

UNIVERSITY OF ALABAMA

REMARKS ON THE ARCTIC WHALE-FISHERY, 1611-1776  
WITH AN ECONOMETRIC PRODUCTIVITY ANALYSIS OF  
BRITISH ARCTIC WHALING PORTS 1770-1775

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The history of whaling is a history not only of whales, ice, men, and ships, but also of numbers-of tons, tuns, gallons, pence, and pounds. For those brave enough to plumb the depths of the historical record on the subject, there exists a wealth of data regarding most every aspect of the industry. Unfortunately, the statistical analysis and long hours spent poring over logbook and ledger required to interpret the available data almost inevitably makes the study of the whaling industry a decidedly more difficult task than might first appear. In short, while there is a great deal of statistical information available about the industry over time, the effort required to organize, develop, and above all to *interpret* the data forces the prospective researcher to limit the scope of the data analyzed, and in doing so to leave the better part of the data unexamined out of necessity. In this study, the methodology applied by Lance Davis, Robert Gallman, and Karin Gleiter in *In Pursuit of Leviathan* has been partially applied to a limited set of heretofore unrefined data<sup>1</sup> regarding British whaling efforts in the Arctic fishery during the eighteenth century in order to determine which British whaling ships and ports were most productive over the period 1770-1775.

In Part I, the Arctic fishery will be clearly defined and discussed for the purposes of introduction and of centering the data in a proper historical context. In Part II, the products of the whaling industry will be discussed, along with a brief description of the various types of whales hunted during the period. In Part III, the data set developed for the study and the methods utilized in doing so will be outlined. Part IV consists of an explanation of the translog production function used to analyze the data and the justification for various assumptions which played into the application of the function to the available data not explained in parts II-III. Part V is taken up with the findings of the study.

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<sup>1</sup> The British Arctic Whaling databank maintained by the University of Hull.

## I. A History of British Arctic Whaling, 1596-1775

### *i. On the Discovery of Spitsbergen and the Rise of the Muscovy Company*

A Dutch expedition led by Willem Barendszoon (Barents), Jacob Heemskerke Hendickszoon, and Jan Corneliszoon Rijp of Enkhuizen discovered the desolate, frozen island of Spitsbergen on June 17th, 1596.<sup>2</sup> Strangely, for a place that was to become the centerpiece of a grand economic conflict spanning two centuries, it attracted next to no interest from businessmen at the outset. However, as Dutch activities began to hamper the English Muscovy Company's trade with Russia, the Company's backers began to ponder the possibility of turning Spitsbergen into a miniature Russia all their own, a source for uniquely northern goods such as furs, tallow, wax, timber, flax, tar, and hemp completely free from Dutch competition. Over the course of the next fifteen years, a number of expeditions were sent to the island to assess the extent of its natural resources and the degree to which said resources could be utilized for profit. While the majority of these expeditions were concerned with exploiting the island as a source for walrus (called 'morses' by those that hunted them), seals, and furs, it became increasingly apparent over time that the true value of Spitsbergen lay not in the goods to be harvested from the island itself (which were rapidly depleted), but rather in the fishing grounds surrounding it, which were quickly noted to be practically filled to bursting with whales.

In 1611, the first dedicated whaling expedition was sent to the Spitsbergen grounds under the command of Jonas Poole and Thomas Edge. For some years previously, the Muscovy Company and

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<sup>2</sup> Conway, William Martin. *No Man's Land, a history of Spitsbergen from its discovery in 1596 to the beginning of the scientific exploration of the country*,. (Cambridge: University Press, 1906), 11-19.

its agents had been hard at work enlisting the assistance of the French and Spanish Basque whalers, the only people in the European world knowledgeable in whalecraft, having been engaged in the trade of “pursu[ing] the whales that frequented their coasts from time immemorial,”<sup>3</sup> and without whose help any whaling expedition was liable to be a futile endeavor. The first expedition ended in disaster amid the ice, and it was only with the assistance of Thomas Marmaduke, one of the infamous “Hull interlopers” who made it their business to encroach upon the Muscovy Company’s monopoly in the north, that any of those who made the trip managed to return home and confirm the tales of vast numbers of whales ripe for the taking in the northern waters.

Determined to open the fishery and armed with lessons learned by the first expedition, the Company sent a second expedition the following year, again under the command of Poole and Edge, and carrying with them a larger contingent of Basque whalers than before. This expedition proved very successful, striking seventeen whales over the course of the year for a net result of 180 tuns (~45360 US gallons) of oil.<sup>4</sup> During the course of the voyage, the English boat crews learned a great deal about whaling from those Basques willing to teach them the craft on the one hand, and from observing the practices of those who wished to keep the art and mystery of the trade private on the other. In this way, a body of English whalers which could ply their trade independent of Basque assistance was developed.

The news of the Muscovy Company’s success in 1611 spread throughout Europe. Several Dutch and Spanish trading concerns took particular interest, hiring on men who shipped on the

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<sup>3</sup> Conway, 40.

<sup>4</sup>Zupko, Ronald Edward. *A dictionary of weights and measures for the British Isles: the Middle Ages to the twentieth century*. Philadelphia: American Philosophical Society, 1985. "Quoting Gras (1918), p.706."

1611 expedition to guide them to the Spitsbergen grounds. In 1613, King James I awarded the Muscovy Company a monopoly over the Spitsbergen whaling trade, a move which would bear disastrous fruit over the course of the following years. During the summer of 1613, a Dutch admiral by the name of Van Muyden defied the monopoly, seizing modern-day Recherche Bay as his base of operations, and molesting the *Michael de Aristega*, a Spanish whaler bearing authorization from the Muscovy Company, which attempted to encroach upon his claim. The captain of the *Michael* fled the bay and sought out the English Admiral, Benjamin Joseph, to ask him to retaliate on his behalf. On July 11th, four Muscovy ships led by the 21 gun *Tiger*, Joseph's flagship, stood into the bay and held Van Muyden's ships under their guns until the latter agreed to surrender their cargo and leave. Other foreign interlopers were dealt with less harshly, but they were nonetheless largely prevented from carrying on the trade in the region, much to the dismay of their owners. The Dutch in particular found English actions objectionable, and when their protests fell on deaf ears in London, they resolved to take matters into their own hands.

## *ii. The Dutch Ascendancy*

On January 27th, 1614, the Dutch government granted a monopoly to the Noordsche Compagnie, an alliance of the Amsterdam, Delft, Rotterdam, Hoorn, Enkhuizen, and Zaardam whalers.<sup>5</sup> In response, the British annexed Spitsbergen, claiming right of first discovery based on an erroneous interpretation of the journal of Sir Hugh Willoughby's Arctic voyage of discovery in 1553,<sup>6</sup> and authorized the Muscovy Company to defend itself against foreign interlopers. Undeterred, the

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<sup>5</sup> Conway, 65.

<sup>6</sup> Asher, G. M.. *Henry Hudson the navigator The original documents in which his career is recorded collected, partly translated and annotated..* London: (Printed for the Hakluyt society, 1860), clix-clx.

