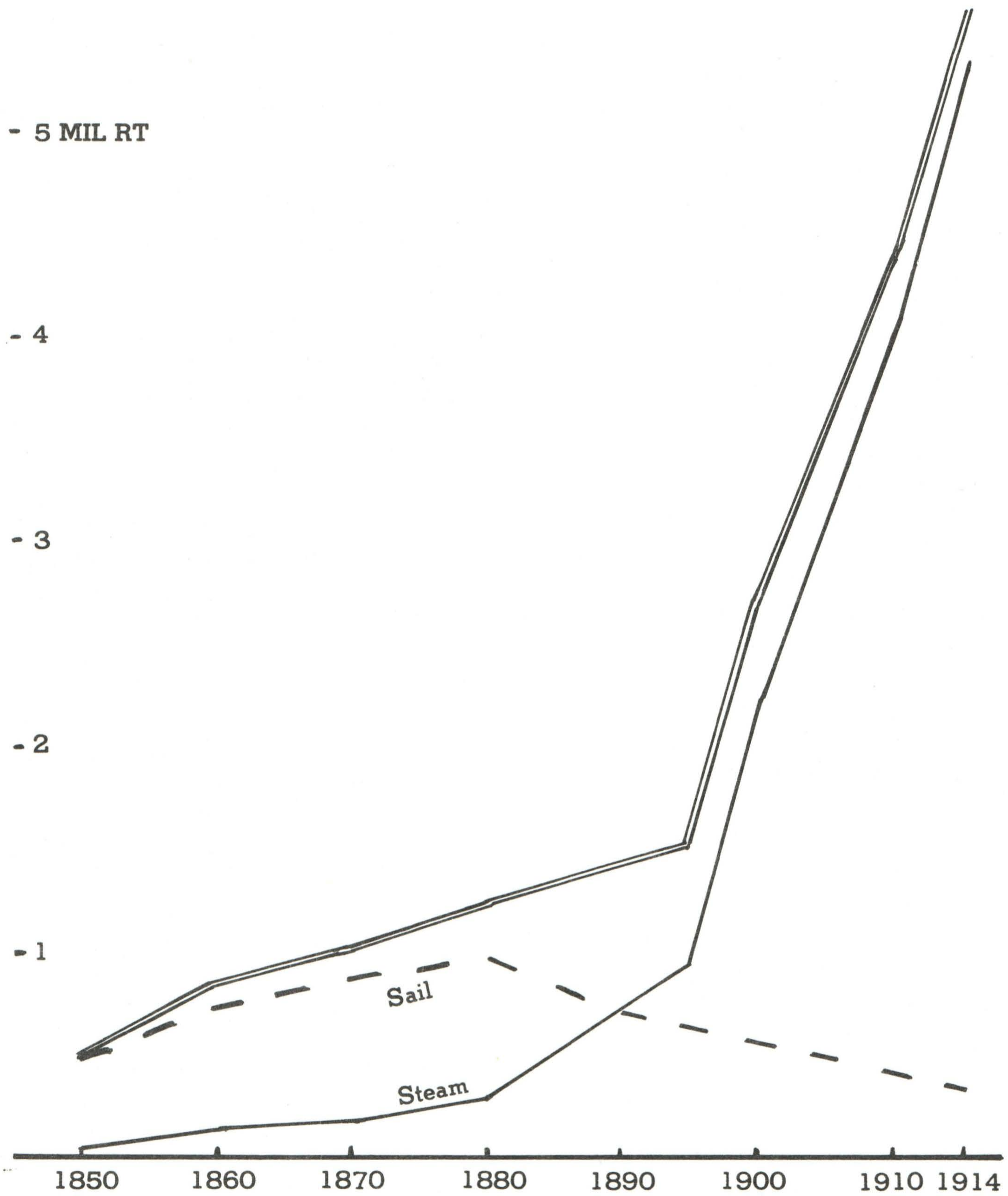
			via Hamburg	
to U.S.A.	66	69	88	168
to Brit. North America	12	10	10	8
to Brazil	8	9	4	9
to Australia	11	5	8	2

FIGURE 1
GERMAN FLEET — BALTIC AND NORTH SEA PORTS



Source: Bodo Hans Moltmann, *Geschichte der deutschen handelsseehifffahrt* (Hamburg, 1981), 135-136, 140, 144 and 164.

FIGURE 2
GERMAN FLEET — SAIL AND STEAM



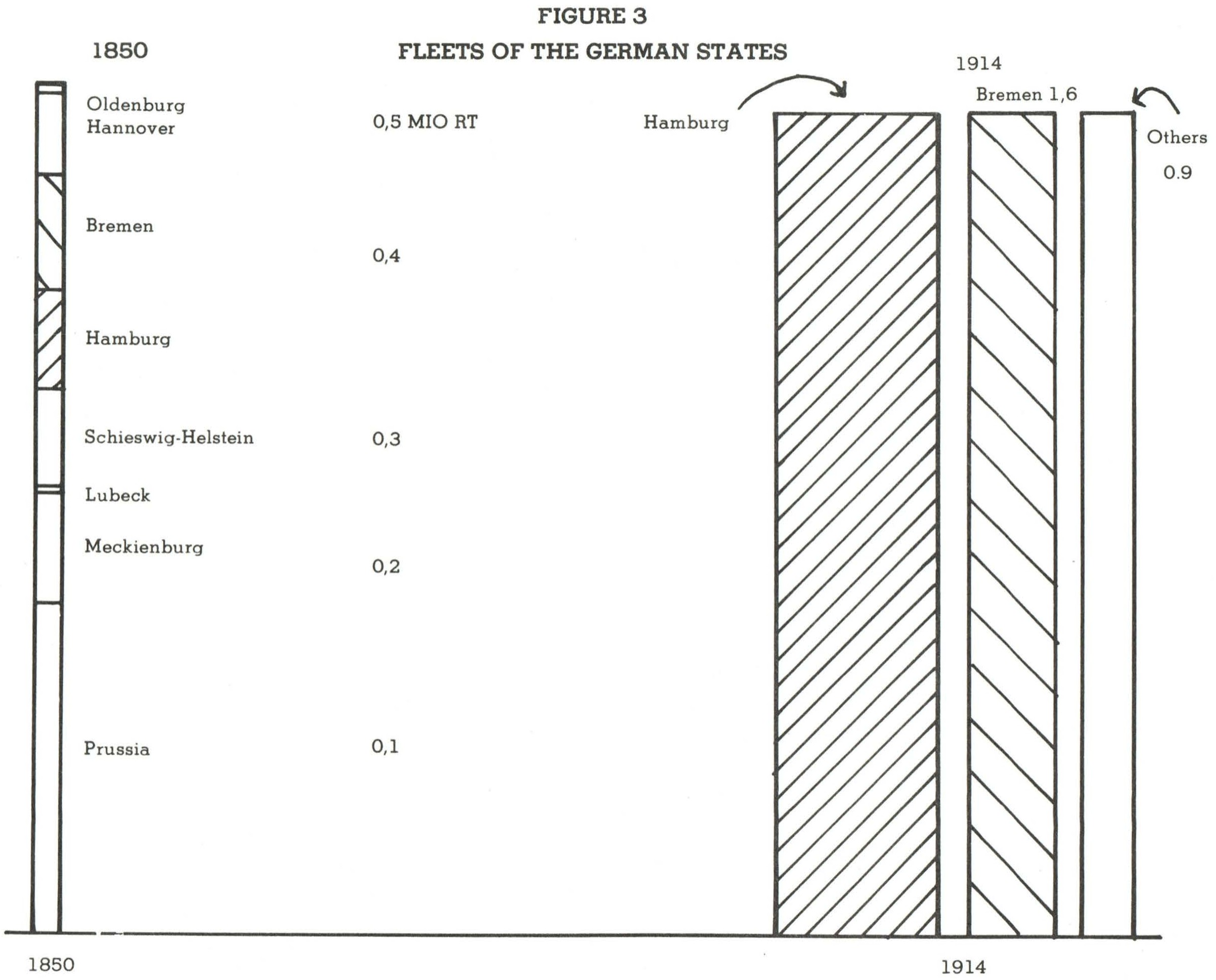
Source: See Figure 1.

The first Hamburg steamer in the New York trade, the HELENA SLOMAN, came into service in 1850. The first steamers of the Hapag, HAMMONIA and BORUSSIA, followed in 1856. And in 1857 the Norddeutsche Lloyd was established in Bremen. Hamburg shipping to oversea countries began during the American War of Independence and had its first boom in 1796-1803. After 1814 the main partners were the Caribbean islands and Brazil. From 1824 to 1849 Hamburg sailing vessels made 800 passages to Brazil.¹⁰ In 1856 the first Hamburg steamship line to Brazil was established. Already in the forties Hamburg owners had begun to import copper ore from Chile and Australia. After the crisis of 1857 Hamburg ships found new occupations, for instance in the Far East. During the American Civil War they succeeded in gaining a certain share of that market as well as the second place in the traffic of Hong Kong. One hundred and twenty-four Hamburg ships arrived in Hong Kong in 1862, many of which were engaged in the Chinese coastal trade. By 1864 the number of these Hamburg ships arriving in Hong Kong had reached 315.¹¹

Another aspect of German trade had developed from the merchant's tradition and experience in the trade with colonial goods via Spain, Portugal and the Netherlands. After the destruction of Antwerp in 1570/1585 thousands of Sephardic Jews, Flemish Protestants and English Merchant Adventurers settled in Hamburg. The population increased from 20,000 in 1550 to 40,000 in 1600.¹² These new inhabitants promoted trade, especially to the Iberian Peninsula. Two hundred years later, after the wars of independence in Latin America, the merchants no longer bought colonial goods in Cadiz, Lisbon or Amsterdam. They sent their ships directly to Vera Cruz, Laguayra, Bahia, Rio and Batavia (Djakarta) — and after the end of the British Navigation Acts in 1847/50 to Singapore, Hong Kong, Adelaide, Melbourne and Sydney.¹³

As indicated earlier, the bulk of this overseas trade was carried in ships registered in Bremen and Hamburg. Figure three shows the fleets of the German states; Prussia, Mecklenburg, Lubeck, Schleswig-Holstein, Hamburg, Bremen, Hanover and Oldenburg, in 1850; and of Germany in 1914. By that year, fifty-seven percent of the German fleet were registered in Hamburg.

Apart from the Norddeutsche Lloyd and the D.D.G. Hansa (German Steamship Company Hansa) in Bremen, all other big German shipping companies of 1914 resided in Hamburg. The Hapag (Hamburg-Amerikanische Packetfahrt-Actiengesellschaft) had taken possession of several smaller companies and had steamship lines all over the world. The Deutsch-Austral (A.G. Deutsch-Australische Dampfschiffs-Gesellschaft) had lines to Australia and the Dutch East Indies, both from Hamburg and from New York. The field of the Hamburg-Sud (A.G. Hamburg-Sudamerikanische Dampfschiffahrts-Gesellschaft) was Brazil and the La Plata, with daughter companies in the coastal trade in these countries; and for a time a line from Trieste to South America. Woermann's lines (Woermann-Linie A.G.) and the A.G. Deutsche Ost-afrika-Linie served the trade in Western and Eastern Africa. Ferdinand Laeisz's fourmasted barques, the modern "Flying P-Liners", were in the nitrate trade from Chile to Hamburg. Also Knohr and Burchard Nfl. and the Rhederei-A.G. von 1896 (including the former ships of



Source: Moltmann, Handelsschiffahrt, 135-136, 163 and 164.

Wencke) had modern ships, most of them built in Great Britain: they sailed to Chile, but also to Australia, Santa Rosalia/Mexico and Puget Sound. The older wooden sailing vessels had been sold abroad before 1914 — many of them to Scandinavia.¹⁴

Turning from these general considerations of the size and structure of the German fleet to the trades and transition from sail to steam, the example of the vessels of Hamburg will be used. Hamburg is used as an example for three reasons. First, the pertinent records for Bremen have been destroyed; second, the records of Eastern Germany are not accessible, and third is the fact that Hamburg with fifty-seven percent of the German fleet in 1914 was preeminent.¹⁵

First let us take a look at the development of the German foreign trade as a whole and at the most important partners in Germany's foreign trade in 1898-1900.¹⁶ On an average, there were more imports than exports and more foreign trade to European countries than to overseas. (See Figure Four). Overseas trade, however, was increasing more rapidly. In 1913 the trade to overseas countries through the port of Hamburg amounted to sixty-one percent of all Hamburg maritime trade.¹⁷

Concerning the more particular trading partners, Hamburg's trade with Hull employed very few Hamburg sailing vessels, because after 1830, the paddlesteamers of Joseph Gee of Hull dominated the market. In 1841 and 1846, respectively, the Hanseatische Dampfschiffahrts-Gesellschaft and the Elbe-Humber Dampfschiffahrt Gesellschaft of Hamburg began their activities. They transported railway equipment to Germany and emigrants to Hull, for further transport to Liverpool.¹⁸

In the London trade two steamers of the British General Steam navigation Company were in service after 1826 since Hamburg sailing vessels could not compete because of the British Navigation Acts. In 1848, Sloman's London line was established.¹⁹

Among the colliers of the late 1950s and the 1960s were small Hamburg sailing vessels and several big ones which were very old. In 1856-1871 two steamers of the Gas-Compagnie of Hamburg carried coal to the Elbe. In 1866 O.L. Eichmann of Hamburg began to send steam colliers to Newcastle-upon-Tyne and to Sunderland.²⁰

