

Maritime Strength and the British Economy, 1840-1850

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Your fleet and your trade have so near a relation and such mutual influence on each other, they cannot well be separated: your trade is the mother and nurse of your seamen: your seamen are the life of your fleet: and your fleet is the security and protection of your trade: and both together are the wealth, strength, security and glory of Britain. (Lord Haversham in the House of Commons, 1767).¹

The Royal Navy's victory at Trafalgar on 21 October 1805 has been recognised by historians as the point at which Britain became the nineteenth century's unchallenged maritime power.² Its maritime strength in the immediate post-Trafalgar era was symbolized not only by its line-of-battle ships, frigates, corvettes and sloops scattered on stations around the globe but also by its industrial capacity to build and support such a navy; the material and monetary importance of the world's largest merchant fleet; government's reliance on a maritime presence to ensure the nation's strategic security; and the strategic significance of a number of colonial bases.³ Far more than the mere numbers of vessels or guns, British maritime power rested on a complex relationship between government, industry, commerce, and the navy. The concentration of past studies on the RN as Britain's major military force and the protector of its trade is well known. But this continued focus on foreign and military matters to the exclusion of economics and politics has led to a skewed reading of the relationships that produced British maritime strength. A more holistic approach is required. The RN's traditional roles must be placed in the context of their linkages to the industry produced by its construction and maintenance, as well as the merchant marine it protected.⁴

The period from 1840 to 1850 represents a genesis period in Britain's development of her maritime power. A technological transition from wood and sail, to steam and iron, were creating new strategic and tactical considerations for the RN. The possession of the world's largest merchant marine (and its growth during this period) made it possible for Great Britain to gain and maintain access both to all of the world's most important markets and to the most important raw materials needed for the ever evolving industrial and commercial revolution that was occurring in Great Britain. The need for that merchant fleet to ensure a steady and plentiful supply of finished goods to those markets, and the enormous economic benefits incurred through that trade, meant that British industry depended on that merchant marine and its protector, the Royal Navy. This

relationship was unique in its magnitude. As well, particular geographic areas and economic sectors benefitted from the construction and maintenance of the Royal Navy, the adaptation of the navy to technological change, and the expansion of its bases and infrastructure. All of this was an important part of the domestic economy.⁵

This naval-industrial-economic complex, which was linked to the very lifeblood of the nation in so many ways, put millions of pounds into the British economy every year. The relationship was symbiotic. British overseas merchants depended on the maritime power of Great Britain to provide a safe, stable, environment for enterprises. The Royal Navy and the merchant marine depended on the wealth produced by the sale of such produce to sustain and employ them. If British oceanic trade was to provide a significant contribution to the nation's economy, then requisite monies had to be spent to upgrade and maintain the RN to a suitable level of operational capability. These maritime realities stemmed from the fact that Britain's strength was not that of a continental power, but that of a naval power. Britain was also a commercial power. Her navy was an intrinsic part of her commercial and economic well-being, and not just a contribution to the European Balance of Power. This symbiosis set the stage for a financial, commercial and economic expansion during the Victorian period that helped guarantee England the position of the world's preeminent financial and industrial nation into the twentieth century.

To better comprehend that complex relationship in the 1840s, it is important to be clear about the questions that need to be answered. First, what were the size and cost of the RN during this period; what mission was it expected to fulfil; and what was the size and value of the merchant marine? Second, how dependent was the British economy on the merchant marine, both regionally and internationally? Did business and government build or alter their commercial strategies around a certain perception of the nation's maritime ability? Was that perception accurate? Third, what effect did naval bases, dockyards and ports have on local economies in Britain and throughout the empire? By analyzing these topics, it is possible to gain a better understanding of what maritime power meant to the British economy in the fifth decade of the nineteenth century.

After the Napoleonic Wars, the RN did not have to wait long for the normal financial retrenchments that follow major conflicts. Calls for economy soon reduced it numerically to a shadow of its former self. By 1837 fifty-eight ships-of-the-line and many more lesser craft were laid up "in ordinary" in Britain's rivers and creeks. A report on the condition of these vessels indicated that of the line-of-battle ships, only twenty-five were prepared to begin operations immediately; fifteen needed substantial repairs; and the rest were in utter disrepair. At the time there were twenty ships-of-the-line actually in commission, with another eleven building. The RN's numbers, according to this report, were barely adequate to maintain a "two-power standard," the yardstick by which British naval power had been measured for decades.⁶ By 1840, the navy's order of battle had become confusing for those interested in assessing its capability.

The two-power standard had been set against the Russian and, especially, the French navies. In 1840 a senior flag officer noted that the navy was failing to keep pace with French expansion, even discounting the Russians. A survey of British and French naval forces revealed that Britain possessed nineteen vessels of seventy-two guns or more (with two on passage home to be paid off); twenty-five frigates of between twenty-four

and fifty guns; no corvettes; thirty-four brigs and sloops of between sixteen and twenty guns; and sixteen steamers mounting between two and six guns. At the time, seventeen ships-of-the-line, nine frigates, ten brigs and sloops and seven steamers were being built. The French navy was assessed as comprising seventeen ships-of-the-line, all carrying eighty-two guns or more; seventeen frigates, all with between forty-six and sixty guns; thirteen corvettes of between sixteen and thirty guns; twenty-two brigs of between sixteen and twenty guns; and twenty-five steamers mounting between three and six guns. French yards were constructing twenty-six ships-of-the-line; twenty-one frigates; four corvettes; four brigs; and thirteen steamers. Britain's dwindling numeric superiority created pressures on government to spend more money on building programmes.⁷ Thus while government was pledged to economy, and during a period of trade depression, naval appropriations remained higher than in the previous decade.⁸

Shipbuilding, particularly for the navy, had become economically important to many English communities, especially during the Napoleonic Wars, when some towns and cities came to base their entire industrial structure on constructing naval vessels. As a result, many suffered severe depressions in the postwar years. In fact, for those areas without RN dockyards or shipyards, there was little hope for the future, unless the town could acquire merchant shipbuilding contracts. One example makes this clear:

During the second half of the 19th century, Buckler's Hard became a comparative backwater, as the new industries gravitated towards towns. The Industrial Revolution ushered in an age when larger work units required larger workforces, thus causing the decline of rural crafts. Wooden shipbuilding sites in the country fell into disuse, as new and larger shipyards opened in towns. Hampshire shipbuilding concentrated on Southampton and Cowes, at the expense of the Beaulieu and Hamble rivers, of Hythe and Eling and Redbridge.⁹

The French naval scare, as well as technological changes such as the introduction of steam engines, iron hulls and plating, breechloading cannon, and explosive shells, heralded a new era in British naval shipbuilding and associated professions during the 1840s.¹⁰ Between 1840 and 1850 Britain spent on average seven million pounds sterling per year on the RN, with an ever-increasing amount going to new construction. The emphasis on new construction reflected the perception that the French had opened a building gap, as well as concern about the need to add technologically-advanced vessels. Moreover, because many of these new vessels were experimental, the cost of producing prototypes was extremely high compared to traditional designs.¹¹

The construction of a modern naval vessel in the 1840s was no small matter. An enormous number of man-hours and material was required to build either a wooden or an iron-hulled ship. The economic benefits to the communities involved can be seen through a review of the process of constructing a first-rate line-of-battle-ship of 120 guns. The primary costs of a screw ship-of-the-line (starting construction in the second half of the 1840s) were for labour and materials (see table 1).