Noordsche Compagnie prepared a fleet for the 1614 season, and the Dutch government allocated several men-of-war to escort the fleet to and from the Spitzbergen grounds. Faced with such a force, the agents of the Muscovy and Noordsche companies agreed to a truce of sorts until the matter of occupation could be settled in a more satisfactory manner by state diplomats. In exchange for peace, the whalers of the two companies agreed to keep to separate sets of agreed-upon bays and harbors whilst plying their trade. While the Muscovy men agreed to the truce believing it to be one to be renewed annually, the Noordsche men believed it to be one which would remain in force until a formal agreement was reached between the English and Dutch governments. The various difficulties brought on by this difference of interpretation came to a head in July 1618, when the Dutch fell upon two ships of the Muscovy Company, the *Pleasure* and the *Elizabeth* (along with the pinnace *Prudence*), in a bay clearly belonging to the English.

The Muscovy Company later sought compensation from the the crown for the “wrongs and abuses done them by the Hollanders and Zealanders in Greenland, in driving them away from their fishing, under commission from Count Maurice, the [Dutch] States having given Greenland to the Zealanders, and Hudson's touches and the Islands adjoining, to the Hollanders, for fishing,”<sup>7</sup> estimating that Dutch aggression in 1618 caused a loss of “66,436 £ 15s<sup>8</sup> besides the killing of men and spoiling of ships.”<sup>9</sup> Needless to say, this was a matter that needed rectifying, and the Dutch subsequently agreed to pay back the goods taken rather than risk war with England. Unfortunately for the Muscovy Company,

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<sup>7</sup> \*James I - volume 99: September 1618', *Calendar of State Papers (Domestic), (CSP): James I, 1611-18* (1858), pp.. 568-580. URL: <http://www.british-history.ac.uk/report.aspx?compid=51540> Date accessed: 06 April 2013.

<sup>8</sup> It is unlikely that actual losses incurred by the Muscovy Company in 1618 amounted to such a massive sum. It is likely that this estimate includes a great deal of rounding up and overvaluing of assets, and was intended to shock the Crown into action rather than to persuade it to do so.

<sup>9</sup> CSP, *op. cit.*

the English navy was not in a state capable either of forcing the Dutch to pay or protecting English whalers far from home, and as a result the English never saw the promised restitution paid.

From this point onward, English influence over whaling in the Arctic began a general decline. As the Noordsche Compagnie grew, the Muscovy Company found itself unable to compete with the significantly lower prices of Dutch whaling products despite bans on importing foreign-caught bone and oil.<sup>10</sup> To complicate matters, the domestic interlopers of Hull, York, and Yarmouth were making it increasingly difficult for the Company to operate at a profit. In 1626, Company ships under Captain William Goodlad arrived at Spitsbergen to find “that nine ships of York and Hull had been there and taken away the Company's shallops, burned their casks, and spoiled their materials for the fishing, besides demolishing their houses and fort.”<sup>11</sup> Instead of awarding the Company damages, the Crown ordered that the Company “admit three of the merchants of York and three of Hull, to be adventurers with those of London, in a joint stock under the patent,”<sup>12</sup> to ensure the repayment of the damages. In practice, this decision did little more than grant a measure of legitimacy to the interlopers and open the door for similar conflicts with whalers of other domestic ports such as Yarmouth. These difficulties multiplied over the next thirty years, until the domestic whaling trade finally collapsed ca. 1673 under the weight of cheap Dutch oil admitted to the country to foster better relations with the Dutch after the war of 1652-4, the increasingly common impressment of whalers in the late 1650s, and the eventual breaking of the Company monopoly by Act of Parliament.<sup>13</sup> “For almost a century [thereafter,] English whaling was a dismal affair conducted on a level akin to an Englishman with a thimble emptying the same

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<sup>10</sup> CSP, 11 Sept. 1614, 18 May 1619, 25 Jan 1628.

<sup>11</sup> CSP, 15 Nov. 1626.

<sup>12</sup> CSP, 9 Jan. 1627.

<sup>13</sup> Jackson, Gordon. *The British whaling trade*. (London: A. and C. Black, 1978), 23.

tun as a Dutchman with a bucket.”<sup>14</sup>

### *iii. The Early Revival Period, 1749-1766*

The British whaling trade was brought out of its stupor in 1749, when Parliament increased the bounty for whalers to 40s/ton, a sum which was almost enough to outfit a whaling voyage. Such a reduction in risk made entry into the industry extremely attractive to shipowners, and as William Scoresby observes: “immediately after the passing of this...act of Parliament, the British whale-fishery began to assume a respectable and hopeful appearance.”<sup>15</sup> The bounty, in conjunction with the demand for cheap machine oil brought on by British industrialization, the need for affordable illumination in growing urban centers, and the decline of Dutch influence over the Arctic fishery owing to dwindling catch rates and strong competition in the industrial oil market from the owners of rapeseed presses on land, made 1750 a prime time for British reentry into the whaling industry. Furthermore, the growing risk of French interference in the colonial whaling trade (around Nova Scotia in particular) introduced enough uncertainty about the continued availability of whale products from the New World that it seemed prudent to develop a domestic whaling industry, if for no other reason than to protect the British market against some unforeseen failure in the colonial whaling trade.

The returns of the first phase of the industry’s rejuvenation (1750-1766) were poor, owing to several factors, not least of all the depletion of the available body of able seamen by the Royal Navy during the Seven Years’ War. At first glance, the low catch rates of the period<sup>16</sup> might appear to be a result of bad luck, but it must be remembered that whaling requires the application of a highly

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<sup>14</sup> Jackson, 29.

<sup>15</sup> Scoresby, William Jr. 1820. *An account of the Arctic region with a history and description of the northern whale fishery*. 2 vols. (Edinburgh, Archibald Constable. Reprinted 1969 Newton Abbot, David and Charles), Vol. 2. 75.

<sup>16</sup> See Jackson, 62-3 for specific examples.



specialized set of skills (*viz.* the retainer of Basque consultants in the early days of the Muscovy Company), skills which had to be relearned and in many cases rediscovered by the crews engaged in the whaling trade during this period. This would make for a difficult task in ordinary circumstances, but the inherent difficulties were compounded by the fact that His Majesty's wartime navy was in dire need of able seamen, and as the whaling industry had long borne a reputation as a training ground which produced sailors of the highest quality, this made whalers prime targets for press gangs. Although in most cases whalers were protected from impressment by the Crown, obtaining fine sailors in the present often took precedence over avoiding the sanction of the Crown's representatives.