The New York trade was the most important one in 1850 as well as in 1914. In 1857 Sloman's sailing vessels made twenty-one passages to New York; the Hapag's sailing vessels made another fifteen passages, while the Hapag steamers HAMMONIA and BORUSSIA made five passages each. In 1890 a big and fast passenger liner of Hapag left Hamburg for New York every Thursday, an ordinary steamer every Saturday and a cargo vessel twice a month.²¹

In the Caribbean trade steamers replaced sailing vessels within ten years: in 1871 the Hapag opened its main line to St. Thomas-Venezuela-Colon. In 1873 the intercolonial line followed with several small steamers; and in 1879-1881 further lines to Cuba, Mexico, Haiti and so on, were established. This was the end of regular sailship trade in this region.²²

In 1869, the Hamburg-Brasilian'sche Dampfschiffahrts-Gesellschaft was

FIGURE 4
GERMAN IMPORTS AND EXPORTS



Source: *Statistisches Jahrbuch für das Deutsche Reich*, 1939/40, 266.

established and in 1871 it was transformed into the Hamburg-Sud. Henceforth the sailing vessels were confined to small ports without steamer traffic, i.e. in Northern Brazil and to Porto Alegre because of the sand bar.²³

In the West coast of South America trade, the Aktiengesellschaft Deutsche Dampfschiffahrts-Gesellschaft Kosmos, which was established in 1872, did not totally replace sailing vessels before 1914. After the Nitrate War 1879-1884 the first nitrate boom led to the rise of Ferdinand Laeisz's fleet of "P-Liners." In 1884 twelve Laeisz vessels sailed from Chile to Hamburg. In 1887 the first steel vessel, the PROMPT, came into service. In 1891 the first fourmasted barque, the PLACILLA, 2780 NRT, and in 1895 the fivemasted barque POTOSI, 3854 NRT, followed. Modern technology enabled sailing vessels to defend their position in this long distance bulk trade.²⁴

In the West Africa trade, Woermann ordered his first steamer in 1879. In 1885 the Woermann line was transformed into a joint stock company (Aktiengesellschaft) with five steamers.²⁵

In the Middle and Far East Trade the Kingsin Line of Hamburg entered the business in 1872. Up to the early 1880s it made five to ten round trips a year to Penang-Singapore-Hong Kong-Shanghai. More steamers of this line and other steamers of new Hamburg steamship companies in the Chinese coastal trade replaced the sailing vessels in due course.²⁶

Before 1850 most Hamburg sailing vessels sailed from and to Hamburg. In the following decades, however, the majority of sailships went into the tramp trade. In the economic boom of 1871-1873 many old ships were sold abroad and, about 1880, replaced by bigger iron vessels.²⁷

In attempting a generalization about the transition from sail to steam it might be possible from the Hamburg point of view, to formulate this rule: First, in the nineteenth century as soon as a trade had become so extensive that twenty or thirty sailing vessels were permanently occupied in it, then three to five steamers would prove to be more profitable. The promoters of new steamship companies would usually find investors during a boom. Second, the transition to steam, however, depended on the technical standard of boilers and engines. In the 1820s they were sufficient for coastal liners, about 1850 for the Atlantic, and from the 1870s for all seven seas. Third, the superiority of steam over sail was less for long distances until 1914, even in some cases to 1939.

In the developing German merchant fleet, certain patterns of ownership, financing, and profitability were becoming clear in the period under consideration. Up to Napoleonic times the "Partenreedereien" or perhaps "partner companies" prevailed in Hamburg and other German ports. Owners of 1/4, 1/8, 1/16 or even 1/64 interest in a ship participated in the profits as well as in the losses of the ship. A merchant who had five such ships was the manager of five partner companies. Before the age of insurance this was the method of putting the risks on many shoulders.²⁸

Initially, after 1815 people in Hamburg were too poor to raise money to invest in this manner in such ventures as pioneering voyages to unknown overseas countries. As time went on and business confidence returned however, it became

more and more the norm for the merchants of Hamburg to obtain one or two sailing vessels of their own and send them to the Caribbean, Brazil, Africa, and West Coast or to the Far East. Many of the shipmasters were men who had, in Napoleonic times, served on Hamburg vessels under the British flag or on foreign ships and had obtained world wide experience. Not all of the shipmasters were German, some were foreigners with the consequence that after 1814 in many cases a member of the family of the merchant was on board the ship as a supercargo and to study the overseas markets.

In the 1840s and 1850s hundreds of Hamburg merchants participated in this pioneering work of world-wide trade. It became something of a status symbol to have one's own ship. Such merchant shipowners were called "Kaufmannsreeder" and the majority of sailing vessels were owned in this manner.²⁹

In contrast, shipmasters who owned at least fifty percent of the value of their vessels, or "Kapitansreeder," usually had the smaller vessels which tended to be employed in the North Sea or Baltic Sea trades.

The older form of "partner companies" or "Partenreedereien" had somewhat of a revival after the mid 1860s. Often the ships involved were old ones, sold by the merchants to the shipmasters, shipchangers, and their friends and relatives who tried to maintain a way of life on the sailing vessel in spite of falling freights and the competition of steam.

Unlike the sailing ships, steamships were, from the beginning usually managed by joint-stock companies (Aktiengesellschaften) and by limited liability companies (Gesellschaften mit beschränkter Haftung). As well, the large shipping companies were joint-stock companies that obtained their capital through the issuing of stocks and from loans. This capitalization can be seen in Table 4.

TABLE 4
CAPITALIZATION OF SOME SHIPPING COMPANIES
IN 1914 (M.MARKS)³⁰

	Stocks	Loans
Hapag	180	69.5
Deutsch-Austral	20	0.8
Hamburg-Sud	25	9.502
Kosmos	14	
Woermann	20	
Deutsche Ostafrika Linie	10	
F. Laeisz	unknown	
Knorr and Burchard Nfl.	private owners	
Rhederei A.G. von 1896	2	
Norddeutscher Lloyd	125	

Concerning profitability, first of all some figures might be of some value. The freight rates shown in Table 5 for transportation of coal give some idea of the rapid decline of rates in the last quarter of the century.

TABLE 5
FREIGHT RATES FOR COAL FROM CLYDE
TO SELECTED PORTS (shillings per ton)³¹

1874	1896	
Le Shorn	17	7
Havana	12	8
La Plata	40	10

For sailing vessels the consequent rate of return by the end of the century was not enough to maintain operations and to gather funds to invest in a new ship. Steamers, however, could be profitable. The profitability might be read from dividends. Table 6 shows the dividends from one company, Hapag, for 1850 through 1910:

TABLE 6
HAPAG DIVIDENDS (Percentages)³²

1850	0	1860	6	1870	7	1880	10	1890	8	1900	10	1910	8
1851	0	1861	8	1871	12	1881	12	1891	5	1901	6	1911	9
1852	4	1862	10	1872	16	1882	9	1892	0	1902	4.5	1912	10
1853	28	1863	8	1873	12	1883	4	1893	0	1903	6	1913	10
1854	0	1864	8	1874	0	1884	0	1894	0	1904	9	1914	0
1855	10	1865	20	1875	0	1885	0	1895	5	1905	11	1915	7
1856	3	1866	20	1876	0	1886	4	1896	8	1906	10		
1857	0	1867	16	1877	0	1887	6	1897	6	1907	6		
1858	0	1868	8	1878	7	1888	8.5	1898	8	1908	0		
1859	0	1869	15	1879	6	1889	11	1899	8	1909	6		

These figures from one company are of some interest as a barometer of the cyclical development of the economy as well as of the management of the enterprise in question. More interesting are some figures from private sources showing profitability of several lines of the Hapag after depreciation of the book values of the vessels occupied in these lines. (See table 7).

TABLE 7
HAPAG-VARIOUS LINES (marks profit and percent)

NEW YORK LINE

1905	4,513,185	12 %
1906	10,446,181	21.6
1907	9,884,383	18
1908	3,550,424	6.9
1909	10,670,025	15.8
1910	13,427,977	22.5
1911	8,970,604	18.6
1912	12,699,172	27.2
1913	10,809,423	18.4

TABLE 7 (continued)

**BRAZIL AND
LA PLATA LINE**

1905	678,695	5.2%
1906	772,300	3.3
1907	1,019,776	4.8
1908	194,043	0.9
1909	1,678,277	7.2
1910	470,281	1.7
1911	3,277,019	13.9
1912	4,584,674	18.4
1913	6,723,194	27.5

FAR EAST LINE

1905	3,073,497	17.4%
1906	669,094	3
1907	63,820	loss
1908	915,340	5.2
1909	1,765,202	9.7
1910	1,445,121	7.8
1911	4,002,304	20.3
1912	2,752,850	22.2
1913	4,764,081	27.3

PERSIAN GULF LINE

1906	144,768	loss
1907	882,968	loss
1908	462,977	loss
1909	227,488	loss
1910	307,418	loss
1911	328,226	loss
1912	99,346	profit
1913	238,757	loss

Thus it would appear that for Hapag at least the steamer lines towards the end of the period were profitable.

Another aspect of the German shipping industry in the period under study that should be looked at is the extent of government subsidies to shipping and the general governmental policies affecting the industry.

Before World War I, British authors maintained that German shipping was subsidized by the German government.³³ Otherwise they argued such big ships as *IMPERATOR*, *BERENGARIA*, and *VATERLAND*; or later the *LEVIATHAN*, *BISMARCK*, and *MAJESTIC*, were not capable of being financed. They maintained that the good relations of Albert Ballin, director of the Hapag, to the German Kaiser seemed to have opened the way to the needed capital. German authors have contested these British contentions. While these questions cannot be verified through such sources as the financial records of Hapag or the German shipyards, the figures given in Table 7 above on the profits of Hapag in 1905-1913 may be part of an answer.

Certain subsidies, however, can be verified. The subsidies for postal services are well known. The North German Lloyd got such subsidies for its Far East and Australian lines. Similarly the German East Africa Line got some money. The three lines together received 8.5 million marks a year.³⁴ The requirements of the Government, however, regarding the use of fast ships to be built in German shipyards, and relative to timetables were tremendous. Thus these subsidies were no pleasure for the shipping companies. Albert Ballin hesitated to apply for them on behalf of Hapag.

Another type of subsidy came about when the German Navy afforded assistance for the building of fast passenger liners as potential auxiliary cruisers. In 1914 the CAP TRAFALGAR of the Hamburg-Sud and the KRONPRINZ WILHELM of the North German Lloyd were quickly converted for such enterprises, although during the war they had no successes worth mentioning.³⁵ With the opening of the war, however, many other German merchant steamers escaped quickly to neutral ports rather than being converted because apparently they were not built for such conversions.

To be sure, the German government promoted shipping, but in other ways. One way was to guarantee a sufficient volume of freight. An example was the German East Africa Line. This company was guaranteed the transport of all railway equipment to German East Africa as well as the officials, the soldiers and all the goods which were necessary to colonize this African country. Another example might be the construction of the Bagdad Railway in 1888 to 1914. This project was policy and business at the same time. The government aimed at gaining influence in the Near East and the Deutsche Bank was interested in profits. The Deutsche Levante-Linie which managed the transport of the railway equipment increased from ten steamers in 1898 to fifty-nine steamers in 1914. These fifty-nine steamers, however, transported more and more goods of every kind. The German-Turkish cooperation opened the way for commerce, as the imperialistic policies of other countries did in Morocco, Persia, China or Central America.

A more subtle type of government aid was at work as well. The promotion of German foreign trade in German ships would not have been possible if the peoples at home were not receptive to the adventures abroad, if they were not shipping-minded. This had been a big problem in Germany. Up until the middle of the nineteenth century industrialization was in its beginning and the majority of the Germans lived still in small inland principalities, duchies and kingdoms as farmers in their villages and as workmen and shop keepers in the picturesque framework houses of the small provincial towns, looking, if they did, to the residences of their petty sovereigns or longing for Italy or the Rhine if they were priests or professors. Naturally they received letters from their relatives and friends who had emigrated to North America. But thinking and talking about America was less a matter of ardent desire than an outlet in times of distress. Most Germans were not sea- and shipping-minded, except in the anglophile Hanseatic cities and in the coastal regions of Schleswig-Holstein and Friesland.

Then during the national and democratic revolution of 1848 the Germans

perceived with surprise that they did not have a single man of war. Two Danish ships-of-the-line and three frigates were sufficient to blockade the mouths of the rivers Elbe and Weser. The Germans, indeed, armed some paddlesteamers and purchased some vessels in Great Britain. But three years later, in 1852, they auctioned off their whole navy!

It was not until after 1867 when the North German Federation was established, and especially after 1871, when the Southern German states joined the North to form the Reich, that the new government developed a program for a small navy capable of defending the North German coasts.

Finally, after 1888 when William II had acceded to the throne he declared "Unsere Zukunft liegt auf dem Wasser!" (Our future is on the waves). But many Germans were skeptical and hesitating. Therefore the government started, about 1900, a vehement nationalist propaganda for the sea, the navy, the colonies, for Germany's "place in the sun": this time successfully. The new German "Flottenverein" (navy society) had, within ten years, more than 400,000 members rising to more than a million by 1913. As a reward, good schoolboys got books with printed copies of propaganda paintings of new battleships. Coloured prints of proud passenger liners of Hapag and Lloyd hung in many, many public houses even in small villages. More and more Germans were convinced that they and their Kaiser were on the right track.

It is not my intention to begin a discussion about the naval policy of Admiral Tirpitz. What I want to do is to demonstrate the rise of an atmosphere of maritime enthusiasm: nearly everybody in Germany wanted to promote shipping as much as possible — the governmental ministers, the civil servants. The railway companies did it by lower freights to Hamburg and Bremen, the industrial enterprises by preferring German ships for export, and even the parsimoniously calculating bankers under the pressure of the public opinion. I think this feeling towards shipping in the Germany of 1900-1914 was more significant than 8.5 million marks for postal subsidies.