Table 1
The Cost of Building a 120-Gun, First-Rate Ship-of-the-Line,
1845-1850

Labour (Hull)	30,652
Materials (Hull)	75,639
	106,291
Masts, Rigging, Sails and Stores	19,224
Engines and Gear	46,220
	65,444
Total	171,735

Source: Hans Busk, *The Navies of the World: Their Present State and Future Capabilities* (London, 1859), 59-60.

Building the hull of such a vessel occupied 200 men for twelve months, and rigging it completely required twenty-four riggers working thirty ten-hour days. Some idea of the amount of canvas needed can be gained by considering that the spread of sail would considerably exceed an acre and a half. With respect to the spars, the mainmast cost approximately £500, the foremast about £400, the mizzenmast £100, and the bowsprit and jib-boom about £250. The anchors and cables weighed more than 100 tons, and the weight of provisions and stores for six months exceeded 300 tons. Cannon and carriages, without the cost of shot or powder, ran well over £12,000.¹²

As warships grew in size and complexity, so too did the workforce needed to build them. Since more man-hours per ship were required than previously, RN construction furnished a standard salary to those fortunate enough to be employed at the Royal Dockyards. The organization of the labour force gives a glimpse of the complexity of the building process. Men were divided into gangs of about twenty under a leading hand. Periodically, the gangs would be "shoaled," as foremen chose men to avoid the traditional position where more senior foremen selected all the best men for their gangs. An inspector supervised the work of the three leading hands; at Portsmouth, there were eight inspectors working for three foremen and the assistant master shipwright. The master shipwright was the managing director, coordinating the other craftsmen. All were professionals whose services were vital. This importance was reflected in their pay. A master shipwright could expect to be paid between £500 and £700 per year, while his assistant would draw about £400; a foreman about £250; an inspector in the range of £150; and a leading hand around £120. These wages were quite high for the day. Craftsmen on day rates, as most were, earned 5s 6d a day, with "task and job" rates averaging 5s 9d. Calculations show that a joiner working at 5s 9d on our hypothetical ship could make about £100 on the job. Working overtime could increase that to twelve shillings, but such earnings were unusual in peacetime. When necessary, convicts could be hired at sixpence a day. Working hours were not excessive: Pembroke employees

worked from 0740 to 1200 and 1315-1645. Compared with outside earnings, these less-skilled workers may have been paid on the low side, but a good workman could earn "established status," which gave a considerable measure of job security.¹³

Labour (the support structure of the RN) and manpower (those actually serving) were major sources of expenditure in the 1840s. Moreover, qualified, capable seamen and artisans were thought to be in short supply by mid-decade and changes to traditional methods of advancement and retention in all ranks were seen as crucial if the RN were to maintain capable crews and support staff. Apprentice schools were established in 1843-1846 to "shape a more efficient workforce by imparting useful knowledge and inculcating habits of discipline and subordination, to provide better education and more effective supervisors, and to prepare apprentices for the School of Mathematics and Naval architecture established in 1848."¹⁴ Coupled with the lack of a central training institution, as well as the slightly unattractive and harsh history of life on board its ships, the RN faced a difficult task in trying to attract, train and retain qualified personnel in the face of economic difficulties:

Most of the captains and officers of the ships lately commissioned complain of the inferior men they are obliged to rate as petty officers; and yet the old regulation that when a ship was paid off the valuable old petty officers might remain on board the flag-ships, to be put into newly commissioned ships, remains still rescinded. These men are the very foundation of a crew to instruct the young men in duty and discipline...It is truly of immense importance that steps should be taken to attach our seamen to Her Majesty's service and to their country. Would it not be true economy to add largely to our navy...to increase the seamen's wages, to restore the warrant officer's widows pensions, and to be less economical in that respect!¹⁵

Faced with increasing social awareness in Britain, which called into question such tactics as impressment, flogging, dangerous working conditions and lengthy terms of service, the RN was forced to find new ways of recruiting and retaining trained personnel.¹⁶ One obvious method was to increase pay and benefits. Due to the stringent fiscal environment, such rises were not favoured by government until other options had been exhausted, but they eventually had to be introduced. As a result, even in the context of increased expenditures on shipbuilding, total wages in 1847-1848 accounted for £3,683,000, close to half of total naval spending (£7,916,000).

Advances in ordnance, armament and iron-working not only increased costs but also created new opportunities for tradesmen and entrepreneurs who sought employment and profit in naval construction. Increases in the size, number and weight of cannons led to rises in price per unit, as well as driving up other costs. More shot and powder were carried on larger vessels.¹⁷ The Board of Ordnance was a very valuable customer for ordnance-related tradesmen, such as the gunfounders in Kent and Sussex Weald.¹⁸ As the navy concentrated on using its own foundries, gunpowder factories, and the like, opportunities for private naval armament manufacturers became more constrained. Without a government contract to ensure sustained demand, the chances of competing against

established navy contractors were slim, which limited both the attractiveness any interloper held for the Admiralty and the innovation that an outsider could offer.

Still, such intrusions were necessary to continued technical progress. Competition to provide the navy with the new iron-plating and steam engines was especially spirited. Official naval "inertia" and conservatism were overcome by civilian techniques, which were more advanced than the levels of technological sophistication in the RN. In the 1830s private firms, lured by the prospect of enormous profits for those who could construct steam vessels capable of crossing the Atlantic, drove the research and development of this new technology to a higher level.¹⁹ This rivalry between entrepreneurs created an environment that led to bigger, faster and more durable vessels.

The situation concerning the construction of boilers for steam vessels is a case in point. Copper boilers were acknowledged to be superior to iron, especially in terms of years of service and scrap value. A copper boiler that could be made for £5,000 would still have a retail value of £3,000 after nine years of service. Iron boilers, on the other hand, while costing only £1,500 to construct, had no salvage value after only three years of use. Despite the qualitative difference, iron boilers continued to be ordered because of lobbying in Parliament plus the RN's preference for construction in its own yards. The Admiralty's defence was that these yards were best suited for engine construction and no legal actions were ever taken, although suspicions about MPs, such as Sir Charles Napier, with personal interests in the yards, were strong.²⁰

The navy also subsidized new technical endeavours and defrayed the cost of new designs. Starting in 1839, subsidies were given indirectly to entrepreneurs through mail contracts. Such grants, administered by the Admiralty between 1839 and 1850, were conferred only on ships deemed potentially useful in war. Under the assumption that subsidised commercial vessels could be converted easily into effective warships, the Admiralty believed it was maintaining naval strength cheaply.²¹ The navy's mail subsidies also allowed developments in steam propulsion and iron working to proceed in directions favourable to its needs. At the same time, it permitted naval authorities to avoid having to commit to any particular design.²² Subsidies enabled the navy to evaluate new technology while it was still in the private sector, instead of having to build expensive prototypes. Costly mistakes were therefore kept to an acceptable minimum.