It is important to note here that the actions of press gangs in this regard were misguided, for the whalemen of the early revival period were largely undeserving of the reputation of being the best sailors the British merchant marine had to offer, as they were not privy to the same body of knowledge regarding whaling as the whalers of the early English Arctic whaling trade. Instead they were engaged in rediscovering and redeveloping the art of whaling from scratch. Instead of only accepting sailors with whaling experience or those judged by experienced whalemen as being capable of learning the trade, as had been the case in the late 1600s, owners found themselves manning ships without any real idea of what kinds of sailors made good whalemen, with the result that the overall quality of the British whaling fleet was brought below that which it had traditionally held. To make matters worse, by pressing whalemen, the navy made it far more difficult for an experienced whaling elite, such as had come into being over the course of the early seventeenth century, to develop, as the number of whalemen who made multiple voyages and passed on their knowledge to new crews was drastically reduced. Moreover, the navy's practice of hiring whaling vessels into the service for use as transports, reducing

the number of vessels available for working the grounds and training new whaling crews. As British whaling efforts floundered, American whaling exports to Britain increased to fill the demand, depressing the market for British-caught whale products and prompting a large-scale shift away from whaling on the part of shipowners.

*iv. The Hull Revival and Second British Ascendancy, 1766-1776*

The industry remained in decline until 1766, when a lucky voyage by the *Berry* of Hull<sup>17</sup> sparked a renewed interest in whaling among the merchants of that port, an interest which quickly spread to shipowners throughout the rest of Britain. As the threat of war with the colonies loomed ever larger on the horizon, it became clear that an alternate source of supply for whale products was necessary, as a British blockade of colonial sea trade would surely strangle the New England whaling trade in turn. The flurry of whaleship construction which took place in Britain in 1775 is almost entirely attributable to speculation regarding this particular state of affairs. What is more, the gamble paid off. As American whaling historian Eric Jay Dolin observes, “The American Revolution devastated the colonial whale fishery. All along the coast, whaling operations ground to a halt as the risks of capture by the British navy escalated and many of the men needed to outfit whaleships joined the patriot cause,”<sup>18</sup> and the once mighty New England whaling industry, which exported 4093 tuns of oil during 1775, exported only 52 tuns during 1776 and 2 tuns in 1777—a reduction of ~99.987% and ~99.999% respectively<sup>19</sup>—had disappeared. The British merchant marine stood perfectly positioned to take full advantage of such favorable economic conditions.

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<sup>17</sup> See Jackson, 64.

<sup>18</sup> Dolin, Eric Jay. *Leviathan: the history of whaling in America*. (New York: W.W. Norton & Co., 2007), 149.

<sup>19</sup> Data from Jackson, Appendix 6: *Regional Sources of Whale Oil, 1772-1805*.

## II. The Products of Whaling

### *i. Species of Whales*

Whaling during the 17th century was almost entirely restricted to the pursuit of baleen whales, chief among them *Eubalaena glacialis*, the right whale (so dubbed because it was the “right” whale for hunters to attack, being of a peaceful disposition and in possession of vast quantities of high quality whalebone and oil) and its relative, *Balaena mysticetus*, the bowhead whale. Occasional attempts were made to take humpback whales (*Megaptera novaeangliae*) and gray whales (*Eschrichtus robustus*), but as the oil and baleen of these particular species is of inferior quality to that of right and bowhead whales, humpbacks and grays were never hunted with the same zeal as their more profitable cousins. During the eighteenth century, a third type of whale, the sperm whale, was discovered in tropical and subtropical oceans and hunted for its great size, extraordinarily pure oil, and two products unique to the species: spermaceti (a waxy substance useful in chandlery, pharmacy, and textile manufacture), and ambergris (a very rare and exceedingly valuable fatty substance used as a fixative in the manufacture of perfumes). As this study is concerned with Arctic whaling, what follows will only take into consideration the products of baleen whales, as sperm whales tend to range between 60°N and 60°S latitude, for the most part below the latitudes of the Arctic fishery (~80°N-60°N).

### *ii. Whale Oil*

Whale oil was extracted from a slain whale by stripping and boiling down the blubber from the carcass, a process called “trying out.” It found use as lamp fuel and in the manufacture of soap, as well as as a lubricant for precision instruments. With the advent of the industrial revolution, specially treated

whale oil became popular as a high-pressure lubricant used in factory machinery. Whale oil was also important in the manufacture of varnish, leather, and rough cloth, such as jute.<sup>20</sup>

For the purposes of this study it was necessary to fix a price per gallon of oil for the period 1770-1775. According to *The Merchant's Magazine and Commercial Review*, Vol. 3, published in 1840, the average price in the market for whale oil was ~\$70/tun.<sup>21</sup> In order to convert \$70(1775) to £ (1775), a value equivalency based on economic aggregates was used, yielding a result of £ 18 11s(1775)/tun.<sup>22</sup> According to *The Grocer's Encyclopedia*, published in 1911, one ton of blubber yields ~200 gallons of oil,<sup>23</sup> and a tun is a standard of measure for casks roughly equivalent to 236 gallons, it can be concluded that one ton of blubber was valued at approximately £ 15 14s 5d(1775).

### iii. Whalebone (Baleen)

Baleen is a keratinized structure like hair, fingernails, and hooves. The baleen hangs down in two rows, one from each side of the roof of the mouth. The function of baleen is to filter krill and other marine animals out of water so they can be eaten by the whale. In the right whale, single plates of baleen can reach seventeen feet long. Before the invention of spring steel in the nineteenth century, whalebone was very valuable. Because it is flexible and retains shapes imposed on it with heat, baleen was used for springs and in products such as corsets, knife handles, umbrella ribs, brushes, and fans.<sup>24</sup>

<sup>20</sup> *Encyclopædia Britannica Online*, s. v. "whale oil," [www.britannica.com/EBchecked/topic/641432/whale-oil](http://www.britannica.com/EBchecked/topic/641432/whale-oil).

<sup>21</sup> Hume, Joseph. *The merchants' magazine and commercial review*, volume iii. New York: Freeman Hunt, editor and proprietor, 1840), 368.

<sup>22</sup> The following operations were conducted using the calculators available at [measuringworth.com](http://measuringworth.com): \$70(1775)->\$367(1970)-> £ 153(1970)-> £ 18 11s(1775). The conversion to and from 1970 values was necessary because calculators are only available for \$(1774-Present), £ (1270-1970), £ (1971-Present), and \$-> £ (1830-Present). 1970 represented the last year where £ were no longer represented as pounds, shillings and pence, so it seemed a logical point to perform the \$-> £ conversion. A conversion could also reasonably be calculated at 1830.

<sup>23</sup> Ward, 183.

<sup>24</sup> *Encyclopædia Britannica Online*, s. v. "baleen whale," [www.britannica.com/EBchecked/topic/50134/baleen-whale](http://www.britannica.com/EBchecked/topic/50134/baleen-whale).

As baleen was not a significant output for whalers operating in the period under scrutiny,<sup>25</sup> the only available correlation<sup>26</sup> projects an average return of 15 pounds of bone/tun of oil at ~\$0.50(1775)/pound (~3d(1775)/pound<sup>27</sup>), accounting for a trivial average revenue of ~ £ 2 15s 4d(1775) per voyage. As the available data regarding whalebone returns outside of mathematical projection is extremely limited, revenue from whalebone has been omitted from the calculations of voyage productivity indexes. The data can easily be adjusted to accommodate whalebone returns based on the above calculations should the need arise.