NOTES

1 I wish to thank the Maritime History Group and especially its chairman Mr. Keith Matthews of Memorial University of Newfoundland for the invitation to the Sixth Annual Conference in St. John's which enables me to present some results of our German research to colleagues of Canada, Great Britain, Norway and the United States.

2 *Statistisches Jahrbuch für das Deutsche Reich*, 1939/40, 9.

3 Werner Sombart, *Lie deutsche Volkswirtschaft im Neunzehnten Jahrhundert* (Berlin, 1909), 597.

4 Sombart, *deutsche Volkswirtschaft*, 595.

5 *ibid.*, 556.

6 *ibid.*, 548.

7 *ibid.*, 541.

8 Bodo Hans Moltmann, *Geschichte der deutschen Handels-schiffahrt* (Hamburg, 1981), 131.

- 9 F.A. Brockhaus, *Conversations-Lexikon*, Zwölfte Auflage (Leipzig, 1875), II, 575.
- 10 Walter Kresse, *Die Fahrtgebiete der Hamburger Handels-flotte 1924-1888* (Hamburg, Museum für Hamburgische Geschichte, 1972), 77.
- 11 Kresse, *Fahrtgebiete*, 187.
- 12 Walter Kresse, *Von armen Seefahrern und den Schifferalten zu Hamburg* (Hamburg, Christians, 1981), 27.
- 13 Kresse, *Fahrtgebiete*, 49-105.
- 14 Walter Kresse, *Seeschiffs-Verzeichnis der Hamburger Reedereien 1824-1888* (Hamburg, Museum für Hamburgische Geschichte, 1969), 1-880.
- 15 Moltmann, *Handelsschiffahrt*, 163.
- 16 Sombart, *deutsche Volkswirtschaft*, 601-602.
- 17 *Statistisches Jahrbuch für die Freie und Hansestadt Hamburg 1928/29* (Hamburg, 1929), 130-132 and 145-147.
- 18 Kresse, *Fahrtgebiete*, 30.
- 19 *ibid.*, 27.
- 20 *ibid.*, 211.
- 21 *ibid.*, 132.
- 22 *ibid.*, 230.
- 23 *ibid.*, 234.
- 24 *ibid.*, 262.
- 25 *ibid.*, 240.
- 26 *ibid.*, 246.
- 27 *ibid.*, 199.
- 28 Walter Kresse, *Materialien zur Entwicklungsgeschichte der Hamburger Handelsflotte 1765-1823* (Hamburg, Museum für Hamburgische Geschichte, 1966), 38-39; and Walter Kresse, "Die Entwicklung der Eigentumsformen in Hamburgs Seeschiffahrt 1824-1888 in: Das historische Museum als Aufgabe — Forschungen und Berichte aus dem Museum für Hamburgische Geschichte (Hamburg, 1972), 213-245.
- 29 Kresse, *Eigentumsformen*, 238-239.
- 30 Otto Mathies, *Hamburgs Reederei 1814-1914* (Hamburg, 1924), 168-223.
- 31 Sombart, *deutsche Volkswirtschaft*, 545.
- 32 Hans Jürgen Wittholt, *HAPAG-Hamburg-Amerika Linie* (Herford, 1973), 14, 28, 46.
- 33 *ibid.*, 46.
- 34 *ibid.*, 45.
- 35 Arnold Kludas, *Die groben deutschen Passagierschiffe* (Oldenburg, 1971), 42-43, 32-83.

8. DISCUSSION FOLLOWING THE PAPERS OF NORDVIK AND KRESSE

PALMER suggested that perhaps Nordvik ascribed too much importance to internal developments in Scandinavia while downplaying the role of international conditions. For example, the Great Depression of the 1880s affected shipping markets throughout the world, and there is no reason to believe that Scandinavia should have been different.

SAFFORD agreed, pointing out that downward investments in Scandinavia coincided precisely with the onset of major depressions in the United States.

NORDVIK accepted these points, but argued that internal factors still played a major role in the determination of whether to invest in new shipping tonnage. Investment slowed in the 1880s not only because of international developments but also because of the realization by investors that the rates of return in the 1880s were going to be lower than they had been in the previous decade.

KRESSE responded that Germany, on the other hand, had different experiences. Major German liner companies were established in both the 1880s and 1890s, when economic indicators for most major nations were unfavourable.

HARLEY suggested that the 1880s marked a major transition period in world shipping. That decade marked a watershed in the expectations of many shipowners, particularly concerning steam. The opening of the Suez Canal should not be downplayed in this model, since the Canal opened many new opportunities for steamers.

CRAIG argued that the rise of both German and Scandinavian shipping was in some sense a blessing for British shipowners. The increased demand for secondhand tonnage in these markets boosted the price that British owners could expect to receive for vessels, particularly for tramp steamers.

HARLEY suggested that the Norwegians did better than the British late in the century by purchasing second-hand tonnage and by taking advantage of a lower cost structure in Norway.

NORDVIK agreed partially, but doubted whether in fact Norwegian wage costs were substantially different than British.

KRESSE pointed out that it is a mistake to see sail and steam as competitors prior to 1914. In Germany, and in Scandinavia as well, the practice was to utilize sailing vessels as tramps and steamers as liners.

NORDVIK disagreed with the generalization concerning Scandinavia. Norwegian steamers, by and large, did not go into liner trades but remained as tramps. Indeed, the Norwegians believed that the movement into liner trades presented a real danger. The Director of the Norwegian Central Bureau of Statistics argued this very forcefully in a paper presented in 1899. Despite the establishment of the Norwegian-American Line in 1910, liners did not play any major role in the pre-World War I expansion of Norwegian shipping.

HARLEY asked whether the profit figures reported for Norwegian vessels represented rates of return on capital or something else.

NORDVIK replied that it was very difficult to measure the precise rates of return on capital invested because of the part-ownership system and confusion over rates of depreciation. The profit figures reported represent essentially the surplus of gross revenues over costs.

HARLEY expressed skepticism over the high profit rates reported. Shipping, with few major barriers to entry, should not over a long period of time produce "super profits."

NORDVIK suggested that the best way to understand Norwegian profit rates was to accept that Norwegians were capturing economic rents that other nations were missing. They did this by operating extremely efficiently. But the rates of return do not appear to be out of line with the results reported by the members of the Atlantic Canada Shipping Project for Canada in similar periods, which gives some confidence in the results.

9. ASPECTS OF THE ECONOMICS
OF SHIPPING, 1850-1913*

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ASPECTS OF THE ECONOMICS OF SHIPPING, 1850-1913

C. Knick Harley

In this paper I wish to look at merchant shipping between the mid-nineteenth century and the outbreak of the First World War from the perspective of an economist whose primary interest lies in the process of change in the international economy in those years. From this vantage three principal yet related themes stand out. The first is the sharp decline in freight rates that stimulated international specialization and the expansion of trade. The second is the process of technological and organizational change, the mechanisms of their adoption and their implications in a broader economy. The third is the determinants of the location of activity and the nature of specialization among various geographic areas.

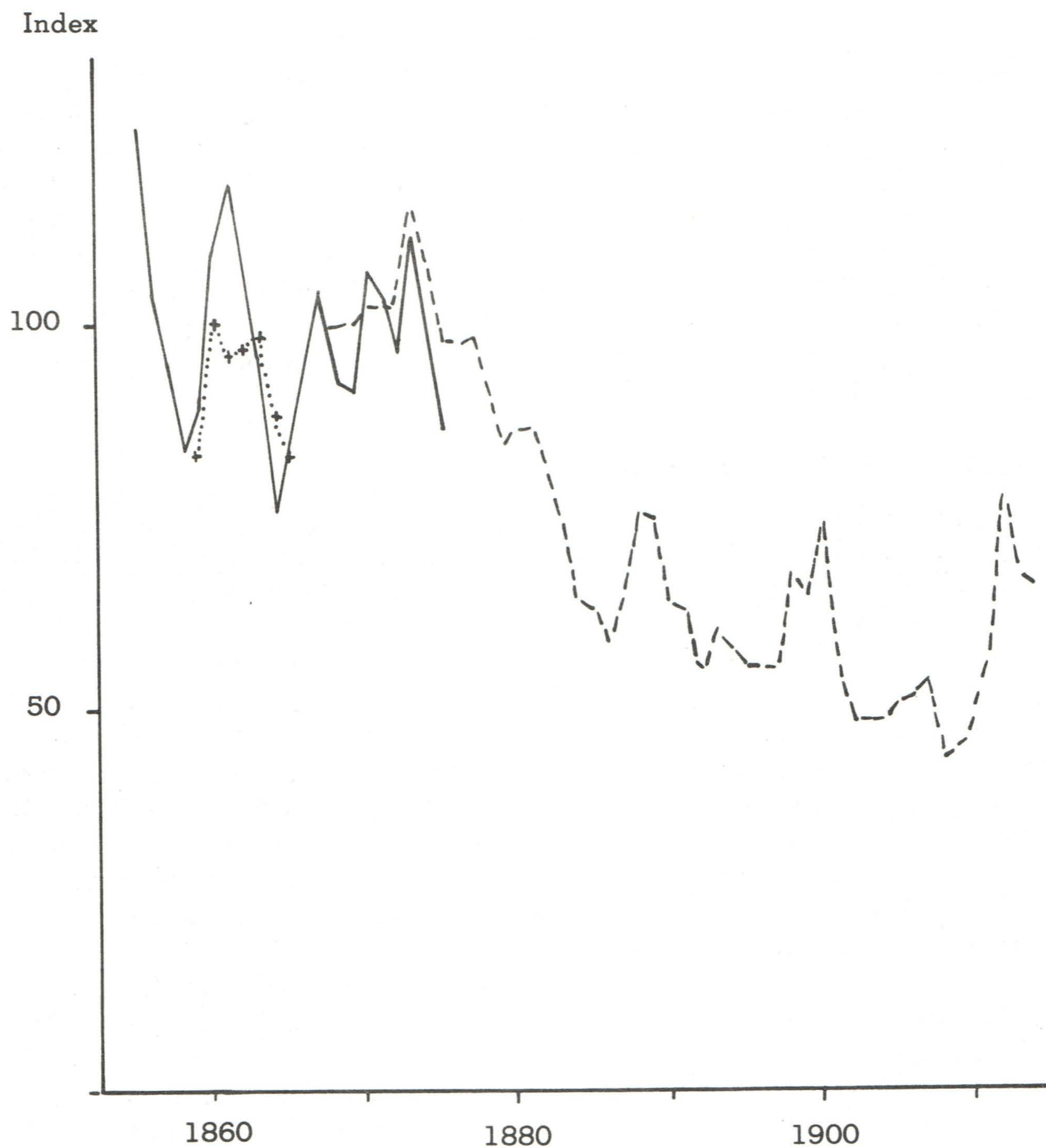
I. A SUPPLY AND DEMAND FRAMEWORK

The economist's training leads him to organize his thinking around a model in which price and quantity are determined by the interaction of independent supply and demand decisions in a competitive market; I shall follow that route. Within this framework it is useful to discriminate analytically between long and short runs since different factors dominate markets over these different periods. In the analysis of trends in freight rates, technology and industrial location, the long-run perspective is most appropriate. Since it abstracts from transitory effects on markets and concentrates on durable underlying factors, long-run equilibrium represents those levels of prices and outputs toward which the expansion, contraction and exit of old firms and the entry of new firms lead the industry. In a somewhat looser sense, we may think of long-run equilibrium prices and quantities as those we see when we examine graphs of time series from far enough away that distance blurs the detail of year-to-year fluctuations.

One must, however, stand very far indeed from a graph of freight rates or shipbuilding output to blur the cycles in those series since fluctuations are a key feature of the time series (see Figures 1 and 2). For this reason it is impossible to ignore a short-run analysis completely both because cycles in freight rates and shipbuilding were so important in the industry and because short-run analysis is involved in an understanding of the process of technological change, and particularly the persistence of old techniques. In the short-run, analysis is dominated by the slowness of response, particularly of the capital stock. As a result short-run equilibrium can involve considerable temporary departure from long-run equilibrium.