Yet even this seemingly efficient method of research and development came under fire from those MPs intent on keeping naval expenditures to an absolute minimum. On 9 May 1848, for example, two radical Reform MPs, W. Macgregor and J. Hume, voiced their displeasure at the expensive measures taken by the former Surveyor of the Navy, Sir W. Symonds, to refurbish and construct vessels embodying new technologies. While acknowledging the necessity for a strong navy, Macgregor expressed concern over the ships constructed under Symonds' direction.²³ In particular, he was bothered by the estimated £1,500,000 cost. As well, Macgregor called into question the navy's building program, particularly the amount of money going into expanding and improving the dockyards at Sheerness, Woolwich and Portsmouth (Devonport was also being considered for a £300,000 dock and basin improvement project) at a time when a deficit of two to three million pounds was looming in the forthcoming budget. The great waste and mismanagement of such resources could be avoided, said Macgregor, if the RN turned to private contractors to build its ships and "if the system which had been pursued in the

naval dockyards had been adopted in the yard of any private shipbuilder, it would have been attended with absolute ruin." Moreover, Macgregor argued that valuable space at Deptford, and elsewhere along the Thames, would be better utilized if left for the use of the growing merchant marine.

The Secretary to the Admiralty, H.G. Ward, responded vigorously to these charges.²⁴ He argued that the need for construction expenditures was due to the dramatic instability of naval design brought on by rapid technological innovation.²⁵ Ward pointed out with respect to curbing wasteful expenditures that £600,000 had been cut from the next year's naval estimates. As well, the system of promotion in the yards was being regulated by government, which had instituted a rule that "made preferment the reward of merit tested by the severest examination; so as to give fair play to all and not to shut out the younger men."²⁶ Ward also challenged Macgregor's contention that private builders were cheaper. Citing the obvious technical and design differences between warships and merchantmen, he disabused Macgregor of the idea that building the two types of vessels was similar. The most telling evidence against Macgregor's argument for private construction came when Ward asked:

What private merchant could afford to keep a stock of seasoned timber always on hand for the chance of obtaining a contract to build a ship for the Government. There were no fewer than 60,000 loads of seasoned timber stored in the dockyards; and if that stock should not be kept up, vessels would be badly built...because their durability depended upon the goodness of the timber.²⁷

Table 2
Original and Repair Costs, Selected Vessels

Vessel	Built	Cost	Repairs 8 yrs.	Annual Repairs
<i>Petrel</i>	Dockyard	£8,219	£1,314	£164
<i>Penguin</i>	Dockyard	£8,386	£1,540	£192
<i>Ranger</i>	Contract	£7,020	£8,225	£914
<i>Alert</i>	Contract	£7,478	£5,163	£737

Note: Repair data for *Alert* includes seven years only.

Source: *Hansard's Parliamentary Debates*, XCVIII, 7 April-26 May 1848, 821.

While acknowledging that the initial outlay for ships built by private contract might be slightly less than those built in the Royal dockyards, Ward noted that the expenditure on future repairs to those privately-built vessels would be enormous. To prove this, he compared the original cost and subsequent repairs of four vessels, two built in the dockyards and two in private yards (see table 2). Ward was quite certain that Symonds and the Boards of Admiralty had taken, and continued to take, every possible precaution

to prevent any "of that rash and precipitate expenditure, and to avoid any necessity for those experimental alterations of ships against which the Hon. Member protested."²⁸

Through this method of evaluation and procurement, the RN expanded from forty-five steam vessels (19,796 tons) in 1840 to eighty-five (164,389 tons) ten years later.²⁹ This reflected the realities of rapid technological change. While such shifts created uncertainty and hesitancy in some areas, there was a recognition by government that the Admiralty had to stay in step, while at the same time always watching expenses.³⁰ One MP, Viscount Ingestre, "quite approved of the appointment of so distinguished an officer as Sir Baldwin Walker to the post of Surveyor of the Navy." Nonetheless,

he hoped to hear the gallant gentleman would have sufficient advice at his command, that he might not fall into the errors of his predecessors. He had often pressed on the Admiralty the necessity of appointing a board of scientific men to assist them. Sooner or later they would have to do so, or fail in the performance of their duties, for with the present march of science it was absolutely necessary to have men of high attainments to whom the Board should refer new plans and inventions for their opinion. He quite agreed with the Hon. Secretary [Mr. Ward] with respect to vessels built by contract, and was surprised to hear that recently some vessels had been built in merchants' dockyards.³¹

There was a profit to be made by developing marine engines and innovative building techniques, but the risks were high and the returns uncertain. This period was also marked by a growing reliance on private industry, especially in the areas of hull and engine design. This slow transition signalled the beginning of a process that would by 1860 see the RN become dependent on private contractors for the actual vessels and the Royal Dockyards become mere maintenance bases for the growing navy.³²

As the size, number and technical sophistication of the vessels in the RN increased, so too did the demands on the supporting infrastructure. Bases and dockyards, with their millions of pounds worth of buildings, mills, raw materials and stores, became increasingly important to the RN's strategic deployment. The bases and dockyards, both in England and abroad, became ever more expensive to operate as their role became more complex.³³ Bases expanded because of demands for larger stores of ordnance, victuals, and docking and repair facilities:

In the early 1840s it was decided that the existing yard was too small for the new docks required by the bigger ships entering service and to accommodate a steam factory. Some 72 acres of land were purchased at Keyham and the contractor, G. Baker, began work in 1844 with a coffer dam, 1,600 ft. long and 26 ft. wide along the river front. A Nasmyth steam pile-driver was used to drive timbers up to 66 ft. long, taking three or four months for the complete job. The foundation stone of the basin was laid in 1849...There were two basins, the south, which was 650 ft. x 560 ft. and the north which was longer and narrower. There were three docks in the south basin, 318 ft. x 80 ft. All the usual dockside equip-

ment was provided including steam cranes, one of 40 tons capacity and two lifting 20 tons. The cost of £1.5 million was about twice the estimate.³⁴

Channels and harbours were dredged and docks strengthened or redesigned to accommodate larger, heavier vessels. Requirements for coal storage, metal shops, forges, brewers, victuallers, and permanent staff in general created a situation where communities and their hinterlands became interconnected through supplying goods and services. The construction of buildings and living quarters on the bases and in the adjoining areas provided employment and income for many artisans and labourers.³⁵

A case in point was the naval base on Lake Ontario at Kingston in Upper Canada. In 1845, this complex depended on local producers in a radius of approximately 150 miles for goods such as beef, pork, chicken, charcoal, firewood, finished wood for construction, masonry and iron; the total cost for these supplies ran well into the thousands of pounds.³⁶ Such annual tenders and the repeated need for contract work led to an important influx of capital. Indeed, it is fair to state that the monies and work emanating from the Kingston base generated key industries and stable sources of income in the area. Such economic stability was obviously important to the economy of a newly-developing area. Undoubtedly, such benefits also accrued in other parts of the Empire where bases were located.