### III. The British Arctic Whaling Databank

The BAW Databank (BAW set) is a database maintained by the University of Hull consisting of data drawn from original contemporary records such as logbooks, journals, archive lists and published literature, along with citations for each data point.<sup>28</sup> Over the course of the research for this study, the database available at the University of Hull British Arctic Whaling website<sup>29</sup> was expanded to include whaling records drawn from Lloyd's List over the period 1770-1775. In particular, differences in the number of whales reported in the BAW set and in Lloyds were noted, along with the names of ship captains and the dates when the arrival of a ship was first reported. For the purposes of calculating productivity, the greatest number of whales between the catches reported in the BAW set and in

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<sup>25</sup> See Davis, 30.

<sup>26</sup> Ward, *ibid*.

<sup>27</sup> See note 21 for conversion procedure.

<sup>28</sup> "BAW - British Arctic Whaling." University Home page - University of Hull. <http://www.hull.ac.uk/baw/databank/databank.htm> (accessed April 9, 2013).

<sup>29</sup> "BAW - British Arctic Whaling." University Home page - University of Hull. <http://www.hull.ac.uk/baw/databank/databankdatafiles.htm> (accessed April 9, 2013).

Lloyd's was used. Ships which were reported in Lloyd's but not in the BAW set were added (36 ships total, 27 in the year 1773). In cases where a ship's burthen was unavailable, the average burthen for the year in which the ship first appeared on the record was assigned to that ship. Dates when ships which spoke to other ships in the record reported having done so were also noted.

#### IV. The Translog Productivity Index

The function applied to the data outlined in part III and included in Appendix I for the purpose of determining which ships and ports were the most productive is one applied by Lance E. Davis in an analysis of the productivity of American whaling 1816-1906,<sup>30</sup> and seemed appropriate for the purposes of econometric analysis of the BAW set. The function given by Davis is as follows:

$$\ln \lambda_{kn} = \frac{1}{2} \sum_i (R_i^k + \overline{R_i})(\ln Y_i^k + \overline{\ln Y_i}) - \frac{1}{2} \sum_n (W_n^k + \overline{W_n})(\ln X_n^k + \overline{\ln X_n})$$

In the equation,  $\ln \lambda_{kn}$  is the productivity index.  $k$  represents capital invested in the voyage. In this study, the burthen of the vessel was entered as  $k$ , as assuming that all owners paid a competitive market price/ton burthen it is not necessary to know the actual price.  $n$  is the name of the vessel.  $R$  is the revenue derived from voyage outputs (in this particular case, whale oil), adjusted to include the bounty of 40s/ton burthen.  $Y$  represents the quantity of whale oil returned by the voyage in question. In cases where the tonnage of blubber is not specified but the number of whales caught is available, the number of whales caught has been multiplied by the average number of tons of blubber/whale over the period (~18.18).  $W$  represents the factor shares in production paid out to the crew, assuming a crew/ton

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<sup>30</sup> Davis, 297-300.

burthen ratio of 0.14<sup>31</sup> and a labor cost of 0.24R.<sup>32</sup> X is the factor inputs of the voyage, calculated as  $k$ .  $R(\text{bar})$ ,  $Y(\text{bar})$ ,  $W(\text{bar})$ , and  $X(\text{bar})$  are the averages over the period<sup>33</sup> (for all voyages, this was calculated against voyages in the voyage year and all voyages over the six year period, returning two productivity indexes per voyage,  $\lambda(1y)_n$  and  $\lambda(6y)_n$ ). Since the function is cast in log form, it cannot accept zero values where natural logs are taken; to handle this, in cases where zero values occur for tons of blubber returned, a quantity of .1 tons has been entered. It must also be noted that the above function represents the *total* productivity of a given data set, not simply the productivity of a single voyage. The single-voyage productivity function that was applied to the data is:<sup>34</sup>

$$\ln \lambda_{i,n} = \frac{1}{2} (R^k + \overline{R_i})(\ln Y^k + \overline{\ln Y_i}) - \frac{1}{2} (W^k + \overline{W})(\ln X^k + \overline{\ln X})$$

## V. Findings

Based on the above calculations, the most consistent (i.e. most productive on average) whaling port on average over the period was the port of Newcastle, enjoying a 586514 index-point advantage over the next most consistently productive port of London. While Newcastle did not field as many whalers as the larger port of London (e.g. 3 to 27 in 1770), it is clear that the whalers that they did send to the Arctic were skilled. Only once in the years 1770-1775 did a Newcastle whaler return without a whale or appreciable stores of blubber (*Royal Exchange*, 1771). By comparison with another of the smaller whaling ports, Hull, multiple Hull whalers returned clean in 1770, 1771, and 1775, bringing the average productivity index of the port down. The fact that Newcastle whalers were the most consistent

<sup>31</sup> Davis, 464. Note this is an estimate based on post 1816 data, used because no better estimate could be found.

<sup>32</sup> Davis, 468. Note this is also an estimate based on post 1816 data, used because no better estimate could be found.

<sup>33</sup> Davis, 298.

<sup>34</sup> I have been assured by a colleague schooled in economics that this adjustment is correct, and I shall defer to her superior judgement on that score.

producers means little other than that it would have been a relatively safe risk to invest in a Newcastle whaler at the time, as among the top 5 British whaling ports, Newcastle ranks dead last in total productivity because of the small number of ships it sent out. Unsurprisingly, the port among the top five which sent out the most ships, London, was the most productive port based on total aggregate production 1770-1775. Liverpool ranked second, followed closely by Hull, which produced significantly more (+4,000,000 index points) than Whitby. This supports the claim that Hull is indeed deserving of its reputation as one of Britain's finest Arctic whaling ports.

The most productive voyages in terms of  $\lambda(6y)$  productivity during the period appear to have been those of the *Brenthall* of London in 1772 ( $\lambda(1y) = 6818043$ ,  $\lambda(6y) = 7712387$ ), and the *Unity* of London in 1773 ( $\lambda(1y) = 5152383$ ,  $\lambda(6y) = 7061155$ ). While these voyages were the most productive in terms of total factor productivity, the most all-things-considered *profitable* voyage for the average crewman based on a complete data set was that of the *Golden Lyon* of Liverpool under Captain Thompson in 1772. The voyage brought in £ 2523 2s 2d, approximately \$4,090,000(2013)! The average wage of a crew member on this voyage would have been in the neighborhood of £ 6 1s 7d, the rough equivalent of \$9830(2013).<sup>35</sup>

## VI. Conclusion

The findings above represent only a small part of the conclusions that might be drawn from the data set developed for this study in the future. The set contains a wealth of information for a diverse set of users: economic researchers, students of maritime history, those interested in the dynamics between

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<sup>35</sup> Calculations from [measuringwealth.com](http://measuringwealth.com) calculators.



the British and American markets in the years leading up to the Revolutionary war, social historians interested in the whaling trade, local historians desiring to examine and pin down the factors which contributed to a particular port's success or failure in the whaling industry, and others whose eventual purpose for examining this research is less presently apparent. Though it is by no means perfect, this set appears to constitute a meaningful advance in the study of British Arctic whaling, one which should be examined, expanded, challenged, and revised as the need arises.