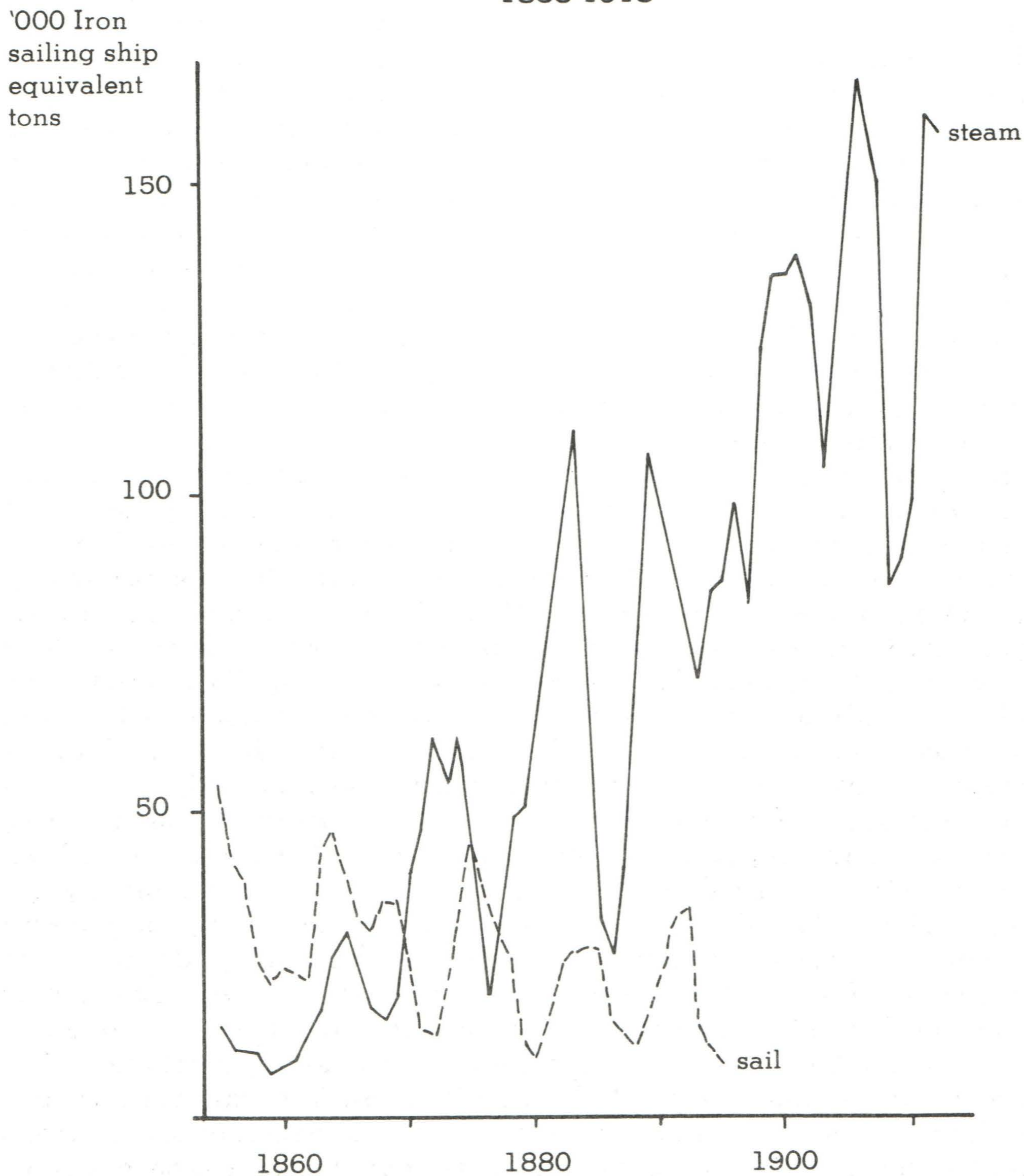
It is necessary to go beyond the simplest models of supply and demand to more detailed models of supply in competitive markets to analyze most processes involved in long-run changes. Technological and organizational changes altered world shipping by lowering the costs and thus the long-run supply price of

FIGURE 1
FREIGHT RATES, 1855-1913¹



¹The index for 1855-1875 is a simple average of Douglass North's export index and the rates he reports for Black Sea and Baltic wheat. The dotted line for 1859-1865 omits the American series. Sources: 1855-1875: D.C. North, "Ocean Freight Rates and Economic Development, 1750-1913," *Journal of Economic History*, XVIII (1958), 549-551; 1869-1913: L. Isserlis, "Tramp Shipping Cargoes and Freights," *Journal of the Royal Statistical Society* (1938).

FIGURE 2
SHIPBUILDING: BRITAIN AND NORTH AMERICAN SAIL AND STEAM
1855-1913¹



¹The aggregation is on the basis of a net registered ton of steam equalling two net registered tons of iron sail; British and American wooden sail equals $\frac{3}{4}$ ton of iron sail; Canadian wooden sail equals $\frac{3}{4}$ ton of iron sail.

Sources: B.R. Mitchell, *Abstract of British Historical Statistics* (Cambridge, 1962), 223-224; C.K. Harley, "On the Persistence of Old Techniques: The Case of North American Wooden Shipbuilding," *Journal of Economic History*, XXXIII (June 1973), 392

shipping services. The process of entry and expansion of new, efficient firms and the contraction of inefficient firms establishes a long-run equilibrium price per unit at the minimum cost per unit, including, of course, rewards to capital and management, of the current best-practice technique. Price will fall over time either as a result of a fall in the prices of inputs to production or because of technological progress, in the economist's sense of the same level of output being produced with fewer inputs. Low cost producers will continue to enter the industry and expand so long as price exceeds the costs (still including a normal return to capital) of the most efficient new techniques. This expansion of output of lower cost producers will continue until market price equals cost per unit using these techniques. This implies also that only low cost techniques and locations of production will expand for as equilibrium is approached price will cover only the costs of the most inexpensive techniques and locations. Only these producers cover their expenses and thus expand. Higher cost areas and techniques will have no incentive to expand but will attempt, so far as they are able, to reallocate resources from the industry to more profitable activities.

The movement to long-run equilibrium, however, occurs in a short-run context. To ignore the short-run in shipping would overlook many important features of the industry's history. For our purposes we may identify the short-run as the period over which the stock of vessels in the industry is substantially unchanged by either new building or losses through scrapping or attrition. Now it is apparent that there is an asymmetry in the speed at which the world's fleet adjusts. The stock of vessels could be expanded relatively rapidly, at least to the extent of shipbuilding capacity. Contraction, however, tended to be more protracted since the economic life of a ship was in the neighborhood of twenty years; scrapping before that time was economically sensible only in extreme situations. In contrast to the long-run where freight rates are dominated by costs, in the short-run freights may be thought of as being dominated by demand, at least so long as that freight exceeded the variable, or out-of-pocket costs, of the voyage. Competition among the ships seeking employment and shippers desiring transportation will result in an adjustment of freight rates — either downward as shipowners with unfilled vessels attempt to secure cargo, or upward as shippers bid for space to ship unbooked cargo — until supply and demand are equalled. Since the fleet available is fixed in the short-run these freight fluctuations will be dominated by fluctuations in demand. There are limits on the range of fluctuations in a downward direction since shipowners will tie up and eventually scrap vessels if the freight earnings fail to equal the anticipated out-of-pocket expenses of the voyage. But since something like a third of the long-run costs of providing shipping services were capital costs that could not be avoided in the short-run,¹ freights could fall to about two-thirds of their long-run level before the laying-up of ships would tend to reduce supply and halt the decline of freight rates. There were, therefore, considerable periods when freight was below long-run costs so that it did not pay to build new vessels or even to replace those lost to age and the perils of the sea (thus reducing capacity and gradually improving freight rates), but when it also did not pay to scrap existing vessels.

The high proportion of capital costs in long-run average costs also ensured the persistence of old techniques. Owners of old ships had the choice of operating their vessels at the freight rate determined in the market, not only by short-run demand fluctuations but also by the persistent downward pressure of cost-saving improvements that pushed down the long-run equilibrium freight rates or to scrap their ships. So long as freight rates covered the out-of-pocket expenses of operation they did better by operating their ships for what they would bring than they could have done by laying-up or scrapping their vessels.² Selling out offered no avenue of escape since no rational buyer would pay more for these old ships than he could hope to recover from their operation. The old vessels were scrapped only when the discounted present value they could reasonably be expected to earn minus their out-of-pocket costs from continued operation was less than the scrap value of the vessel. For softwood Canadian vessels this scrap value must have been very low indeed.

II. THE ADOPTION OF NEW TECHNIQUES AND THE PERSISTENCE OF OLD: IRON AND STEAM, WOOD AND SAIL

Long-run equilibrium price always equals the cost of the least cost method of production. When we examine an industry we see these least cost methods in the new capacity being installed. New techniques, however, will almost never immediately drive out the existing capital stock in an industry like shipping where the return to capital is a significant portion (a third or more) of the long-run equilibrium price. Improvements will seldom save a third of costs, so it will still pay to operate old ships when freights have fallen to equal the lower total costs of new, technologically superior ships. Old techniques in shipping thus will continue in use once they are in place so long as their out-of-pocket costs (including appropriately amortized repairs, etc.) are less than the freight rate. But more than this process of wearing out of existing capacity seems often to be involved in the persistence of old techniques. Certainly other factors were involved in the transition from the wooden sailing ship of the mid-nineteenth century to the steel steamer of the early twentieth. Indeed, there were at least two additional processes which allowed old techniques to persist in nineteenth century shipping. Wooden shipbuilding remained in competition with iron because the labor and materials used in shipbuilding in the Canadian Maritimes had few alternative employments. As a result they were forced to accept the income the market provided them. From the 1850s technological improvement in British iron shipbuilding drove ship prices down and wooden shipbuilders accepted lower wages to remain competitive. A different process kept sailing ships in existence as steam technology improved. Steam had a different cost structure than the old sail technology. Steamer costs were lower on short voyages than on long, but sailing ship costs were lower on long voyages than short. Thus steam displaced sail on short routes more than fifty years before it did so on longer journeys.

The final displacement of the old by the new was a process of ongoing technological change proceeding more rapidly in the new than in the old. The new

technology did not emerge as decisively superior as some in the history of science seem to suggest, but rather overtook the old in a process of continuing improvement.³ Eventually returns in the Maritimes became so low that wooden shipbuilding for the world market was abandoned. Finally improvement in marine engineering made steam cheaper than sail on the longest routes.

Canadian wooden shipbuilding continued to compete with British iron shipbuilding vigorously until the 1870s and only died out in the 1880s.⁴ In Britain, by contrast, iron ships had largely displaced wood by the 1860s. In the thirty years after 1860 the price of sailing ships fell by about a third. These price declines were caused by technological improvements in iron shipbuilding. Calculations of total factor productivity, presumably mainly improvement in metal working, indicate a steady saving of inputs that averaged about 0.9 percent per year. This would have reduced prices by about a quarter over the period. In addition, iron prices declined to half their 1850 level by the 1880s and produced a saving of around twenty percent on an iron ship. On the other hand, British wages increased by about fifty percent and would have raised the cost of a ship by some fifteen percent.⁵ These three factors — the rate of technological change, the course of iron prices, and the level of wages — were the main determinants of the change in the costs of producing iron ships.

The building of iron sailing ships in Britain had an enormous potential to expand at substantially unchanged costs. This ability to adjust output at constant cost determined the price of sailing ships in general. If the price of sailing ships were higher, output would expand almost immediately as iron shipbuilders shifted to sailers from building steamships, normally a larger part of their output than sailers. In the longer run, although shipbuilding was a large industry in Britain it was only a portion of a much larger metal working sector and would have easily been able to draw resources for expansion if the price of ships had been such as to generate greater profits in shipbuilding than elsewhere in British industry. Such expansion would have driven down ship prices and eliminated excess profits, and thus the price of ships was dominated by British costs.

North American softwood shipbuilders faced the option of either accepting that price or leaving the industry. Many shipbuilders and their workers saw no preferable options and accepted the falling price. Unfortunately, reliable wage data are not available for the Canadian Maritimes but data exist for Maine, which also had a major wooden shipbuilding industry competing in the world market at mid-century. The data for Maine probably underestimate the effect on wages in the Maritimes since by the 1880s the Maine shipbuilders were benefitting from the American Navigation Acts which restricted the United States' coasting trade to American-built ships. Nonetheless the effect was dramatic enough. In contrast to wages in Britain and elsewhere in the United States, which had increased by about fifty percent between the late 1850s and 1880, wages in Maine shipbuilding were substantially the same in 1880 as they had been in 1850. Not surprisingly a slow process of out-migration, particularly by young adults, had begun from the shipbuilding areas of Maine and the Maritimes.⁶

Somewhat more cheerfully, the persistence of the sailing ship as a viable form of investment was dependent upon technological factors rather than the ability of the market to squeeze the relative income of those committed to an industry in a region with few alternative opportunities.⁷ The important difference between sail and steam was that while sail was at a disadvantage on short voyages in confined waters, the steamship faced increasing costs per cargo-ton-mile on longer voyages, because a steamer had to devote more of its cargo capacity to carrying its own fuel and thus a smaller payload was carried for a given set of costs of moving the vessel a mile. Nor could this disadvantage be significantly allayed by coaling along the voyage, since until the late nineteenth century British coal was competitive with other available coal throughout most of the world. Thus the ship carried its own coal or paid someone else to do so. For a vessel engaged in the carriage of bulk commodities — if not for liners — the result was much the same. I have calculated that in the mid-1850s the cost per million cargo-ton-miles for a steamer was about £138 for a five hundred mile voyage, £150 for a three thousand mile voyage and £183 for a ten thousand mile voyage. Even in the early 1870s when a one thousand mile voyage would have cost £100 per million cargo-ton-miles, a five thousand mile voyage would have cost £111 and ten thousand mile voyage, £115.⁸

The triumph of steam on long voyages came about principally as a result of improvements that reduced the coal consumption of the marine steam engine. These new efficiencies depended on the interaction of theoretical understanding of thermodynamics and metallurgy and the practical abilities of engine and boiler builders and the steel mills. The course of coal consumption can be illustrated by Figure 3. Contemporary studies in the second half of the 1850s reported consumption of about five pounds of coal per indicated horsepower per hour. This had fallen to about 3.5 pounds by the mid-1860s. Compound engines further reduced fuel consumption to about 2.1 pounds per horsepower hour and by 1890 triple expansion engines were burning 1.5 pounds per horsepower hour.⁹