A survey of annual RN expenditures shows that the service had a direct impact on the British economy of roughly seven million pounds sterling per year throughout the 1840s. The regional economies affected by these outlays undoubtedly benefited, as did those in outlying areas that provided necessary raw materials and services.³⁷ Common labourers, craftsmen, masons, brewers, bakers, engineers, metalworkers and a host of other small and large businessmen, not to mention those actually serving in the navy, either in Britain or around the world, were linked economically to the construction, maintenance and support of the RN. While making a large enough contribution to the general economy in its own right, the navy fulfilled a still greater economic role as the protector of England's critical overseas trade and commerce.

The RN's function as protector was tied to economic and political developments.³⁸ The growth of British commerce and trade in the 1840s was in large part a function of two interconnected phenomena: Britain's adoption of free trade in 1846 and an enormous increase in the volume of merchant shipping. Both developments led to new demands and duties. As it attempted to shepherd the growing flock of British merchant vessels across the high seas, the operational and strategic demands on the RN increased. As well, as British entrepreneurs and government-supported businesses sought to establish and maintain markets at home and abroad, the RN, and particularly the perception of its invincibility, came to play an integral part in promoting confidence in Britain.³⁹

The British merchant marine underwent a large number of technical and numeric changes in the 1840s. Advances in steam engines, hull designs, engineering, sail distribution and placement, and construction techniques caused as much transition and reassessment for the merchant marine as for the Royal Navy.⁴⁰ Many towns and urban centres, such as Exeter, had prospered in the first part of the century by building wooden merchantmen. This construction had required craftsmen with skills similar to those

employed in the Royal Dockyards. While the scale of the individual vessels may on average have been much smaller than warships, the large number of slipways scattered around Britain dictated a fairly substantial workforce. In 1824, a ninety-two-ton schooner could be built for approximately £900 (£10 per ton), with a profit of £45.⁴¹ Construction could take anywhere from eight months to two years, depending on the availability of materials and men, as well as on weather conditions. In the 1840s, the use of iron and steel concentrated shipbuilding near the coalfields and created many new opportunities and problems. Yards that embraced the new technology and techniques faced difficulties finding suitable labour, machine tools and iron, as well as adequate rail links to iron and coal works, increased craning and wharfing facilities. There were also interminable debates over suitable hull, engine and structural specifications.⁴² Many shipbuilding communities found ways to adapt to the new technical and financial pressures generated by technological change. The result was demonstrated between 1840 and 1850, when merchant shipbuilding and the cargoes freighted in British vessels increased sharply. This growth must be considered with regard to the actual cost of building to get some idea of the regional economic impact.

Between 1839 and 1850, merchantmen in the British fleet increased from 21,670 vessels (2,571,000 tons) to 25,984 vessels (3,565,000 tons), an expansion of 4,314 vessels and 994,000 tons (see table 3). Of that total, sail increased by 3,850 (906,000 tons), while steam grew by 464 (88,000 tons). As table 4 shows, some of the increase was a result of vessels newly-constructed in Britain, although the decadal trends for shipbuilding were continually downward (see table 4).

Table 3
The British Merchant Fleet, 1839-1850

Year	Sail		Steam		All Vessels	
	N	000 tons	N	000 tons	N	000 tons
1839	20,947	2,491	723	80	21,670	2,571
1840	21,883	2,680	771	88	22,654	2,768
1841	22,668	2,839	793	96	23,461	2,935
1842	23,121	2,933	833	108	23,954	3,041
1843	23,040	2,898	858	110	23,898	3,008
1844	23,116	3,931	900	114	23,016	3,044
1845	23,471	3,004	917	119	24,388	3,123
1846	23,808	3,069	963	131	24,771	3,200
1847	24,167	3,167	1,033	141	25,200	3,308
1848	24,520	3,249	1,118	151	25,638	3,401
1849	24,753	3,326	1,149	160	25,902	3,486
1850	24,797	3,397	1,187	168	25,984	3,565

Source: B.R. Mitchell (comp.), *Abstract of British Historical Statistics* (Cambridge, 1971), 218.

Table 4
Vessels Built and First Registered in the UK, 1839-1850

Year	Sail		Steam		All Vessels	
	N	000 tons	N	000 tons	N	000 tons
1839	1,115	175.2	62	6.1	1,217	181.3
1840	1,296	201.1	74	10.2	1,370	211.3
1841	1,063	148.2	48	11.4	1,111	159.6
1842	856	116.2	58	13.7	914	129.9
1843	652	77.0	46	6.1	698	83.1
1844	624	88.9	65	6.1	689	95.0
1845	788	112.3	65	10.9	853	123.2
1846	732	109.4	77	16.0	809	125.4
1847	830	129.7	103	16.2	933	145.8
1848	733	107.2	114	15.3	847	122.6
1849	662	105.5	68	12.5	730	118.0
1850	621	119.1	68	14.6	689	133.7

Source: Mitchell (comp.), *Abstract*, 221.

If construction costs (£10/ton) for the Exeter schooner are taken as the standard for wooden vessels; the cost/ton figures for the comparison between Liverpool and Glasgow construction of iron-hulled vessels are averaged at £35/ton; and it is accepted that those vessels listed as steamers were iron-hulled, then between 1839 and 1850 £148,980,000 was spent on the construction of wooden merchant vessels in the UK and £48,685,000 on iron-hulled steamships.⁴³ These figures, which are likely to be of about the right magnitude, show clearly that the industry was an important contributor to the economy. Moreover, once the vessels entered active service, they were significant generators of employment. From 1839 to 1844, across the Empire maritime employment grew from 191,283 to 216,350 people.⁴⁴ If we assume an average wage of five shillings per week for fifty-two weeks (£13 per year), and calculate that at least three-quarters of the men involved were British subjects (and would therefore put their wages back into the British economy), this particular part of the British workforce earned £12,656,475 over that six-year period.⁴⁵ It is apparent that the combination of ship construction, maintenance and manning of the merchant fleet had a great impact on the British economy. But even greater gains were to be made through the cargoes carried by these vessels.