*Feci quod potui, faciant meliora potentes.* D.N.

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## APPENDIX I: EXPANDED BAW SET, 1770-1775 (ABRIDGED)

Year	Ship	Burthen	Burthen Parts	Fitted Out	Total Whales	Lloyd Diff.	Tons Blub.	Part Tons	Captain	Reported In	Reference	£ (1y)	£ (6y)
1770	Adventure	281	40	London	1		47	0.5	Waterhouse	07/06/70	Lloyd's List 1770-71, No. 3588, p2	1646693	2699854
1770	Ann & Elizabeth	220	17	Hull	5	1	82	0.5	Fisher	08/16/70	Lloyd's List 1770-71, No. 3600, p2	1965631	2901155
1770	Betty	286	16	Liverpool	2		48	0.5	???	08/24/70	Lloyd's List 1770-71, No. 3602, p2	1807477	2871298
1770	British Queen	346	90	Hull	5		101	0.5				3946459	5494857
1770	Cambleton	295	55	Leith	0		0	0	Stewart	08/16/70	Lloyd's List 1770-71, No. 3600, p2	-679439.2	-693472.4
1770	Chance	329	92	London	2		30	0				1570795	2638363
1770	Dolphin	274	28	Liverpool	15		109	0.5				3186041	4430474
1770	Duke of Bedford	319	63	London	3		47	0.5				2044785	3226798
1770	Duke of York	288	33	London	5.5		85	0	Boerfloor	09/04/70	Lloyd's List 1770-71, No. 3605, p2	2755188	3990018
1770	Enterprise	387	22	London	2		46	0				2559754	3979716
1770	Exeter	328	28	Exeter	3		78	0				3014552	4392475
1770	Forbes	374	27	London	1		19	0				1384668	2423874
1770	Golden Lyon	310	44	Liverpool	2		84	0.75				3001597	4330459
1770	Grampus	318	13	Liverpool	1		51	0.5				2149845	3352074
1770	Hawke	326	11	London	3		66	0	Paterson	08/24/70	Lloyd's List 1770-71, No. 3602, p2	2643404	3957307
1770	Hazard	201	26	London	1	0	26	0	Cheesman	08/16/70	Lloyd's List 1770-71, No. 3600, p2	768368.56	1389313
1770	Henrietta	323	62	London	0		9	0				658987.07	1313740
1770	Humber	221	9	Hull	0		3	0.5	Anderson	08/16/70	Lloyd's List 1770-71, No. 3600, p2	114234.47	350273.1
1770	James	298	1	London	1		24	0				1191783	2088681
1770	James and Mary	285	69	Whitby	0		1	0.5				-180297.9	-118063.4
1770	Jenny	200	33	Hull	1		25	0				744147.69	1354311
1770	Jenny	314	23	Whitby	3		78	0				2858958	4177766
1770	John & Margaret	397	0	Newcastle	0		9	0.25				890582.3	1705327
1770	Kent	324	13	London	1		34	0				1666273	2755736
1770	King of Prussia	344	31	Hull	0		11	0				842646.68	1608973
1770	Levinathan	422	59	London	2		40	0				2622263	4112811
1770	Liverpoole	198	40	Liverpool	1		27	0.75				788940.51	1414056
1770	Lord Mollineaux	190	10	Liverpool	1		31	0.75	Cox	08/24/70	Lloyd's List 1770-71, No. 3602, p2	821517.66	1446058
1770	Loyalty	301	80	London	0		0	0.5				-650592.1	-918536.9
1770	Lyon	300	11	London	9		54	0.5	Miller	08/16/70	Lloyd's List 1770-71, No. 3600, p2	2080333	3231393
1770	Manchester	266	77	Hull	3.5		73	0.5				2245762	3349102
1770	Mary	283	38	London	2		54	0				1925651	3009807
1770	Neptune	333	56	London	5.5		105	0				3869888	5369923
1770	Peggy	228	31	Whitby	1		22	0.5				814330.53	1485938
1770	Perserverance	332	0	Liverpool	1		28	0.5				1533351	2590333
1770	Porpoise	278	69	Whitby	1		29	0.5				1250740	2147323
1770	Priscilla	340	0	Newcastle	1		41	0				2004536	3211543
1770	Reading	327	48	London	0	2	1	0	Hastings	08/23/71	Lloyd's List 1770-71, No. 252, p2	-415615.8	-477525.9
1770	Rebecca	231	49	London	0		1	0				-243549.3	-288234.6
1770	Rising Sun	361	73	London	15		95	0.5	Hugh	08/24/70	Lloyd's List 1770-71, No. 3602, p2	3957358	5549827
1770	Rockingham	189	10	London	13	9	75	0	Reed	07/06/70	Lloyd's List 1770-71, No. 3588, p2	1531968	2316852
1770	Royal Exchange	287	0	Newcastle	1		27	0.75				1248182	2153776
1770	Sea Horse	291	86	London	2		34	0	Clark	08/27/71	Lloyd's List 1770-71, No. 253, p2	1456090	2436941
1770	Springfield	391	35	London	0		0	0.5				-971716.3	-1318234
1770	Suffolk	295	41	London	3		40	0	Dryden	08/27/71	Lloyd's List 1770-71, No. 253, p2	1648262	2689320
1770	Thames	371	4	London	2		70	0	Petrice	07/06/70	Lloyd's List 1770-71, No. 3588, p2	3237986	4755286
1770	Triton	320	37	London	10		85	0.5				3138505	4512790
1770	Tweed	185	85	London	0		2	0.5				20022.833	154995
1770	Weymouth	266	77	London	9		103	0	Goldsmith	07/06/70	Lloyd's List 1770-71, No. 3588, p2	2933175	4127154
1770	Winnington	119	25	Liverpool	1		31	0.75				479214	869767.46
1770	Young Eagle	362	0	London	2		43	0.5	Drydon	08/10/70	Lloyd's List 1770-71, No. 3598, p2	2260419	3567292
1771	Adventure	281	40	London	0		5	0.5	Waterhouse	08/27/71	Lloyd's List 1770-71, No. 253, p2	369926.87	761893.77
1771	Ann & Elizabeth	220	17	Hull	0		0	0				-292671.6	-511082.7
1771	Benjamin	221	7	Hull	4	3	49	0	???	07/26/71	Lloyd's List 1770-71, No. 244, p2	1119279	2155921
1771	Berry	315	30	Hull	2		5	0	???	08/09/71	Lloyd's List 1770-71, No. 248, p2	265990.24	789543.22
1771	Betty	286	16	Liverpool	2		38	0.75	Swinny	08/27/71	Lloyd's List 1770-71, No. 253, p2	1299056	2550670
1771	British Queen	346	90	Hull	2		30	0	Hord	10/04/71	Lloyd's List 1770-71, No. 264, p2	1402950	2801324
1771	Cambleton	295	55	Leith	3		0	0	???	07/26/71	Lloyd's List 1770-71, No. 244, p2	1783085	3209323
1771	Chance	329	92	London	2		27	0.5	???	07/26/71	Lloyd's List 1770-71, No. 244, p2	1232303	2524655
1771	Dolphin	274	28	Liverpool	0		19	0.75	Lloyd	08/27/71	Lloyd's List 1770-71, No. 253, p2	758746.5	1714006
1771	Duke of Bedford	319	63	London	0		0	0				-430820.3	-752135.7
1771	Duke of York	288	33	London	3		20	0	Boutfleur	08/27/71	Lloyd's List 1770-71, No. 253, p2	819836.17	1828518