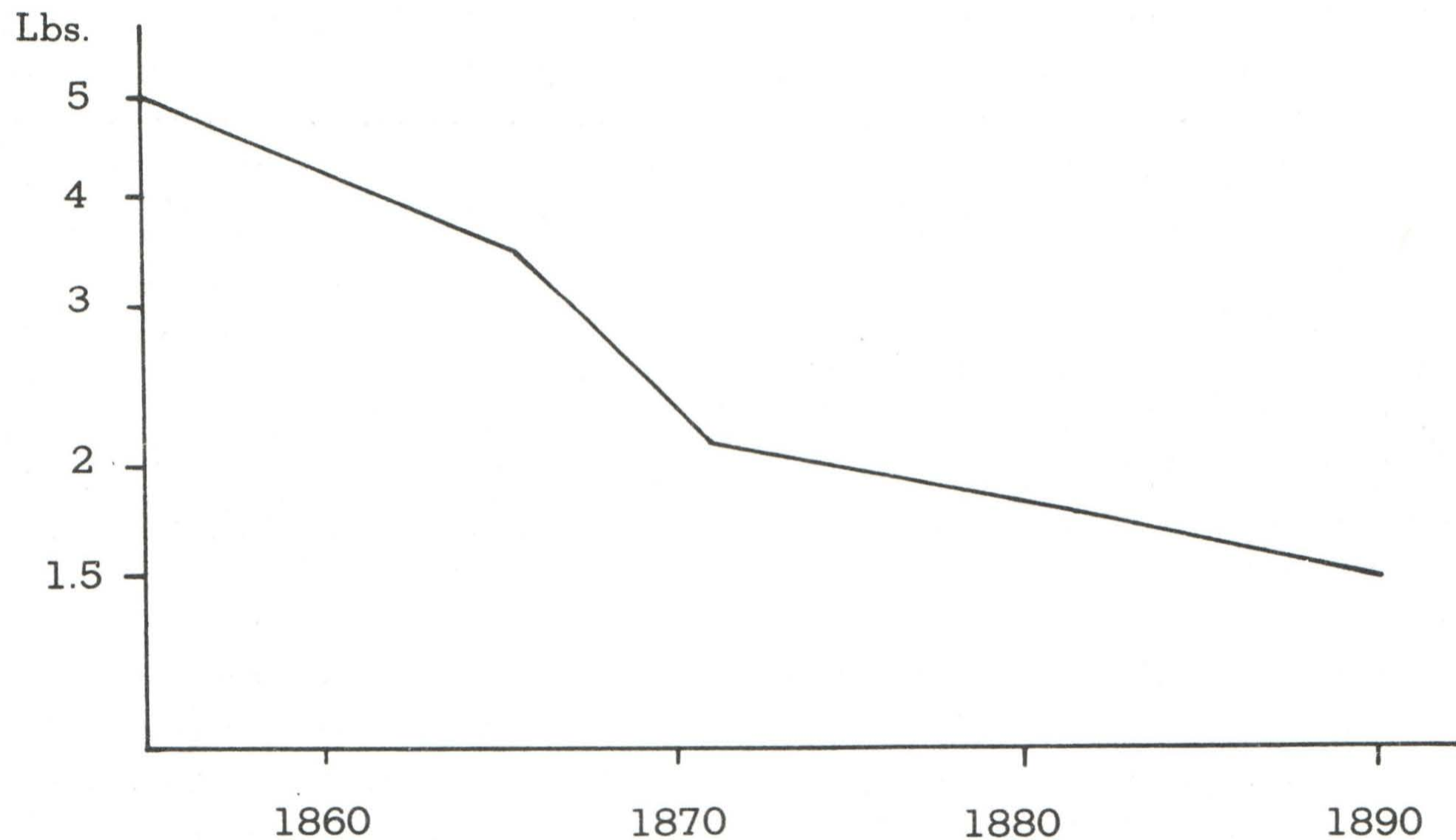
The result of this improvement was a more rapid decline in the costs of steam than of sail. This led to a steeper decrease in freight rates in steamer than in sailing trades and to the displacement of sail by steam on progressively longer routes. The progress of steam to longer voyages may be illustrated by Table 1. The very longest voyages — those around the world from Europe to the West Coast of America and then back to Europe — remained predominantly sailing voyages until the First World War. Earnings on that route remained high enough to encourage the building of sailing ships at least until the 1890s.

III. CHANGES IN THE ORGANIZATION OF SHIPPING

A number of other changes had impacts on shipping that were comparable to the technological changes already discussed. For want of a better overall designation they may be termed "organizational changes." Specifically, I have in mind the following:

1. the opening of the Suez Canal;
2. the coming of the submarine cable;

FIGURE 3
COAL CONSUMPTION AT SEA OF MARINE STEAM ENGINES
PER INDICATED HORSEPOWER PER HOUR
1855-1890



Source: C.K. Harley, "The Shift from Sailing Ships to Steamships, 1850-1890: A Study in Technological Change and Its Diffusion," in D. N. McCloskey (ed.), *Studies on a Mature Economy: Britain after 1840* (London, 1971), 220.

3. changes in the balance of outward and homeward traffic with special reference to the immigrant traffic on the North Atlantic;
4. economies of scale in larger ships and the organization necessary to make them possible; and
5. the development of liners and the liner conferences.

Clearly there is room to do little more than indicate the importance of these developments here, but to ignore them will be to distort the history of late nineteenth century shipping.

The opening of the Suez Canal at the end of 1869 was the greatest discontinuity in the shipping history of the late nineteenth century. The Canal not only vastly shortened distances to the east (the distance from Britain to Bombay was reduced from about 11,500 miles to 6,200 miles) but also proved entirely unsuitable for sailing ships. The result was that steamers, which on the open ocean bulk cargo trades were not competitive with sailing ships on voyages longer than those to the northeast parts of America, about three thousands miles each way, were suddenly able to compete successfully with sail at Bombay, some 6,200 miles from Britain. The unsuitability of the Canal for sail led to a five year boom in the

construction of steamers to replace a portion of the sailing ships trading to the Indian Ocean and initiated a curious inverse relationship between the cycles in steamer and sailing ship construction (see Figure 2). Furthermore the peculiar advantage the Canal conferred on steamers suddenly introduced ordinary tramp steamers on a voyage twice the length of those they had previously been engaged in. This extra distance increased the value of improved fuel efficiency and led to near universal adoption of the energy efficient, but still expensive, compound steam engine. The compound-engined steamer would undoubtedly have forged its way into the commercial services of the world by the late 1870s but its rapid introduction, the strong shipbuilding boom of the early 1870s and the inversion of the cycle in building sailing and steam ships that began with that boom all owe their existence to the construction of the Canal. The Canal's impact on freight rates, however, was more modest, for even with the steamers' distance advantage, sail was able to compete for bulk cargoes at Bombay in the 1870s and continued to make up about a third of the tonnage entering Britain from Bombay and Scinde throughout the 1870s.¹⁰

TABLE 1

**THE VOYAGES ON WHICH SAIL AND STEAM WERE COMPETITIVE
FOR BULK CARGO**

(Various dates)

Date (approximate)	Voyage	Distance
1855	Northern Europe	500 miles
1865	Mediterranean Fruit and Cotton	up to 3000 miles
1870	North Atlantic Grain Trade	3000
	Bombay via Canal	6200 via Canal
		11,500 via Cape
1875	New Orleans Cotton	5000
1880	Calcutta	8200 via Canal
		11,500 via Cape
1895	West Coast of America, Grain, Ore	13,500 to San Francisco

Source: These are based on both theoretical cost calculations and the actual composition of shipping on the relevant routes. For more detail see Harley, "Shift from Sailing Ships," 221-224.

The submarine cable had an enormous impact on the organization of the business of shipping since it made possible both tighter control of vessels by

owners throughout the world and provided the information and communications necessary for more efficient utilization of shipping capacity. Mail steamers and railroads were the fastest means of communication before the middle of the nineteenth century. The London-Bombay mail which had taken an average of 108 days in the East Indiamen between 1824 and 1832 was carried by rail, steamship and overland in Egypt in thirty-nine days by 1840, and by 1868 the P & O's mail contract stipulated delivery within twenty-four days. But this speed of communication was far short of that needed to allow a manager in Britain to assess alternative uses of his vessel and send instructions to his captain in India. Perforce, considerable managerial function had to be delegated to the vessel's captain, perhaps constrained by the advice of trusted local agents. After the development of the marine telegraphs in the late 1860s and early 1870s information and instructions could be conveyed in hours rather than days or weeks. As a result managerial activities became concentrated in managing directors in Britain. In addition ships could be more easily directed away from markets with a glut of tonnage to those with a shortage, which led to a considerable increase in the efficiency of deployment. By the late nineteenth century the direction of shipping had become largely concentrated in the Baltic Exchange in London. The Baltic came to symbolize the international organization of shipping.

The presence or absence of return cargoes greatly influenced freight rates. The continued provision of transportation between two points, say New York and Liverpool, must involve the return of the vessel to its starting point, perhaps by a very circuitous route, every time the trip is repeated. In long-run equilibrium the total costs of the vessel, including depreciation and normal profits, on its total voyage from New York to Liverpool and back to New York must be equal to the earnings on the voyage. However, since the eastbound and westbound voyage must inevitably be performed in strictest sequence, conditions of long-run equilibrium provide no information about the contribution of each leg of the round trip to long-run earnings.¹¹ A simple accounting rule would be to assign half of the costs of a simple back and forth shuttle to each direction and assume that each leg should make an equal contribution to earnings. However, the operation of competitive markets, such as in nineteenth century shipping, led to this result only in the exceptional circumstances that the quantity of shipping space demanded at the freight rate generated by this sort of cost allocation was the same in both directions. When, instead, there is excess supply in one direction and excess demand in the other, the market will adjust the freight rates so that more of the joint costs of the voyage are assigned to the leg with the greater demand. In fact, preliminary research suggests that usually all the joint costs were borne by one leg of the voyage. The implications of this market mechanism for the study of shipping should be understood. Before conclusions can be drawn from freight rate information, the nature of the entire voyage must be known. This is important both in comparing freights in different trades and in studying the evolution of freight rates over time. Nor is this consideration of trivial importance during the period we are investigating since there is considerable evidence to suggest that the increase in American immigration in the 1880s had the effect of removing much of the joint

cost of a round trip Atlantic voyage from the eastbound freight to the westbound leg. This, of course, contributed to the remarkable decline in Atlantic freight rates in the 1880s.¹²

It seems useful here to digress briefly and raise some other caveats regarding the interpretation of freight rate data. A simple freight rate quotation represents different earnings to a vessel depending on the exact nature of the charter party contract and on the conditions particular to the voyage involved. Charter parties provide terms covering many aspects of the voyage — how costs are to be shared between shipowner and charterer, the date the ship will be available, the dispatch with which it must be loaded, the ports to which it may be sent — as well as the payment for the use of the vessel. Interpretation of the payment depends on the other clauses in the contract and these differed among charter parties. Consider a particularly important example. The shipment of grain from the east coast ports of the United States in the early twentieth century was under two dominant forms of contract. The first was the standard berth rate charter party under which the shipowner was responsible not only for direct navigation costs such as coal and wages but also for the costs of loading and unloading, port dues, and towing charges. The second was a time charter, "government form" contract under which the charterer assumed all direct costs of the vessel, particularly port costs and coal, except crew costs and any maintenance costs the vessel might incur. Under the time charter the charterer paid for the actual time involved in performing the voyage, including loading and unloading. Under the "berth form" the charterer's payment was not directly connected to time on the voyage but he was obligated not to delay the vessel but rather to make his cargo available when the ship was ready to receive it and to accept his unloaded cargo at an agreed rate of discharge at the port of delivery. The charterer was subject to demurrage if he delayed the vessel beyond the agreed time. Other conditions also affected freight rates. Ports with difficult access or poor facilities for loading or discharge (e.g., Rouen, Kings Lynn) faced higher freight rates to compensate the shipowner for the delay a visit to such a port entailed. Thus a freight rate can only be understood within the context of the trade involved. Availability of return cargo, the nature of the ports and the specific nature of the contract need to be considered with care.

Larger ships came into use in the second half of the nineteenth century. These larger vessels were more economical to operate at sea than their smaller predecessors since they required fewer men per ton, were somewhat cheaper to build per ton of carrying capacity — at least once the principles of metal shipbuilding were perfected — and required less power per ton to displacement for propulsion. For example, doubling the size of the average new steamer from 1500 to 3000 gross tons in the two decades after 1870 reduced crew size by nearly a quarter, the cost of the ship by ten to fifteen percent and coal consumption by about a quarter. That resulted in a total cost saving of about an eighth.¹³

Ports, however, have always placed a limitation on the economical size of ships, for unless more tons of cargo can be loaded and unloaded in a given time the advantages of large ships were dissipated. My calculations suggest that about a quarter of the cost of an average round trip voyage to La Plata around the turn of the century was made up of the cost of the vessel while in port.¹⁴ Thus to double the

size of the vessel (to about eight thousand ton capacity including bunkers) in the absence of any increase in loading and unloading rates (in tons per day) would, other things being equal, increase cost per ton by a quarter and would more than offset the gains from the economies at sea of a larger vessel. Larger ships did come into use but their adoption depended on the organization of trades so that large cargoes would be on hand when the vessel arrived; as well, port facilities had to be such that the cargo could be loaded and unloaded rapidly. It is, therefore, not surprising that the largest vessels were found on the best organized routes and traded to relatively few well-equipped ports.