The free trade debate reached its zenith in Britain in the 1840s.⁴⁶ One of the central features of this controversy centered around its effect on British exports and imports. The passing of enabling legislation in 1846 ushered in a period of increased trade both within and without the Empire. The strength of the merchant marine and the RN contributed to an acceptance of this programme. Those two institutions allowed Britain to compete for trade globally like no other nation.⁴⁷ The possession of the world's largest

merchant marine and most powerful navy ensured that free trade operated to Britain's advantage.

The Prime Minister, Sir Robert Peel, believed that opening British markets to external competition would only benefit Britain, since its superior industrial capability and maritime power allowed it to prosper in such an open environment. As well, the elimination of tariffs and duties would likely ease economic tensions between Britain and other nations:

We cannot promise that France will immediately make a corresponding reduction in her tariff...But your exports, whatever be the tariffs of other countries, or apparent the ingratitude with which they have treated you — your export trade has been constantly increasing. By the remission of your duties upon the raw material...by inciting your skill and industry — by competition with foreign goods, you have defied your competitors in foreign markets, and you have even been enabled to exclude them. Notwithstanding their hostile tariffs, the declared value of British exports has increased above £10,000,000 during the period which has elapsed since the relaxation of the duties on your part...Thus is promoted the peace of the world. But peace will expose us to more extensive competition. The more certain that a guarantee of peace is, the more formidable will be the competition which we shall have to encounter in our commerce and manufactures. In order to retain our preeminence, then, it is of great importance that we should neglect no opportunity of securing those advantages which this preeminence secures.⁴⁸

Peel and other pro-free traders contended correctly that under such a liberal regime trade would grow at an ever-increasing rate. Some of the prime indicators of this included the number of vessels entering and clearing British ports and the value of their cargoes. British vessels employed in the foreign and colonial trades increased between 1839 and 1845 from 14,348 (2,756,533 tons) to 15,964 (3,669,853 tons), while the value of British exports grew from £53 million in 1839 to £58 million by 1844. Moreover, customs revenues, even with decreased duties, rose due to the increased flow of traffic. As well, imports, exports, and re-exports all increased steadily (see table 5); in an island nation, all of course require safe, reliable and efficient maritime transport.⁴⁹

Indeed, between 1840 and 1847, trade with northern and southern Europe, the US, British North America, India, Africa, and Asia grew at fairly linear rates. Only commerce with the West Indies (British and foreign), Russia, the Netherlands and Belgium, France, and Australia and the Pacific showed little or no growth.⁵⁰ This trade expansion reflected not only increased industrial production and capital formation in Britain but also a continued conviction among mercantile and shipping interests that government, by maintaining the RN, accepted a direct role in the nation's continued economic development. At any point when interference with British overseas trade occurred, concerned business groups looked to the government to use the RN to solve the problem.

Some examples make this latter point clear. In 1838, France blockaded Buenos Aires and Montevideo over some territorial disputes with Britain, taking advantage of a

weak British naval presence in the area. In the face of failed diplomatic efforts, British merchants and shipowners in the region petitioned the Secretary of State for Foreign Affairs, Viscount Palmerston, for more drastic action.⁵¹ Expressing their displeasure at the lack of sufficient British naval forces, the petitioners cited the considerable loss in trade caused by the blockade:

That a very large amount of British capital is invested in the trade, which is one of great importance to British commercial and manufacturing industry; and that the amount of British capital now locked up in Buenos Ayres is not less than from a million to a million and a half sterling. That the amount is chiefly invested in the produce of the country, which, from its perishable nature, has undergone and is undergoing, great deterioration, and that the expense of preserving the same from entire destruction is estimated at not less than £20,000 monthly.⁵²

Table 5
British Imports, Exports and Re-Exports, 1839-1850
(£ millions)

Year	Imports	Exports	Re-exports
1839	62.0	97.4	12.8
1840	67.5	102.7	13.8
1841	64.4	102.2	14.7
1842	65.3	100.3	13.6
1843	70.2	117.9	14.0
1844	75.4	131.6	14.4
1845	85.3	134.6	16.3
1846	75.9	132.3	16.3
1847	90.9	126.1	20.0
1848	93.5	132.6	18.4
1849	105.9	164.5	25.6
1850	100.5	175.4	21.9

Source: Mitchell (comp.), *Abstract*, 290.

The merchants and shipowners called on the British government to "afford suitable protection to the property, by directing an adequate force to be sent to the Plate, to guard and watch over the interests of the subjects of Great Britain." Palmerston reacted by dispatching a stronger naval presence in hopes that this show of force would lead to a satisfactory diplomatic conclusion.⁵³ But the key point is that these demands by commercial interests for military action were not isolated.

Another example concerned British whaling interests in New Zealand, which were being threatened by an influx of American and French whalers. Calls were soon heard for a stronger naval presence to protect British commercial interests. Once again, the response was an increase in naval forces on station in the waters surrounding the islands.⁵⁴

The Peel administration, which came to power in 1841, was hardly averse to using the RN in this way. Yet it also recognized that increasing responsibilities required an expanded service. Faced with technical changes and increased operational duties linked to protecting a growing maritime trade, Peel felt justified in asking for more funding for the RN. A strong naval presence in all major waters, he felt, was necessary to protect British commerce. Undoubtedly, the 1846 free trade legislation was predicated on the notion that Britain could survive industrially and economically better than its adversaries in an increasingly open international trade environment, and that the RN would ensure an acceptable measure of security for that traffic, while at the same time making the industrial and mercantile interests in Britain confident that their investments and activities were safeguarded. Many members of the business community agreed with the Prime Minister's appreciation of what the RN meant to British business interests overseas, and thus to the British economy in general. As a result, the RN's estimates slowly increased over the decade.⁵⁵

Overall, spending on the maritime pillars of the British empire (the Royal Navy and the merchant marine) was an exceedingly effective means of ensuring the growth of overseas trade and investment in the 1840s, as well as protecting vital strategic assets.⁵⁶ As David French has pointed out in his writings on the *British Way in Warfare*, a secure financial basis was also a key strategic element in British defence preparations. These two strategic demands, the need for a strong navy and the need for a strong economy, worked in a complex and symbiotic fashion in the British situation.⁵⁷ Industrial demands, strategic concerns, domestic financial pressures, international trade issues, and technological change, all placed within an imperial context, played an enormous part in defining the question: What was the Royal Navy for in the mid-nineteenth century? The navy was a useful way for the government to re-distribute money into the national economy; it provided economic security through the demands made on the nation for the upkeep of the navy, a navy which in turn ensured a steady flow of raw materials and access to markets throughout the empire; it provided a psychological deterrent to other nations who might desire to destabilize that imperial system; and finally, it was a living experiment for the introduction and application of the new technologies issuing forth from Britain's industrial revolution. The complexity of that reality requires that British maritime strength be taken as much more than simply a "naval" force in any historical analysis and, therefore, can only truly be appreciated in the context of Empire.