1771 Exeter	328	28 Exeter	2	26	0			1178061	2439492
1771 Forbes	374	27 London	3	25	0			1378751	2796201
1771 Golden Lyon	310	44 Liverpool	5	53	0 Thompson	08/27/71	Lloyd's List 1770-71, No. 253, p2	1824205	3310162
1771 Grampus	318	13 Liverpool	0	16	0.5 Wheatly	08/27/71	Lloyd's List 1770-71, No. 253, p2	821054.05	1852173
1771 Hawke	326	11 London	4	60	0 ???	07/26/71	Lloyd's List 1770-71, No. 244, p2	2138328	3752325
1771 Hazard	201	26 London	5	54	0.5 Cheesman	08/27/71	Lloyd's List 1770-71, No. 253, p2	1087607	2060011
1771 Henrietta	323	62 London	0	0	0.5			-561063.9	-1010856
1771 Humber	221	9 Hull	3	13	0.25 Fisher	08/23/71	Lloyd's List 1770-71, No. 251, p2	422987.68	1077079
1771 James	298	1 London	1	12	0.5 Shaw	07/30/71	Lloyd's List 1770-71, No. 245, p2	610333.7	1467137
1771 James and Mary	285	89 Whitby	5	22	0.25 ???	07/26/71	Lloyd's List 1770-71, No. 244, p2	872890.91	1913575
1771 Jenny	314	35 Whitby	7	30	0 Banks	08/27/71	Lloyd's List 1770-71, No. 253, p2	1226059	2493863
1771 John & Margaret	397	45 Newcastle	2	48	0.5 Aulder	07/30/71	Lloyd's List 1770-71, No. 245, p2	2369477	4222764
1771 King of Prussia	344	31 Hull	0	0	0.5			-622432.1	-1101497
1771 Leviathan	422	59 London	1	12	0 ???	07/26/71	Lloyd's List 1770-71, No. 244, p2	983056.13	2171458
1771 Liverpool	198	40 Liverpool	0	23	0.75			564468.19	1305120
1771 Lord Mollineaux	190	10 Liverpool	2	70	0.75			1266321	2250460
1771 Lyon	300	11 London	1	13	0.5			653208.83	1546601
1771 Manchester	266	77 Hull	4	40	0 ???	07/26/71	Lloyd's List 1770-71, No. 244, p2	1213048	2391637
1771 Mary	283	38 London	4	32	0 Hutchinson	08/27/71	Lloyd's List 1770-71, No. 253, p2	1116151	2283949
1771 Neptune	333	56 London	5	23	0.5 Sword	08/27/71	Lloyd's List 1770-71, No. 253, p2	1122995	2360009
1771 Pennant	218	24 Liverpool	1	53	0			1172811	2218927
1771 Perseverance	332	0 Liverpool	3	27	0.75 ???	08/23/71	Lloyd's List 1770-71, No. 252, p2	1252133	2556323
1771 Porpoise	278	69 Whitby	5	21	0.5 ???	07/26/71	Lloyd's List 1770-71, No. 244, p2	823061.42	1825000
1771 Priscilla	340	40 Newcastle	4	43	0 ???	07/26/71	Lloyd's List 1770-71, No. 244, p2	1763204	3297612
1771 Reading	327	48 London	2	10	0.5 Hastings	08/23/71	Lloyd's List 1770-71, No. 252, p2	608468.28	1473731
1771 Rebecca	231	49 London	1	20	0 ???	07/26/71	Lloyd's List 1770-71, No. 244, p2	609020.28	1419955
1771 Rising Sun	361	73 London	1	22	0.5			1221963	2541899
1771 Rockingham	189	10 London	0	0	0 Reed	08/23/71	Lloyd's List 1770-71, No. 252, p2	-249974.9	-436582.8
1771 Royal Exchange	287	58 Newcastle	0	0	0.75			-343415.6	-587849
1771 Sea Horse	291	86 London	6	29	0.5 ???	07/26/71	Lloyd's List 1770-71, No. 244, p2	1095129	2266378
1771 Springfield	239	3 London	1	7	0.5			290681.87	817377.51
1771 Suffolk	295	41 London	1	5	0 Dryden	08/23/71	Lloyd's List 1770-71, No. 252, p2	242998.2	734001.38
1771 Thames	371	4 London	6	73	0 Petrie	07/26/71	Lloyd's List 1770-71, No. 244, p2	2940985	4872405
1771 Tweed	185	85 London	2	22	0 Cook	08/23/71	Lloyd's List 1770-71, No. 252, p2	490559.16	1165814
1771 Weymouth	266	77 London	1	62	0.5 Bartlet	07/30/71	Lloyd's List 1770-71, No. 245, p2	1713503	3049605
1771 Winnington	119	25 Liverpool	2	52	0.25 Bell	07/30/71	Lloyd's List 1770-71, No. 245, p2	571363.95	1141259
1771 Young Eagle	362	0 London	5	27	0 Dryden	08/23/71	Lloyd's List 1770-71, No. 252, p2	1386358	2794472
1772 Adventure	281	40 London	8	127	0.5			4911380	5051526
1772 Ann & Elizabeth	220	17 Hull	4	65	0			2094805	2516962
1772 Benjamin	221	7 Hull	3	65	0.5			2115151	2539733
1772 Berry	309	78 London	0	0	0			-1304711	-728144.2
1772 Betty	286	16 Liverpool	3	46	0.75			2298681	2817330
1772 Brenthall	400	63 London	9	132	0.5			6818043	7712387
1772 Britannia	392	52 Hull	5	68	0.5 Dale	07/17/72	Lloyd's List 1772-73, No. 3791, p2	4243652	5021159
1772 British Queen	346	90 Hull	1	24	0.5			1977731	2526955
1772 Chance	329	92 London	8	84	0			3944531	4619299
1772 Dolphin	274	28 Liverpool	5	73	0.75			2921681	3465273
1772 Duke of Bedford	319	63 London	5	65	0			3213283	3835170
1772 Duke of York	288	33 London	5	100	0			3813196	4419027
1772 Exeter	328	28 Exeter	8	127	0			5258426	5981146
1772 Favorite	285	41 London	6	110	0			4037391	4647221
1772 Forbes	374	27 London	1.5	49	0			3260940	3953531
1772 Friendly Adventure	286	32 London	9	104	0			3890762	4496488
1772 Golden Lyon	310	44 Liverpool	7	160	0.5 Thompson	07/03/72	Lloyd's List 1772-73, No. 3788, p2	5914049	6623926
1772 Grampus	318	13 Liverpool	5	120	0 Wheatley	07/03/72	Lloyd's List 1772-73, No. 3788, p2	4865593	5558358
1772 Hawke	326	11 London	3	74	0 Patterson	07/17/72	Lloyd's List 1772-73, No. 3791, p2	3578384	4229318
1772 Henrietta	323	62 London	4	51	0 Bell	08/11/72	Lloyd's List 1772-73, No. 3798, p2	2803091	3403342
1772 Hope	289	43 Whitby	2	38	0 Pocock	08/18/72	Lloyd's List 1772-73, No. 3800, p2	2056789	2558971
1772 Humber	221	9 Hull	4	66	0			2125982	2551244
1772 James and Mary	285	90 Whitby	0	0	0			-1200717	-670068.5
1772 Jenny	314	0 Whitby	10	93	0.5			4009710	4663410
1772 Jenny & Polly	198	40 Liverpool	9	90	0.5			2341549	2745395
1772 John & Margaret	397	25 Newcastle	9	80	0.5			4776308	5587770