The increase in importance of the liner companies and their organization into conferences with formal rate structures and a system of deferred rebates is the final organizational change which merits comment. There is no question that vessels owned by companies operating liner services had grown to a considerable portion of the world's merchant fleet by 1913. The estimates vary but it is likely that on the eve of World War I liners comprised about half of the ocean carrying capacity.¹⁵ This greatly over-emphasizes the economic importance of the liners and their conferences on the freights of the world, however, since the conference rate applied only to high value cargoes while much, and in fact probably most, of the cargo carried by the liners were the bulk cargoes in which freights were determined by open competition. Thus while Manchester piece goods were covered by conference rates, coal was not. Grain, fibers, timber and ores that made up the vast bulk of the world's transported commodities were also excluded.¹⁶

Nonetheless the liners, with their established rates and deferred rebates to enforce shipper loyalty, did play a significant role in ocean transport. The economics of their operation invites comment. Certainly one motivation for the formation of the conferences was to limit output, competition, and entry in order to raise prices and profits. The history of the conferences suggests, however, that these efforts were of very limited success. It seems more useful to see the deferred rebate system as a method of enforcing a long-term contract between shippers and shipping companies.

Brief examination of a typical liner commodity, say textiles or chilled beef, suggests that shippers were willing to pay for regular, reliable, specialized transport. To the shipowner the provision of regular specialized services imposed costs that were not present in tramp shipping, for he had to provide vessels even during periods when only modest amounts of cargo were forthcoming and the freight of non-conference cargoes with which he filled his vessel was depressed. In addition he had to establish idiosyncratic organizations to handle small lots of cargo and to provide particular vessels and terminal equipment (refrigeration in warehouses and vessels was a particularly notable case). Thus, the shipowner who entered and decided to operate a liner service had a considerable financial commitment in specialized capital that could be converted to other uses only at considerable expense. The shipper, on the other hand, had very little natural financial allegiance to the liner service. This unequal commitment hampered the establishment of liner services, since the company became constrained by its capital investment but the shipper always had the option to take advantage of cheap outside competition as it became available. There arose a situation of

potentially incompatible incentives. The shipper's interest would be best served by getting the liner company to commit itself. Then, once the company had done so, the shipper could force the freight down with outside competition and thus avoid having to pay for the extra expense of liner service. The liner company, however, was aware of this incentive to the shipper, and thus liner service became difficult to arrange without a commitment from the shipper to provide an incentive to remain loyal to the liner company. This dilemma can be overcome by designing a contract that alters the options facing the shipper in such a way that his own self-interest, even in the short-run, is to remain loyal to the company.¹⁷ In the liner trades the contractual arrangement to provide the shipper with an incentive to ship on the liners took the form of deferred rebates from freight shipped on conference vessels. The deferred rebate system provided for a rebate — commonly ten percent of the freight — that would be credited to a shipper who shipped exclusively on conference vessels for a stated period of three or six months. The rebate would only be paid, however, if the shipper remained loyal to the conference for another three or six month period. Thus once the liner trade was covered by a conference arrangement the incentives of any substantial shipper were altered for the potential gain of using any price-cutting outside vessel was more than offset by the loss of the rebate that had been accumulated over the previous rebate period. The deferred rebate acted as a bond posted by the shipper to ensure his loyalty to the contract between liner companies and shippers.

It seems likely that the most important aspect of the deferred rebate system was to provide incentives for the shipper to remain loyal to the long-term contracts that liner service required. It seems unlikely, despite shipping companies' efforts to the contrary, that the conferences were very successful in acting as monopolies to raise the price of their services in these long-term contracts above a competitive level. The histories of the conferences make it clear that outside entry was too easy and internal agreement too difficult for the conferences to create much in the way of excess profits.¹⁸

IV. THE COURSE OF FREIGHT RATES

Freight rates were the principal avenue through which transformations in shipping affected the economy as a whole. The change in the cost of transportation in the late nineteenth century was revolutionary. The fall in the European price of wheat and the decline of European agriculture were principally due to the decline in the cost of transport from distant sources in America, Russia and elsewhere. Generally the rate of freight appears to have fallen by some fifty percent between the 1850s and the early years of the twentieth century (see Figure 1).

Analysis of the causes of the decline in freight rates is obviously complex; some of the problems have been noted above. The transition from sail to steam complicates the analysis since improvements in steam technology had no effect on freight rates until steam displaced sail. Furthermore all the complications of return cargoes, actual charter party conditions and port conditions must be taken into consideration. The most fruitful approach is probably to analyze certain important individual trades. For example, I have analyzed the trends in freight

rates between the early 1870s and the early 1890s, when freight rates were falling at their fastest, for the general cargo rate from Bombay, then the longest of the general steam trade, and the sailing grain trade from San Francisco (see Table 2).²⁰

Obviously the steam freight rate declined more rapidly than that of sail. After all steam was displacing sail, but the fall in the sail freight was impressive.²¹ The largest single contribution to the contracting freight rate may be attributed to the fall in ship prices. Another considerable portion of the decline arose from the drop in other input prices. Together these input price decreases accounted for almost half of the lowering of freight rates. This in turn was to a considerable degree a reflection of the generally deflationary environment of those years, but some of the decline in ship prices nonetheless reflected technological changes in steel production and in shipbuilding. Improvements in metallurgy and shipbuilding techniques also contributed to the cost saving that arose from the reduction of the weight of the ship itself, for this weight decrease was principally the result of the change from iron to steel in shipbuilding that occurred in the 1880s. The contraction in coal consumption was, of course, the result of improvements in marine engineering. Somewhat less than half of the effect of lower coal consumption arose from reduced expenditure on coal; the space and lifting capacity of the ship which was liberated by the lesser use of coal were somewhat more important. Finally, the reduction in the crew of vessels of a given size primarily reflected improvements in vessels. The twenty percent decline in the manpower on sailing ships resulted primarily from labor-saving alterations in rigging, assisted by new and more reliable materials such as wire rope. The halving of crew size on steamers over the same time again arose primarily from improvements in marine engineering. On the one hand the decline in coal consumption reduced the requirement for firemen to tend the boilers. On the other hand the greater reliability of the engines made it possible to reduce the rig and the deck hands who had been present to man sails, if need be, on pioneer steamers.

The increase in the size of vessels, as previously mentioned, should be primarily attributed to improved organization of trades and port facilities that made the larger vessels commercially viable. The final item in the Table ("residual") is that portion of the decline in freight rates for which it has proven impossible to account directly. Any errors in the calculations are also incorporated in that figure, so there is room for a great deal of skepticism in its interpretation. This "residual" accounted for about a ten percent decline in freight rates and much of this would seem to be best attributed to improved utilization of vessels that the marine telegraph made possible.

V. THE CONCENTRATION OF SHIPOWNING IN BRITAIN

Many of the papers in this volume focused on the experience of national fleets and so the issue of the location of ownership requires some attention. In particular it is useful to consider why such a disproportionate segment of shipping remained in British hands up until the First World War. The type of industrial concentration, such as cotton and iron in Britain at the middle of the nineteenth century and in

TABLE 2

ANNUAL RATES OF CHANGE IN FREIGHTS AND THE CONTRIBUTION
OF VARIOUS FACTORS TO THE DECLINE,
BOMBAY AND SAN FRANCISCO, 1873-1890

	Bombay: Steam 1873/4 to 1890/1 (-5.7% per year)	San Francisco: Sail 1873 to 1890 (-4.3% per year)
Freight		
<i>Contribution of</i>		
Ship Prices	-1.9%	-1.2%
Other Input Prices	-0.7	-0.7
Weight of Vessel	-0.4	-0.4
Crew Size	-0.4	-0.4
Coal Consumption	-1.1	—
Ship Size	-0.7	-0.9
"Residual"	-0.5	-0.7

Source: Harley, "Shipbuilding and Shipping in the Late Nineteenth Century" (Unpublished Ph.D. Dissertation, Harvard 1972), 302-313 and "Shift from Sailing Ships," 228.

shipping in the next half century, is quite unusual. It usually seems to arise from transient technological leadership in a rapidly changing industry.²² In shipping, ownership had been much more dispersed at the repeal of the Navigation Acts and again became so in the twentieth century. Why then did it become so concentrated in the late nineteenth century?

Discussion must start with the costs of the typical firm, since British predominance must have arisen from a cost advantage. By the late 1860s technological leadership in the iron and steel industries and in heavy engineering gave Britain an advantage in the building of metal ships propelled by steam. This advantage in construction need not have translated into concentration of ownership, however. After all, before the age of metal and steam, British owners had bought ships from foreign builders, and in the late twentieth century there is little correspondence between where ships are built and where they are owned. Furthermore, during the late nineteenth century foreign buyers had the same access to British shipbuilders as did British owners. British leadership in shipbuilding combined with the American registry laws that required American registered vessels to be American built did, however, effectively destroy the United States Merchant Marine that had challenged British superiority prior to the American Civil War.²³

Britain enjoyed no obvious special advantages in operating costs. Certainly there were not the advantages of lesser regulation and lower tax rates that

characterize present day flag-of-convenience countries, for Britain led in both safety regulation and in the development of the income tax. British labor was more expensive than labor in most other places. Britain did have cheap coal but it was available to others on the same terms as it was available to the British.

This is not, of course, to argue that Britain should not have had a large merchant fleet. Britain was the world's largest trader and her predominant position in the bulk trades implies that the share of world shipping engaged in carrying her trade must have exceeded her share in the value of trade. But nonetheless, Britain must have been a terminus for much less than half of the world's trade.

The cost advantage that Britain's predominant position clearly implied that her shipowners enjoyed seems to have arisen from the advantage that British-based owners had vis-a-vis worldwide commercial information. The marine telegraph appears to have been one of those utilities that possesses declining average cost over a very large range of output and thus becomes a natural monopoly. Because the marine telegraphs were overwhelmingly British in the late nineteenth century, worldwide commercial intelligence was most available in Britain. But the telegraph alone cannot be the whole answer for it would have been relatively inexpensive to relay information from London to other European centers had the demand existed.

The most likely story of Britain's predominance would weave several strands together to explain an informational advantage to British owners. British owners probably had an initial advantage of better information because of proximity to the shipbuilders as the new technology was introduced. They were in a position to capture the shipping trades that passed from American hands. Thus when the marine telegraphs were laid in the late 1860s and early 1870s, not only were the telegraph companies based in Britain but so too was the largest merchant fleet. As the telegraph made possible greater control of shipping by managing owners, the most advantageous position to exercise that control was London. Institutions such as the Baltic Exchange and a strengthened Lloyds grew out of this situation. Presumably these "informational" institutions also had economies of scale that inhibited their imitation elsewhere. Their importance as centralizing institutions only declined in the twentieth century as further advances in communication occurred.

It is revealing to notice that the rise of the German mercantile marine in the late nineteenth century did not present a serious challenge to British predominance in tramp shipping where centralized information provided advantage in efficient allocation of shipping. Instead the Germans developed liner trades where regular service predominated. Even here special circumstances aided German firms. Germany rose to a dominant position in the Atlantic liner trades on a quite different basis than the indivisibility of the information network that supported Britain's shipping. British shipping's advantage was based on worldwide intelligence and institutions to facilitate the use of that information. The German liner companies grew on the basis of an advantageous location in relation to the flow of immigrants from Eastern Europe.²⁴

FOOTNOTES

*The research reported in this paper was supported by research grant No. 410-81-0280 from the Social Science and Humanities Research Council of Canada. This assistance is gratefully acknowledged.

¹C. Knick Harley, "Issues on the Demand for Shipping Services, 1870-1913: Derived Demand and Problems of Joint Production" in Lewis R. Fischer and Eric W. Sager (eds.), **Merchant Shipping and Economic Development in Atlantic Canada** (St. John's, 1982), 76-78.

²For a general discussion of this point see W. E. G. Salter, **Productivity and Technical Change** (Cambridge, 1966), Ch. 4.

³This interpretation seems to underly Schumpeter's theory of growth and cycles, for example.

⁴C. K. Harley, "On the Persistence of Old Techniques: The Case of North American Wooden Shipbuilding," **Journal of Economic History**, XXXIII (June 1973), 372-398.

⁵*Ibid.*, 377.

⁶*Ibid.*, 384-385.

⁷C. K. Harley, "The Shift from Sailing Ships to Steamships, 1850-1890: A Study in Technological Change and Its Diffusion," in D. N. McCloskey (ed.), **Studies on a Mature Economy: Britain After 1840** (London, 1971), 215-234.

⁸*Ibid.*, 218.

⁹*Ibid.*, 220 and C. K. Harley, "Shipbuilding and Shipping in the Late Nineteenth Century" (Unpublished Ph.D. thesis, Harvard University, 1972), 219.

¹⁰Harley, "Shift from Sailing Ships," 224.

¹¹D. A. Farnie, **East and West of Suez** (Oxford, 1969), 7, 19 and 74.

¹²For a fuller discussion of this point see Harley, "Issues on the Demand for Shipping," 73-85.

¹³*Ibid.*, 79-85.

¹⁴Harley, "Shipbuilding and Shipping," 310-312, and "Shift from Sailing Ships," 227.

¹⁵Harley, "Issues on the Demand for Shipping," 76-79.

¹⁶See, for example, United States, Bureau of Foreign and Domestic Commerce, "Liner Predominance in Transoceanic Service," **Trade Information Bulletin**, No. 448 (1926), 2, 47-51.

¹⁷For an estimate of the relative importance of various commodities in world shipping on the eve of the First World War see Harley, "Issues on the Demand for Shipping," 67-73.

¹⁸This sort of issue in designing contracts to overcome perverse incentives has recently commanded considerable attention from economic theorists. For an introduction see Lester G. Telser, "A Theory of Self-Enforcing Agreements," **Journal of Business**, LIII (January 1980); Gary Becker and George Stigler, "Law Enforcement, Malfeasance and Compensation of Enforcers," **Journal of Legal Studies**, III (January 1974); and Benjamin Klein and Keith B. Laffer, "The Role of Market Forces in Assuring Contractual Performance," **Journal of Political Economy**, LXXXIX (August 1981).