NOTES

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Schurman (London, 1997). He would like to thank Professors David Moss, Keith Neilson and John Beeler for their valuable assistance on this piece.

1. G.S. Graham, *Sea Power and British North America* (Cambridge, MA, 1941), 15.

2. For the standard appreciation of the British naval position post-Trafalgar, see John Keegan, *The Price of Admiralty* (New York, 1988), 1-107;

William Laird Clowes, *The Royal Navy: A History* (reprint, 7 vols., London, 1966), V; and Paul M. Kennedy, *The Rise and Fall of British Naval Mastery* (New York, 1976).

3. A very good article that gives a nice evaluation of the Royal Navy in the post-Napoleonic War period is Andrew D. Lambert, "Preparing for the Long Peace: The Reconstruction of the Royal Navy 1815-1830," *Mariner's Mirror*, LXXXII, No. 1 (February 1996), 41-54; a fine companion is Donald M. Schurman, "Imperial Defence, 1868-1887" (Unpublished PhD thesis, Cambridge University, 1955). Britain's unique maritime needs and the history of British maritime strength and strategy are discussed in Sir Julian S. Corbett, *Some Principles of Maritime Strategy* (tepxmX, Annapolis, 1988); Corbett, *England in the Seven Year's War: A Study in Combined Strategy* (London, 1907); Bernard Brodie, *A Guide to Naval Strategy* (Princeton, 1942); Vice-Admiral Sir Peter Gretton, *Maritime Strategy: A Study of British Defence Problems* (London, 1965); John Knox Laughton (ed.), *From Howard to Nelson: Twelve Sailors* (London, 1899); A. T. Mahan, *The Influence of Sea Power Upon History, 1660-1783* (rev. ed., Boston, 1908); Clark G. Reynolds, *Command of the Sea: The History and Strategy of Maritime Empires* (London, 1976); Admiral Sir Herbert Richmond, *Sea Power in the Modern World* (London, 1934); Stephen S. Roskill, *The Strategy of Sea Power: Its Development and Application* (London, 1962); Donald M. Schurman, *Julian S. Corbett: 1854-1922* (London, 1981); and Schurman, *The Education of A Navy: The Development of British Naval Strategic Thought, 1867-1914* (London, 1965).

4. For a study which is similar in approach but concerned with the RN at an earlier date, see Michael Duffy, "The Foundations of British Naval Power," in Duffy (ed.), *The Military Revolution and the State 1500-1800* (Exeter, 1980), 49-85.

5. Some rough idea of the overall contribution to the British economy can be gained by adding warship construction, maintenance and infrastructure; merchant marine construction and cargo values; and value of overseas trade, and then comparing that rough indicator with Phyllis Deane and W. A. Cole, *British Economic Growth, 1688-1959* (Cambridge, 1962), 363 (in £ million); 1841: agriculture, forestry, fishing (£99.9); mining, manufacturing and building (£155.5); trade and transport (£83.3);

rents of dwellings (£37.0); and gross national income (£452.3). The figures for 1851 were as follows: agriculture, forestry and fishing (£106.5); mining, manufacturing and building (£179.5); trade and transport (£97.8); rents of dwellings (£42.6); and gross national income (£523.3).

6. N.A.M. Rodger, *The Admiralty* (Lavenham, 1979), 94; and Peter Padfield, *Rule Britannia: The Victorian and Edwardian Navy* (London, 1981), 17; C.J. Bartlett (ed.), *Britain Pre-Eminent: Studies of British World Influence in the Nineteenth Century* (London, 1969); Bartlett, *Great Britain and Sea Power, 1815-1853* (Oxford, 1963), 113-116; Andrew Lambert, *Battleships in Transition: The Creation of the Steam Battlefleet, 1815-1860* (Annapolis, 1984), 13; and National Maritime Museum (NMM), Milne Papers (MLN) 103/4, Paper by Lord Minto on the Requirements of the Navy, 1841. I am most grateful to Prof. John Beeler for bringing the Milne documents to my attention. The two-power standard in 1837 was comprised of the combined strength of France and Russia, both of which were perceived in British military and political circles as having strong desires to surpass Britain's naval power through aggressive building programmes.

7. *The Times*, 10 and 11 January, and 23 February 1840. It should be noted that during the 1840s Britain suffered a number of invasion scares because of tensions with France and the fear of growing French naval power. See C.I. Hamilton, *Anglo-French Naval Rivalry, 1840-1870* (Oxford, 1993); William H. McNeill, *The Pursuit of Power: Technology, Armed Force and Society since A.D. 1000* (Chicago, 1982), 223-261; Larry H. Addington, *The Patterns of War Since the Eighteenth Century* (Bloomington, 1984), 39-57; and Theodore Ropp, *War in the Modern World* (Durham, NC, 1959), 143-147.

8. See John Beeler, "Steaming Erratically towards the Dreadnought: British Naval Policy in the Gladstone-Disraeli Era, 1866-1880" (Unpublished PhD thesis, University of Illinois, 1991), 67-135; NMM, MLN/143/3/10, Confidential Cabinet Memorandum by Henry Corry, Peel's Parliamentary Secretary, to the Admiralty, 2 December 1867.

9. A.J. Holland, *Buckler's Hard: A Rural Shipbuilding Centre* (Emsworth, 1985), 135-147; and Clive N. Ponsford (ed.), *Shipbuilding on the Exe:*

The Memoranda Book of Daniel Bishop Davy (1799-1874) of Topsham, Devon (Exeter, 1988). It should be noted that all figures and estimates on costs are conservative and are likely to understate rather than overstate the impact of maritime industries on the British economy. These numbers are not meant to be definitive but to act as general guides for other more qualified researchers to use in more detailed considerations of the topic.

10. McNeill, *Pursuit of Power*, 224-234. It should be noted that while four large ships with completely iron hulls were built by the RN during this period such a design did not yet become viable on a large scale. On escalating costs of naval ship construction see NMM, MLN/142/4[1], Confidential Report on the Navy Estimates, 1852 and 1858, 1 December 1858.

11. D.K. Brown, *Before the Ironclad: Development of Ship Design, Propulsion and Armament in the Royal Navy, 1815-1860* (London, 1990), 125-137. During 1844-1845 there were a number of events that caused both Britain and France to believe that war was certain. The British were particularly alarmed by a pamphlet by the Prince de Joinville, son of Louis Philippe, whose *Notes sur l'état des forces navales de la France* suggested that the introduction of steam could help France defeat its historic enemy. While the note created panic in some circles, others noted that any attempt to outbuild the RN could be countered by Britain's superior industrial capability. On de Joinville and the Anglo-French naval rivalry, see Hamilton, *Anglo-French Naval Rivalry*, 18. See also Jacques Mordal, *Twenty-Five Centuries of Sea Warfare* (London, 1970), 202-203; and Hans Busk, *The Navies of the World: Their Present State and Future Capabilities* (London, 1859), 2-6.