1772 King of Prussia	344	31 Hull	6	78	0			3947808	4643356
1772 Leviathan	442	59 London	4	78	0.5			5354016	6257482
1772 Liverpool	307	44 Liverpool	9		Batson	07/03/72	Lloyd's List 1772-73, No. 3788, p2	6077829	6782951
1772 Lord Mollineaux	190	10 Liverpool	4	79	0			2030561	2407034
1772 Lyon	300	11 London	10	83	0.5			3521819	4132730
1772 Manchester	266	77 Hull	9	105	0 Ford	07/03/72	Lloyd's List 1772-73, No. 3788, p2	3617468	4181469
1772 Mary	283	38 London	7	100	0.5			3752394	4348005
1772 Neptune	333	56 London	10	119	0.5 Swords	07/30/72	Lloyd's List 1772-73, No. 3787, p2	5118558	5845613
1772 Northampton	344	76 Hull	10	78	0.5			3969844	4667224
1772 Perseverance	332	0 Liverpool	3	93	0 Smith	08/11/72	Lloyd's List 1772-73, No. 3798, p2	4260339	4952211
1772 Priscilla	340	40 Newcastle	5	117	0.5 Franks	07/30/72	Lloyd's List 1772-73, No. 3787, p2	5174716	5914983
1772 Renthall	307	44	9		Hasting	08/18/72	Lloyd's List 1772-73, No. 3800, p2	6077829	6782951
1772 Rising Sun	361	73 London	8	126	0.5			5856221	6654672
1772 Royal Exchange	342	27 Newcastle	7	80	0			3986591	4681143
1772 Sea Horse	291	86 London	2.5	32	0.5 Clark	08/07/72	Lloyd's List 1772-73, No. 3797, p2	1893505	2382893
1772 Springfield	395	35 London	7	127	0			6508532	7384304
1772 St. George	374	57 London	4	55	0			3499443	4208999
1772 Suffolk	295	41 London	8	82	0.5			3429916	4029599
1772 Thames	371	4 London	2	53	0.5			3402651	4101317
1772 Volunteer	302	61 Whitby	5	68	0			3102717	3695417
1772 Weymouth	266	77 London	11.5	120	0			3991755	4569313
1772 Winnington	119	25 Liverpool	6	58	0			994428.44	1212333
1772 Young Eagle	362	0 London	11	74	0			4047570	4772954
1773 Aukland	371	34 Liverpool	4	0	0 Wheatley	08/03/73	Lloyd's List 1772-73, No. 455, p2	3825669	4927786
1773 Britannia	392	52 Hull	2	0	0 ???	08/20/73	Lloyd's List 1772-73, No. 460, p2	2221486	3610870
1773 Benjamin	221	7 Hull	5	0	0 Dring	07/06/73	Lloyd's List 1772-73, No. 447, p2	2153357	3146940
1773 Dolphin	274	28 Liverpool	2	0	0 Lloyd	07/30/73	Lloyd's List 1772-73, No. 454, p2	1398696	2368998
1773 Duke of Bedford	319	63 London	3	0	0 Fither	08/20/73	Lloyd's List 1772-73, No. 460, p2	2248325	3515128
1773 Duke of York	288	33 London	1	0	0 Petrie	08/20/73	Lloyd's List 1772-73, No. 460, p2	936101.38	1746993
1773 Forbes	374	27 London	6	0	0 Cheesman	07/30/73	Lloyd's List 1772-73, No. 454, p2	4625994	6381059
1773 Golden Lyon	310	44 Liverpool	1	0	0 Thompson	09/07/73	Lloyd's List 1772-73, No. 465, p2	1031462	1904699
1773 Grampus	318	13 Liverpool	0	0	0 Catherich	09/07/73	Lloyd's List 1772-73, No. 465, p2	-697274.5	-748405.3
1773 Hawke	326	11 London	2	0	0 Patterson	08/20/73	Lloyd's List 1772-73, No. 460, p2	1743153	2897128
1773 Henrietta	323	62 London	1	0	0 Bell	08/20/73	Lloyd's List 1772-73, No. 460, p2	1089806	2000222
1773 Hope	289	43 Whitby	0	2	0 Peacock	08/10/73	Lloyd's List 1772-73, No. 457, p2	-632213.6	-678577.4
1773 Humber	221	9 Hull	5	0	0 ???	07/17/73	Lloyd's List 1772-73, No. 453, p2	2153559	3147238
1773 James and Mary	285	90 Whitby	2	0	0			1472859	2484494
1773 John de Mary	299	43 Newcastle	3		Alder	08/10/73	Lloyd's List 1772-73, No. 457, p2	2073628	3260210
1773 Jenny	314	0 Whitby	0	4	0 Banks	08/17/73	Lloyd's List 1772-73, No. 459, p2	-687874.6	-738316.6
1773 John and Ann	299	43 Whitby	1	0	0			983505.41	1825706
1773 John and Mary	299	43 Whitby	2.5		Todd	08/17/73	Lloyd's List 1772-73, No. 459, p2	1821567	2951002
1773 Lord Mollineaux	190	10 Liverpool	0	0	0 Cox	07/30/73	Lloyd's List 1772-73, No. 454, p2	-408964.4	-438973.2
1773 Manchester	266	77 Hull	3	0	0 Ford	08/20/73	Lloyd's List 1772-73, No. 460, p2	1799900	2856928
1773 Mary	283	38 London	3	0	0 Hind	08/17/73	Lloyd's List 1772-73, No. 459, p2	1937894	3060758
1773 Neptune	333	56 London	4	0	0 Swords	07/16/73	Lloyd's List 1772-73, No. 450, supp, p2	2928427	4350942
1773 Otter	148	46 Liverpool	0	0	0 Gwin	09/07/73	Lloyd's List 1772-73, No. 465, p2	-316687.2	-339937.1
1773 Perseverance	332	0 Liverpool	2	0	0 Smith	08/20/73	Lloyd's List 1772-73, No. 460, p2	1784075	2958900
1773 Priscilla	347	80 Newcastle	4	1	83 0 Franks	08/23/73	Lloyd's List 1772-73, No. 452, p2	3343259	4874774
1773 Rising Sun	361	73 London	3	0	0 Finn	07/30/73	Lloyd's List 1772-73, No. 454, p2	2627490	4061380
1773 Sea Horse	291	86 London	2	0	0 Clark	08/20/73	Lloyd's List 1772-73, No. 460, p2	1511820	2544574
1773 Unity	402	28 London	5	115	0 Brown	08/23/73	Lloyd's List 1772-73, No. 452, p2	5152383	7061155
1773 Volunteer	302	61 Whitby	0	4	64 0 Coullon	08/17/73	Lloyd's List 1772-73, No. 459, p2	2321029	3570945
1773 Ward	351	56 Whitby	4	0	0 Hutchinson	08/10/73	Lloyd's List 1772-73, No. 457, p2	3124065	4623428
1773 Whale	198	40 Liverpool	0	0	0 Batson	07/30/73	Lloyd's List 1772-73, No. 454, p2	-427507.7	-458874.8
1773 Winnington	119	25 Liverpool	0	0	0 Bell	07/30/73	Lloyd's List 1772-73, No. 454, p2	-252491.8	-271040.4
1774 Adventure	281	40 London	3	45	0 Waterhouse	08/23/73	Lloyd's List 1772-73, No. 452, p2	2459446	2709611
1774 Ann & Elizabeth	220	17 Hull	3.5	74	0			2180813	2718965
1774 Aukland	371	34 Liverpool	3	61	0.75			3556807	4441661
1774 Benjamin	305	67 Hull	7	120	0.25 ???	08/23/73	Lloyd's List 1772-73, No. 452, p2	4494641	5324759
1774 Berry	314	15 Hull	2	40	0			2218670	2893656
1774 Betty	286	16 Liverpool	5	34	0.5 Swinhoe	07/08/74	Lloyd's List 1774-75, No. 552, p2	1812981	2404350
1774 Blessing	221	62 London	0	0	0			-832333.2	-514633.1