¹⁹For some good discussion of the development and operation of the Far Eastern Conferences see Francis E. Hyde, **Shipping Enterprise and Management 1830-1939: Harrisons of Liverpool** (Liverpool, 1967), Ch.4; and Sheila Marriner and Francis E. Hyde, **The Senior, John Samuel Swire 1825-1898** (Liverpool, 1967), Chs. 8 and 9.

²⁰Harley, "Shift from Sailing Ships," 228-229, and "Shipbuilding and Shipping," 299-313.

²¹See Harley, "Shift from Sailing Ships," for evidence that shows the close correspondence between the timing of cost changes and the displacement of sail by steam in the transportation of bulk cargoes.

²²For a discussion of Britain's technological leadership in the Industrial Revolution and its subsequent erosion see David S. Landes, (ed.) "Technological Change and Development in Western Europe, 1750-1914," in **The Industrial Revolution and After** (Cambridge, 1965).

²³See John G. B. Hutchins, **The American Maritime Industries and Public Policy, 1789-1914** (Cambridge, Mass., 1941), 316-324.

²⁴For a discussion of Britain's competitive position see D. H. Aldcroft, "The Mercantile Marine," in D. H. Aldcroft (ed.), **The Development of British Industry and Foreign Competition, 1875-1914** (London, 1968).

10. DISCUSSION FOLLOWING THE PAPER OF HARLEY

SAFFORD argued that British control of the major submarine cables of the world gave them a very real advantage over their competitors prior to World War I.

CRAIG pointed out, however, that the British did not use these cables as a monopoly. Free access to the cables was provided to all, even to Americans. This made economic sense, since after all the British cable companies were capitalist enterprises.

SAFFORD suggested that the experience of the Inman Line proved that unsubsidized liner traffic in the Atlantic could make a profit even in the 1850s. This line recognized the potential in the immigrant traffic to the United States, as well as the market for carrying U.S. exports to Europe. Hence, they were able to turn a profit on both legs of their voyage.

HARLEY pointed out that by the 1880s, however, the volume of space available in liners was sufficient to carry all of the American export trade.

FISCHER asked why the managing owners of Canadian vessels, many of whom were resident in Great Britain, did not seem to be able to benefit from the improved communications network centred on Britain. Had they been able to do so, presumably the arguments about Canada being on the periphery of the shipping world would not be valid.

HARLEY responded that more work needs to be done on the precise way that Canadian vessels were managed before any clear answer is likely to appear.

CRAIG reminded participants that the telegraph by itself did not secure major advantages to British owners. The telegraph, and other communication devices, merely strengthened an existing pattern. The great commodity markets of the world were located in London before the introduction of the telegraph, and this gave those located close to this market a comparative advantage even prior to the telegraphic revolution. Further, it should be remembered that even late in the century there are major gaps in the telegraphic web.

HARLEY agreed with these points, but commented that it was really quite remarkable how complete the telegraph system was by the late 1870s. Relatively few major trading centres were outside the telegraphic link by 1880.

TAGUE asked what effect the introduction of the marine telegraph had on insurance rates for vessels.

HARLEY speculated that it must have had some effect, especially since it reduced the risks involved for vessels at sea.

CRAIG added that the communications revolution also facilitated the process of conducting international business.

HARLEY agreed, stressing that this also strengthened British control over the industry. British shipowners and businessmen were also able to take advantage of the tremendous economies of scale resulting from the concentration in Britain of so much trading activity.

PALMER suggested that more stress needed to be placed on the close contacts developed by British shipowners throughout the world with major exporters in understanding British shipping dominance.

HARLEY accepted the argument in part, but pointed out that all the contact in the world would have meant little in the long-run unless British shipowners could offer competitive rates. This is the importance of the "natural monopoly" which favoured British shipowners.

CRAIG returned to the importance of London as the leading centre of international commerce. Arbitration of most major disputes were conducted in London, regardless of the nationality of the parties involved. London was the centre of the world's financial system, as well.

HARLEY agreed, and pointed out that from an economist's perspective, the fact that this was so likely indicated that costs were lower in London than elsewhere. This obviously added to the comparative advantage enjoyed by British shipowners.

SAGER asked whether Norwegian or German shipowners felt themselves to be at a disadvantage following the appearance of the telegraph.

NORDVIK replied that prior to 1880, the telegraph was of very little importance to Norwegian shipping, although it became more important after that date. But because of their long-standing, close relationship with major British commercial establishments, Norwegians had little difficulty either in maintaining their place in the market or in utilizing the telegraph system.

KRESSE echoed these remarks for Germany, citing the close connections that German shipowners had with British merchant houses. It is also important that many German firms still sent promising new employees to Britain for from one to five years as a sort of apprenticeship. This meant that Germans were ideally placed to take advantage of any changes in Britain.

11. DISCUSSION FOLLOWING THE CONFERENCE SUMMARY BY ROBIN CRAIG

Editor's Note: We regret that it has proved impossible to publish Professor Craig's summary which challenged participants to explore a wide range of important questions. The excellence of Robin Craig's presentation is apparent in the discussion which follows.

SAGER summarized some of the possible comparative advantages possessed by various nations in the late nineteenth century. It has been suggested that close access to suppliers of new technology was one of them. While that remains a possibility, the experience of Atlantic Canada casts doubt on it as a generalization. Canadians certainly possessed the capital to purchase steamers from elsewhere, even if Canadian shipyards did not themselves produce iron and steel steamers. Another possibility that has been suggested was that some nations had access to growing sources of trade. The Norwegians, for example, may have benefited from this. But Canadians, too, had a growing demand for shipping services, as the annual growth rate of tonnage clearing Canadian ports was 4.5 percent in the 1880s, 3.1 percent in the 1890s, and 4.2 percent in the first decade of the twentieth century. Another option to explore is the nature of the ownership structure in the various nations. It would appear that the breadth of ownership was not nearly so wide in Canada as in Norway, Britain or Germany. Before this can be accepted, however, there are some points which require further research. Why was the Canadian ownership structure so narrow in comparison to other nations? Are there any constraints in Canadian society which mitigate against many people investing in shipping? If there are no such constraints, it may be that despite the ability to mobilize domestic capital, people simply chose to seize upon other opportunities. This is an argument which has been presented in several papers by Project members and requires further effort. Possibly the distance from European, and particularly British, sources of management, capital, and brokerage was another factor. Tariff structures, government policies, and legal restraints of all kinds represent yet other possibilities.

SAFFORD suggested yet another possibility: the decline of seafaring traditions in some societies. Life at sea was in many ways a dismal occupation, and the rising standard of living on land coupled with little or no improvement for mariners exacerbated the gap.

SAGER agreed that there is some evidence to support this contention in Canada. In the last three decades of the century, for instance, the proportion of males in the Maritimes who call themselves mariners declined steeply in each census year.

CRAIG countered that a similar phenomenon was occurring in Britain, yet this did not lead to a decline in the British fleet. As well, the proportion of non-British

seamen sailing on British vessels was rising. Given that there was an international pool of labour, Canadian owners should have found it equally easy to recruit a labour supply.

SAGER concurred that it was unlikely that a labour supply problem was a major factor in the decline of the Canadian merchant marine. More likely the decline was a result of a loss of enthusiasm for shipping investments coupled with new opportunities in the landward sector.

SAFFORD contended that while there might not have been a labour shortage, it is likely that at least some American shipowners may have left the shipping industry because of a shortage of native-born crew. Given the level of racism endemic in the United States, this remains a possibility worth exploring

NORDVIK stressed that from the Norwegian perspective there certainly was an international labour pool. By 1913, twenty-six percent of all seamen on Norwegian steamers were foreigners. Similarly, by 1893 about seventeen percent of all sailors serving aboard British merchantmen were foreigners.

FISHER reminded participants that the levels of foreign-born seamen in the eastern Canadian fleets were always of a much different magnitude than elsewhere. By the 1870s, most crews were composed of only between fourteen and eighteen percent Canadian-born seamen with the remainder being foreign-born.

NORDVIK suggested that there still may have been a labour supply problem, particularly relating to skilled personnel. By the middle of the nineteenth century Norway had instituted systems of educating skilled men for a life at sea. This does not appear to have been the case in Canada.

CRAIG expressed doubts that it was crucial for a nation to develop its own skilled personnel. Both German and Norwegian officers, for example, took out naturalization papers in large numbers in Britain during the nineteenth century. People in seafaring occupations tended to be highly mobile, and this reduced the need for nations to develop seamen indigenously.

NORDVIK returned to the question of the structure of ownership. He suggested that in the last quarter of the nineteenth century ownership of vessels was fairly widely-distributed in Norway. Further, there appear to have been no substantial barriers to entry in Norway.

SAGER asked whether the principal investors in shipping were primarily interested in shipping or whether, as in Canada, they had substantial investments in other fields.

NORDVIK replied that the situation varied, but that as the century progressed there were greater numbers of people who actually specialized in shipowning.

CRAIG concurred, but suggested that it was important to distinguish between people who simply hold shares in vessels and those whose principal occupation is to manage ships. The number of people in Britain who actually

chose to get involved in the management of vessels on a day to day basis was always quite small.

PANTING agreed, arguing that it was the managing owner who was most important. Many of the large owners in eastern Canada do appear to have been managing owners as well. Perhaps the most important point, however, is the impact that decisions by these large owners had on the fleets of individual ports. This was especially vital in ports like Yarmouth and Windsor.

OMMER reminded participants of the importance of staples in understanding Atlantic Canada. Regions dependent upon staples tend to produce economies with highly-skewed income distributions. But as the staple base widens, it is highly problematic whether the range of people entering the industry expands; thus, it may be that given this type of economy you will always have a narrow ownership base. Norwegian and other European economies may have been more stable, and hence more conducive to wider participation, because they were not based upon the warped dual economy produced by colonial staples.

HARLEY returned to the question of managing owners, asking whether managing owners in most ports were in fact resident in the ports or whether they were resident in Britain

FISCHER responded that the situation varied from port to port in Atlantic Canada. In Yarmouth, for instance, most managing owners were resident locally; for Prince Edward Island vessels, most were resident in Britain; in Saint John, the situation was more complex, with most managing owners being local residents with extremely good ties to Britain.

NORDVIK took up the question of the importance of staple economies. There were many obvious similarities between Atlantic Canada and Norway up to about 1870, but there were also some important differences. The spread of investment out of the timber industry into shipping was perhaps the most obvious similarity. But the fishing industry provides perhaps the most important contrast. Despite the fact that the fish trade was clearly a major staple trade, Norway did not develop an industry based upon domination by an elite. Instead, the fishermen owned their own boats. Thus, they were able to accumulate capital and in many instances used this capital to enter the shipping industry. This helps to explain the broad ownership structure in Norway. As well, the relative lack of landward opportunities in Norway in the nineteenth century may also help to explain continued investment by large numbers of people in shipping.

OMMER argued that the crucial difference was that the Maritimes were colonies. In developing a staple trade in a colonial setting, you begin with a clean slate. Everything to exploit the staple must be brought in, however, and thus you begin with a dependence upon metropolitan capital, which tends to warp the nature of production. The weakness in the fishing industry in Atlantic Canada is explained by the virtual lack of final demand linkages.

CRAIG wondered about the situation of Denmark, where it appeared possible to mobilize capital in far larger amounts than in Norway or Atlantic Canada.

NORDVIK replied that it was principally a matter of scale. Copenhagen was a large urban centre, with obvious advantages over Norwegian towns. Copenhagen had superb communications and a well-developed banking system, both of which were lacking in Norway.

PALMER suggested that perhaps the best explanation for success in shipping would be a tautology: success breeds success. The concept of "take-offs" is appropriate. Once an owner, or a fleet, or a nation has developed sufficient pools of capital, exploited certain markets, and made the requisite contacts, it then makes it very difficult for competitors to follow. Obviously this all requires a good deal of further research to explain the precise course of events.

HARLEY pointed out that following the introduction of improvements in communications, the nature of trade in the North Atlantic shifted dramatically. Perhaps most important, tramps were placed at a tremendous disadvantage compared to liners. This helps to explain the very rapid rise of the German fleet, for instance.

SAGER asked for some assistance in calculating vessel depreciation and profitability.

HARLEY responded that there were really two different ways of thinking about depreciation. First, it can be thought of as a type of sinking fund. Second, it can be viewed as the equivalent of what a second-hand vessel would be worth in trade at any point in its life. But either way of thinking about the problem is fraught with difficulties.

CRAIG agreed that it is a difficult problem, emphasizing that many of the people operating vessels in the nineteenth century were clearly as confused by the problem as we are. Many of the big liner companies would appear to have used whatever depreciation rate they wished in order to ensure a certain level of profit. But historians should never make the mistake of depreciating a vessel to a value of zero, because after the introduction of iron and steel vessels there was always a readily-available residual value. This obviously was not the case with softwood vessels, however.

SUMMARY

Gerald Panting

This final workshop of the Atlantic Canada Shipping Project was focused on the shipping industries of seven countries around the North Atlantic rim — Britain, Germany, and Scandinavia in Europe; and the United States and Canada in North America. The theme that emerged was the late nineteenth century "transportation boom" based on expanding world trade and technological change. The centre of the technological innovation was the British Isles, while much of the growing world trade consisted of exports from the burgeoning American economy. Ironically, this flow of goods brought prosperity to the North Atlantic ocean going fleets other than that of the United States. The returning flow of transatlantic emigrants from Central and Eastern Europe spurred the growth of the German merchant marine.