12. Robert G. Albion, *Forests and Sea Power: The Timber Problem of the Royal Navy 1652-1862* (reprint, Hamden, CT, 1965), 392-413; Brown, *Before the Ironclad*, 28; and Busk, *Navies*, 60 and 62. To give some idea of the amount of timber required by the RN at this time, it would take seventy-six acres of 100-year-old oak forest to build a vessel like the one described above. To meet the RN's needs in 1849-1850 required nearly 14,000 acres.

13. William H. White, *Manual of Naval Architecture* (2nd ed., London, 1882), 54-62; David

Mathew, *The Naval Heritage* (London, 1944), 190-191; Jonathan G. Coad, *The Royal Dockyards 1690-1850: Architecture and Engineering Works of the Sailing Navy* (London, 1989), 225-245; Philip MacDougall, *Royal Dockyards* (Newton Abbot, 1982); Roger Morriss, *The Royal Dockyards During the Revolutionary and Napoleonic Wars* (Leicester, 1983); and Hamilton, *Anglo-French Naval Rivalry*, 200-230. Established status meant that a worker had proven ability and was sought after for any crew.

14. See J.M. Haas, "The Best Investment Ever Made: The Royal Dockyard Schools and the British Shipbuilding Industry, 1800-1914," *Mariner's Mirror*, LXXVI (1990), 325-337.

15. *The Times*, 17 March 1843.

16. See Arthur N. Gilbert, "Buggery and the British Navy, 1700-1861," *Journal of Social History*, X (1976), 72-98; R. Taylor, "Manning the Royal Navy: The Reform of the Recruiting System, 1852-62," *Mariner's Mirror*, XLIV (1958-1959); Hamilton, *Anglo-French Naval Rivalry*, 144-199; and M. Lewis, *The Navy in Transition, 1814-1867: A Social History* (London, 1965).

17. Jon Sumida, "The Royal Navy and Technological Change, 1815-1945," in Ronald Haycock and Keith Neilson (eds.), *Men, Machines and War* (Waterloo, ON, 1988), 77-81; and Stanley Bonnett, *The Price of Admiralty* (London, 1968), 52-68.

18. These were two of the last private gunfounders used by the RN Board of Ordnance, and the navy contracts are credited with keeping the businesses alive. Coad, *Royal Dockyards*, 245.

19. McNeill, *Pursuit of Power*, 225. This view has been challenged by the comprehensive works of Andrew Lambert and John Beeler. I would especially like to thank the latter for allowing me to look at his manuscript on the Royal Navy in the late nineteenth century, "'Suited for a Period of Profound Peace': British Naval Policy in the Gladstone-Disraeli Era, 1866-1880," which is forthcoming with Stanford University Press.

20. Brown, *Before the Ironclad*, 57; and R.A. Buchanan and H.W. Doughty, "The Choice of Steam Engine Manufacturer by the British

Admiralty 1822-1852," *Mariner's Mirror*, LXIV (1978), 337-343.

21. This assumption was quickly dispelled during the Crimean War. See Andrew Lambert, "Preparing for the Russian War: British Strategic Planning, March 1853-March 1854," *War and Society*, VII (1989), 15-39.

22. David B. Tyler, *Steam Conquers the Atlantic* (London, 1939), 77-81 and 170-172; and J. Briggs, *Naval Administration 1827-1892* (London, 1897), 134-147. Slightly later studies on similar themes include Clive A. Trebilcock, "Spin-off in British Economic History: Armaments and Industry, 1760-1914," *Economic History Review*, XXII (1969), 475-494; and Trebilcock, *The Vickers Brothers: Armaments and Enterprise, 1854-1914* (London, 1977). In his article, Trebilcock reveals that by 1881 less than thirty percent of the RN's expenditures on munitions went to private firms (480). As for actual engines and their reliability, Buchanan and Doughty, "Choice," clearly indicate the reluctance and confusion that accompanied Admiralty decisions about steam-driven engines due to discrepancies in performance, maintenance and costs.

23. On Sir W. Symonds and ship design see, Andrew Lambert, "Captain Sir William Symonds and the Ship of the Line, 1832-47," *Mariner's Mirror*, LXXIII (May 1987), 167-179.

24. *Hansard's Parliamentary Debates*, XCVIII, 7 April-26 May 1848, 816-823.

25. A large number of first- to fourth-rate sailing ships were started in the early 1840s. Few, if any, were finished as sailing ships and most were considerably modified. The first set of changes came about 1847 as a result of the work of the Committee of Reference, headed by Senior Assistant Surveyor John Edye, and involved alterations to the form and proportions. Brown, *Before the Ironclad*, 124.

26. *Hansard*, 819-820. On the question of dockyard improvements and expansion, Ward noted that there was little space available for expansion "at Woolwich, nor yet at Sheerness...for not one inch of building ground could be found there, the whole of the existing buildings being supported by piles sunk at an enormous expense."

27. *Ibid.*, 821.

28. *Ibid.*, 819.

29. *The Times*, 23 February 1840, and 11 March 1851. See also "Memorandum by the Hon. Sidney Herbert, First Secretary of the Admiralty, 4 September 1844," in John B. Hattendorf, et al., (eds.), *British Naval Documents, 1204-1960* (Aldershot, 1993), 682-688.

30. Captain Sir William Symonds, formerly Surveyor of the Navy, to Earl of Minot, Lord Privy Seal, 10 October 1847, in Hattendorf, et al. (eds.), *British Naval Documents*, 688. For Peel's own views on providing funds for the RN, see Sir Robert Peel to Earl of Ellenborough, First Lord of the Admiralty, 17 March 1846, in *ibid.*, 580-581.

31. *Hansard*, 9 May 1848, 821-822.

32. Richard A. Preston and Sydney F. Wise, *Men in Arms* (New York, 1974), 227-228; McNeill, *Pursuit of Power*, 273-279.

33. Some of the more important and expensive bases included Portsmouth, Chatham, Sheerness, Devonport, Woolwich, Purfleet in Essex, Royal Clarence Victualling Yard, Gosport, Royal William Victualling Yard, Stonehouse, Malta, Kingston Jamaica, Kingston Ontario, Gibraltar, Bermuda, Cork, Antigua, Cape of Good Hope, Halifax (NS), Bombay, and Trincomalee. See Coad, *Royal Dockyards*, 245-290.

34. Brown, *Before the Ironclads*, 209.

35. *The Times*, 23 June 1843, describes the dredging requirements in Malta, as well as the reconstruction of docks at Portsmouth. A good example of the amount of employment and material needed to run the victualling yards in England is found in Coad, *Royal Dockyards*, 288. For example, the expansion of the Royal Clarence Yard began in 1828, but was not completed until the early 1840s. As for consumption of material, some idea of the benefit in supplying such institutions can be taken from figures that show that the bakery and brewery in the Royal William Yard were designed to turn 1000 sacks of flour into bread and biscuits and to produce 120 tons of beer per week.

36. Ads and tenders for such work and material are found in the *Upper Canada Gazette*, July-November 1845. A survey of the same months for other years reveals that the ads recurred regularly. Prices for the contract and tenders were rarely listed, doubtless because of the bargaining involved. But a comparison of other tables of tradesmen and their wages in Great Britain in B.R. Mitchell (comp.), *Abstract of British Historical Statistics* (Cambridge, 1971), suggests that with some depreciation factored in, and the few prices of goods and services available in the newspapers, a few thousand pounds per year was reasonable.
37. For example, while shipbuilders benefited from the actual construction and others gained from the storage of surplus stores and material, the oak growers and teamsters responsible for hauling the great loads of timber would also profit. See Albion, *Forests and Sea Power*, 348-365.
38. See Clowes, *Royal Navy*, VI, 22-504. For evidence from a slightly later period that graphically illustrates the point of the demands being made for naval assistance/protection from the private sector, see the appendices in Antony Preston and John Major, *Send a Gunboat!: A Study of the Gunboat and its Role in British Policy, 1854-1904* (London, 1967).
39. For a more detailed examination of the confidence inspired by the RN's position see, Bartlett, *Great Britain and Sea Power*; Beeler, "Steaming Erratically;" Beeler, "Steam Strategy and Schurman: Imperial Defence in the Post-Crimean Era, 1856-1905," in Keith Neilson and Greg Kennedy (eds.), *Far Flung Lines: Essays on Imperial Defence in Honour of Donald MackenzieSchurman* (London, 1997), 27-55; Brian Tunstall, *The Realities of Naval History* (London, 1936), 182-207; Kennedy, *Rise and Fall of British Naval Mastery*, 149-177; and Sir Robert Peel to the Earl of Ellenborough, First Lord of the Admiralty, 17 March 1946, in Hattendorf, *et al.* (eds.), *British Naval Documents*, 581-582.
40. Robert Simper, *Britain's Maritime Heritage* (London, 1982), 246-248.
41. Ponsford(ed.), *S%&u/Wing*, 23-35 and 43-45. While a number of shipbuilders appeared to fall on hard times during the depression of the 1820s, the research available indicates that some consolidation was going on, with employment being stabilized to some extent. In particular, the large growth of merchant shipping between 1835 and 1850 indicates that the shipbuilding industry remained relatively healthy throughout Great Britain.
42. Simon P. Ville, *English Shipowning During the Industrial Revolution* (Manchester, 1987), 62-70; Fred M. Walker, *Song of the Clyde: A History of Shipbuilding* (London, 1984), 35; and Simper, *Britain's Maritime Heritage*, 250.
43. The numbers used to derive these results are by no means definitive and have not been adjusted to account for inflation, cost differentials, regional diversity or overhead. But they do give a rough picture of the money being pumped into the British economy during this decade by one facet of Britain's maritime commitment. Deane and Cole, *British Economic Growth*, 234, list the annual averages (in millions of pounds) for UK shipping growth, 1840-1849, as follows: value of tonnage built and registered in the UK, 1840-1849, 2.5; and value of tonnage built in UK, 2.7. Deane and Cole confirm that in the 1840s the rate of investment in new ships began to rise. In comparison, the value of re-exported raw cotton, the largest principal re-export, for the same period was £45,024,000; see Mitchell (comp.), *Abstract*, 297.
44. University of Alberta, Cameron Library, Government Documents Section, Peel Correspondence (PC), article 96, microfilm reel 4, "Statement on Revenue and Condition of Country."
45. Some idea of where these wages fit into the rest of the British industrial sector can be seen by comparing the figures in the text to Deane and Cole, *British Economic Growth*, 152. In 1841, agriculture, forestry and fishing contributed £33.8 million in wages and salaries. Other main contributors (in £ million) were: mining, manufacturing and building (£68.6); trade and transport (£27.4); domestic service (£26.9); and public, professional and all others (£34.6). By 1851, agriculture, forestry and fishing injected £39.7 million, while mining, manufacturing and building (£92.1); trade and transport (£37.3); domestic service (£27.4); and public, professional and all others (£50.1) were also major sectors.
46. Some more widely-ranging studies that provide a broader context for free trade include P.L.

Cottrell, *British Overseas Investment in the Nineteenth Century* (New York, 1975); Barry Turner, *Free Trade and Protection* (London, 1971); and J.B. Williams, *British Commercial Policy and Trade Expansion, 1750-1850* (Oxford, 1973). Bernard Semmel, *Liberalism and Naval Strategy: Ideology, Interest, and Sea Power during the Pax Britannica* (Boston, 1986), 31-68; Paul M. Kennedy, *Rise and Fall of the Great Powers* (London, 1988), 183-203.

47. Kennedy, *Rise and Fall of the Great Powers*, 192-202.

48. PC, article 32, reel 4, "House of Commons Debate," 28 January 1846.

49. PC, article 96, reel 4, "Statement on Revenue and Condition of Country," 9 March 1846; article 99, reel 4, "House of Commons Debate," 22 January and 23 March 1846.

50. *Ibid.*

51. Barry Gough, "Sea Power and South America," *American Neptune*, L (1990), 20-34; *The Times*, 15 January 1840 and 12 February 1846.

52. *The Times*, 12 February 1846.

53. *Ibid.*

54. *Ibid.*, 20 June 1842.

55. PC, "House of Commons Debate," 20 February 1846; *The Times*, 22 March 1843. For a study which misses the early involvement of business in maritime affairs but is very good on carrying this theme into the late nineteenth century, see Steven R.B. Smith, "Public Opinion, the Navy and the City of London: The Drive for British Naval Expansion in the Late Nineteenth Century," *War and Society*, IX (1991), 29-51.

56. Some rough idea of the overall contribution to the British economy can be gained by adding all the costs mentioned above — warship construction, maintenance and infrastructure; merchant marine construction and cargo values; and value of overseas trade — and comparing this rough indicator with Deane and Coles, *British Economic Growth* 363 (in £ million). 1841: agriculture, forestry, fishing (£99.9); mining, manufacturing, building (£155.5); trade and transport (£83.3); rents of dwellings (£37.0); and total gross national income (£452.3). 1851: agriculture, forestry and fishing (£106.5); mining, manufacturing, building (£179.5); trade and transport (£97.8); rents of dwellings (£523.3); and total gross national income (£452.3).

57. David French, *The British Way in Warfare, 1688-2000* (London, 1990). Given the paucity of legitimate foreign challenges to Britain's maritime supremacy, the need for Britain to spend was minimal; see Paul Schroeder, "The Nineteenth Century International System: Changes in the Structure," *World Politics*, XXXIX, No. 1 (October 1986), 1-26.