Knick Harley saw this boom as the result of two revolutions in costs. The first was a fifty percent drop in marine freight rates between the 1850s and the early twentieth century. The long-run result of this drop was a decline in the cost of shipping accompanying the international specialization in shipping services and the expansion of trade. In the short-run however, the size of established fleets and therefore the capital cost of vessels, remained relatively fixed. So, the fluctuating demand for shipping governed the investment and deployment behaviour of the owners. Since under some circumstances it did not pay to scrap old vessels, rising and declining technologies existed together during the period.

Harley's second cost revolution consisted of the falling price of iron between 1850 and 1890. This occurred at the very core of nineteenth century industrialization and made possible a series of technological changes in the shipbuilding industry that replaced wood with metal and windpower with steam power. In turn, these developments governed the world price of vessels. However, the returns to the capital embodied in the long-term price of vessels was seldom matched by the declining costs. As a result the productivity provided by the new technology only overcame gradually that of the old. Therefore, both freight rates and vessel costs provided for the coexistence of steam and sail. Indeed, as Sarah Palmer noted these two means of propulsion were not always in an adversarial relationship since steamers sometimes opened up completely new shipping services. Helge Nordvik pointed out that by 1914 the Norwegians had discovered that the operation of sailing vessels and steamers in conjunction was profitable.

Certainly, the focus of the nineteenth century transportation boom was Great Britain. Harley argued that the British had no special advantage in operating costs and that their imports and exports accounted for less than half the world's trade. He suggested that their supremacy resulted from Britain's position as the centre of worldwide commercial information. With the appearance of the submarine cable, decisions regarding vessel deployment became centralized and the Baltic Exchange in London collected and dispersed shipping information cheaply. Palmer argued that an initial advantage did accrue to Britain from her historic network of personal business relationships. On some trade routes, outsiders were discouraged by the strength of these established connections. Still, she saw the

British monopolization of more distant routes suggesting the importance of managerial functions. Harley and Palmer agreed about the preeminence of British shipbuilding. The latter stressed the unique position of the United Kingdom in the low cost production of a large number of iron hulled and steam powered vessels. Moreover, increasing imports and exports made Britain the world's largest market for vessels, most of them deployed within the empire. Therefore, Palmer insisted that British supremacy in shipping was the result of general industrial power and globe gridling empire with well distributed coaling stations as well as her coal export trade.

Technically, as Walter Kresse noted, boilers and engines were ready for use on the Atlantic by the 1850s and for all seven seas by the 1870s. As Harley pointed out, steam first replaced sail on the shorter routes because of lower costs. Then, as coal consumption per mile declined, steam triumphed on long voyages as well. Despite the continued costliness of the compound steam engine, the opening of the Suez Canal suddenly made steamers competitive in such areas as the Indian Ocean, where British shipping was dominant. The canal provided no advantage to sailing vessels. While, in the late nineteenth century, the size of vessels increased, Harley noted a reduction in crew size for both steamers and sailing ships. But, these larger vessels could only be effective carriers with arrangements for faster loading and unloading in ports. Palmer commented that steam power provided an increase in the number of voyages that took place during a given period of time but that sail tonnage also displayed increased productivity resulting from such innovations as iron hulls, metal rigging and donkey engines. However, Kresse argued that by the end of the century freight rates made sailing vessels generally unprofitable, whereas steamers returned dividends on certain routes.

The division of vessels into liners and tramps, as a result of the adoption of steam, Palmer regarded as an important factor in British success because owners were involved in both types of shipping. By 1914, some 40 percent of British vessels were liners whereas the Germans had a predominately liner fleet and the Scandinavian fleets consisted of tramps. Kresse argued that in established trades, steamers tended to replace sailing vessels. Nordvik also stressed the tramping characteristics of the Scandinavian mercant marines. Kresse agreed that German liner companies were operating on a number of routes by 1914 but points out that Hamburg vessels took up tramping as well. Of liner conferences, Harley was sceptical because their rates applied to high value cargoes rather than to the large amount of bulk cargo actually carried by liners.

Palmer further suggested that the British may have had a practical monopoly of shipping, by default, because the differing demands upon national resources prevented the Americans, Norwegians and Germans from challenging them successfully. As a result, until the early years of the twentieth century, the gap between the performance of the United Kingdom and that of other maritime nations widened. Harley, Palmer and Jeffrey Safford all stressed the failure of the American challenge to British supremacy in the mid-nineteenth century. Harley pointed out that Britain's initial advantages in shipping made it possible for them to capture the American trades. Palmer underlined the ability of the Americans to

challenge the British on the Atlantic while Safford insisted on the decline of the United States from potential world leadership in shipping to "insignificance," between 1850 and 1914. As he saw it, during the 1840s and 1850s, although the calibre of American crews was declining, every American town with sufficient resources was building clipper ships and wooden freight carriers. But, despite American supremacy in this art, rising costs began to drive capital out of wooden shipbuilding during the 1850s. Therefore, by the 1870s, although sailing vessels made up the largest proportion of their foreign going merchant marine, the Americans were no longer competitive in building them. The American leaders of the wooden sailing vessel industry were reluctant to make the transition from a well known technology to steamers.

Safford pointed out that not until the 1880s did the United States have both the cheap coal and labour, coupled with industrial sophistication, that made the British pre-eminent in shipbuilding. Only after 1900 did American steamers enter international competition. By contrast, Palmer noted that in the British case, during the 1890s, sailing tonnage declined by one-third and by 1914, almost half the world's steam tonnage was on British registry. Safford's estimate was that by 1914 only two percent of American registered tonnage was in the ocean going carrying trade. He point out that the United States could afford to hire economically priced freight shipping because the natiaonl economy generated a high level of exports, especially from agriculture.

Two of Britain's potential challengers, the Germans and the Scandinavians, provide some of that shipping required by the United States. While the German fleet mainly began in the Baltic Sea, it was the North Sea ports of Bremen and Hamburg with their growing hinterlands that became the foci of freight trade. These ports were outlets for an extensive European emigrant traffic westward. Kresse noted that for Hamburg the most important trade was to New York. By the 1880s however, British iron vessels had replaced the older German wooden vessels.

Like the Germans, the Scandinavians began the carriage of food and raw materials on coastal and Baltic voyages. Nordvik argued that there were cheap raw materials and labour for local shipyards in both Norway and Swden. Most of the "shipping towns" were in Norway where the growth rate of tonnage was higher than the world average. Not until the 1840s did Norwegian shipping enter the international carrying trade and during the 1860s and 1870s vessel owners expanded their commitment to the bulk carrying trades. By 1880, Norway was a major shipping nation. Nordvik regarded the Norwegian entry into the American carrying trade as a crucial step in this process. By contrast, the bulk of Danish and Swedish tonnage tended to operate in Europe.

In the Atlantic area of British North America, as in Scandinavia, shipping was also required for the carriage of export staples. In addition wooden vessels were produced for the growing British market. By the 1850s, shipbuilders and timber merchants were involved in the requisition of tonnage as well as in the export of timber. Eric Sager and Gerry Panting argued that shipbuilding and shipping represented a substantial output from the local economy. Moreover, these

industries and the staple trades were mutually supportive until the 1860s. So, the function of shipping was not to earn freight revenues but to provide a cost advantage to the production and export of staples. However, the traditional staple industries were unable to sustain employment and income at acceptable levels. The "equilibrium point" was reached between 1853 and 1864. Declining timber prices and rising import prices created an adverse trade balance that led to a search for new markets.

Like those of Britain, Germany and Scandinavia, Canadian owners sent their vessels into the American trades. In the early 1860s, with good freight returns wooden vessels were still preferable to iron ones and the cost of such craft could be amortized with the profits. Contacts with eastern American ports multiplied in the period 1854 to 1866 under the Reciprocity Treaty. Therefore, before the British demands for wooden vessels began to decline, the capital put into shipping was increasing faster than that put into staple production. Vessel owners, during the 1860s and 1870s, were concentrating upon a few American bulk trades while increasing the number of voyages to European, South American, Far Eastern and Australian ports. Without a corresponding increase in Canadian coastal trade and with a declining proportion of wages paid to crews being repatriated; the close connection between shipping and the local economy of the Maritime Provinces was weakened. In general, there must have been little final demand linkage between shipping and the local economy.

During the period from about 1860 to 1880, the Scandinavian and Canadian patterns which had been rather similar, tended to diverge. The Scandinavian shipping industries went through the transition to steam and survived, while the industry in Atlantic Canada did not negotiate that transition successfully and fell into decline. Certainly there were attempts in New Brunswick and Nova Scotia during the 1860s and 1870s to develop new enterprises. However, iron production sufficiently advanced to provide a comparative advantage in metal shipbuilding was not one of them. New business ventures provided neither demand for, nor links with, shipping. The older generation of entrepreneurs, the staple sector, and shipping, all entered a decline together. Capital in wooden shipbuilding and shipping was easily transferred or liquidated. The shift of this capital, entrepreneurial talent, and expectations away from the traditional staples provided a sufficient condition for the decline of shipping.

In Scandinavia, the Norwegians and Swedes lost their comparative advantage in building wooden vessels. The link between shipping and shipbuilding in Scandinavia disappeared in the period following 1880. Small steamers could be produced before that in the major commercial centres because capital, entrepreneurs, machine tool industries, and technical knowledge were to be found there. Both Danes and Swedes made the transition to steam with relative ease. Danish shipyards built about half the Scandinavian steam tonnage. The Norwegians had not begun the transition by 1880 and the depressed conditions of the 1880s made capital accumulation a problem. By 1910, however, they had built up investment in modern vessels while the Danes had contributed motor ships to the expansion of technology. After 1895 in the three Scandinavian

countries, sailing tonnage levels were maintained as steam tonnage increased.

When the financing and ownership of shipping is considered, Palmer, not surprisingly, found no lack of capital in the United Kingdom for tonnage acquisition. Members of tightly knit shipping families supplied it. The same happened in Norway during the age of sail, according to Nordvik. On the one hand, the British liner business tended to be organized by companies even though at the end of the century, families were still dominant in this form of shipping. On the other hand, the ownership of sailing or steam tramps was through private partnerships until the 1880s. Then single ship companies became general. Kresse stated that in Germany the single merchant owners of the 1840s and 1850s were displaced, in part, by "partnership companies" during the 1860s. From the beginning, as elsewhere, steamers were managed by joint stock companies. Nordvik pointed out that, into the 1890s, partnerships were dominant in Norwegian shipping. The 'corresponding owner' and the captain were important in vessel deployment and the latter remained so even after the telegraph lowered communication costs, because specialized shipbrokers had made rapid decisions necessary. During the 1880s, there was a shift to the joint stock company with a managing director. By 1914, the partnership and the single ship company were rapidly losing their dominant position in Norwegian shipping. At mid-century, according to Safford, private ownership of a single vessel was the American mode in both shipping and shipbuilding. Even in the 1890s, the Americans were unable to achieve competitive economies of scale through shipping organization. The same seemed to apply to the Canadians.

Looking at the relationship of shipping to other economic sectors, Safford pointed out that during the first half of the nineteenth century capital flowed from American shipping to the expanding agricultural and mining frontiers, as well as to canals and railways. Nordvik argued that Norwegian shipping paid for itself and provided funds for investment elsewhere in the economy. There, after 1850, shipping capital was derived from the timber and fish trades. Putting money into shipping was an alternative to other types of investment because knowledge of the shipping industry was widespread in Norwegian towns. Sager and Panting argued that while there was little company formation in the Atlantic Canada shipping industry itself, major vessel owners showed a greater propensity for this form of activity than did other businessmen. Shipowners moved from emphasis upon tertiary, especially financial, companies during the 1850s to the primary sector, including primary manufacturing in the 1860s and 1870s. By 1870, the transition to an industrial economy was underway as the traditional staple industries passed their "equilibrium point". The peak of company formation involving vessel owners occurred while they retained substantial fleets. During the 1880s and 1890s, Canadian shipping declined by about 6 percent per year, following the trend in the freight rates for trades served by it. As the amount reinvested in shipping decreased so did owner participation in company formation.

Governmental activity was viewed as a mixed blessing to the shipping industry by those presenting papers. Palmer stated that government subsidies were not important to the development of British marine technology, just as the

repeal of the Navigation Acts in 1849 was not crucial to the growth of the British merchant marine. Yet Nordvik believed that for Scandinavian shipowners this very change in British policy created a "golden age" during the 1850s. Then too, Safford insisted that the British government used both subsidies and free ship policies creatively in support of shipping. In contrast, he felt that American legislators aided shipbuilders rather than owners and spurred the growth of coastal and lakes trades at the cost of ocean going tonnage. They did not use naval activity to encourage general vessel development. As Kresse noted, in Germany official propaganda for naval development helped to support oceanic development. While shipping companies accepted governmental guarantees of freight volume on some routes they did not always like the conditions attached to subsidies. Sager and Panting pointed out that, in Canada, governments were not committed to the expansion of either staple trades or sailing vessels. Such support as was given to steamers aided the port of Montreal, rather than those in Atlantic Canada. However, denizens of that region, like other Canadians, became enthusiasts for railways and landward growth rather than for oceanic ventures.

In summary, then, the "transportation boom" of the nineteenth century made possible the evolution of steam powered iron fleets. Those owners who were able to make the transition from wood and sail to the new technologies constituted the "successful" ones because they rode the boom. In turn, this points to the differing distribution of national resources and patterns of economic development. Firstly, the United Kingdom, Germany and the United States were industrial powers whereas Atlantic Canada and Scandinavia were not. But secondly, the two North American economies were involved with 'frontier' developments in the interior of the continent. In neither case were the Atlantic cross trades used as the basis for developing a steam powered fleet and, in succession, their ocean going fleets declined as capital was allowed to run down. In the case of the European fleets, as an integral aspect of the transition from new technology to old, maritime capital was replaced regularly.