1774 Britannia	392	92 London	6	137	0.5 Cheesement	08/29/75	Lloyd's List 1774-75, No. 671, p2	6637576	7737768
1774 British Queen	346	90 Hull	3	67	0			3452364	4292244
1774 Chance	329	92 London	3	83	0.5 Lambert	08/16/74	Lloyd's List 1774-75, No. 563, supplement	3770246	4605535
1774 Delight	259	6 Whitby	4	81	0.5			2804401	3453125
1774 Dolphin	274	28 Liverpool	2	79	0.75			2948371	3633122
1774 Duke of Bedford	319	86 London	9	72	0.5			3302979	4088851
1774 Duke of York	288	33 London	2	90	0			3399202	4137937
1774 Dundee	304	15 Dundee	2	45		07/29/74	Lloyd's List 1774-75, No. 558, p2	2293076	2964446
1774 Edward	289	42 London	8	74	0 Patterson	07/26/74	Lloyd's List 1774-75, No.557, p2	2979798	3692124
1774 Elizabeth	371	0 London	4	100	0			4911473	5887788
1774 Exeter	328	28 Exeter	7	119	0 Phillips	07/22/74	Lloyd's List 1774-75, No. 556, p2	4837829	5728898
1774 Experiment	276	14 London	6	97	0			3414833	4132282
1774 Favourite	285	41 London	4	67	0.5 Petre	07/22/74	Lloyd's List 1774-75, No. 556, p2	2756000	3444657
1774 Forbes	374	27 London	4	92	0.5 Beadnel	07/26/74	Lloyd's List 1774-75, No.557, p2	4697563	5667649
1774 Friendly Adventure	286	32 London	7	100	0.5			3651298	4401103
1774 General Conway	456	43 London	7	102	0.5 Kitchin	07/22/74	Lloyd's List 1774-75, No. 556, p2	6399427	7612083
1774 Golden Lyon	310	44 Liverpool	4	80	0.5 Thompson	08/23/73	Lloyd's List 1772-73, No. 452, p2	3424555	4203444
1774 Grampus	318	13 Liverpool	3	41	0.75 ???	07/08/74	Lloyd's List 1774-75, No. 552, p2	2312121	3002927
1774 Hawke	326	11 London	7	118	0.5			4786344	5670655
1774 Hazard	243	1 Sunderland	2 Full	71	0 ???	07/05/74	Lloyd's List 1774-75, No. 551, p2	2369953	2960193
1774 Henrietta	323	62 London	9	100	0 Bell	08/16/74	Lloyd's List 1774-75, No. 563, supplement	4186601	5035682
1774 Hope	267	61 London	3	67	0.5			2557373	3202054
1774 Hope	289	43 Whitby	1	24	0			1477504	2021724
1774 Humber	221	9 Hull	4	79	0.25 ???	08/09/74	Lloyd's List 1774-75, No. 561, p2	2298917	2847202
1774 James and Mary	285	90 Whitby	4	100	0			3631195	4379231
1774 Jenny	314	34 Whitby	6	85	0 Banks	08/23/73	Lloyd's List 1772-73, No. 452, p2	3608062	4405793
1774 John & Margaret	397	45 Newcastle	3	57	0			3675225	4607531
1774 John and Ann	340	14 Whitby	3	64	0.5			3290783	4107103
1774 King of Prussia	344	31 Hull	5	127	0.75			5390819	6339021
1774 Leviathan	422	59 London	9	93	0 Brinkley	07/26/74	Lloyd's List 1774-75, No.557, p2	5451171	6550789
1774 Lord Molyneux	190	10 Liverpool	2	52	0			1458283	1886492
1774 Loyal Club	349	27 Whitby	5	82	0.5			4000022	4883219
1774 Lyon	300	11 London	2	38	0.5			2051459	2689512
1774 Manchester	266	77 Hull	5	133	0.25			4176362	4912888
1774 Maria	293	20 London	2	43	0 Gordon	08/16/74	Lloyd's List 1774-75, No. 563, supplement	2134000	2773667
1774 Mary	283	38 London	6	52	0			2307098	2952557
1774 Mentor	240	29 London	1	18	0.5			1007192	1423958
1774 Mermaid	300	92 London	6	73	0.5 Hodney	07/22/74	Lloyd's List 1774-75, No. 556, p2	3103145	3843511
1774 Otter	148	46 Liverpool	2	54	0.25			1140461	1475806
1774 Pegasus	400	65 London	7	110	0			5755740	6831759
1774 Perserverance	332	0 Liverpool	4	91	0			4033834	4889125
1774 Priscilla	347	80 Newcastle	4	83	0 Franks	07/22/74	Lloyd's List 1774-75, No. 556, p2	3995690	4876250
1774 Providence	188	43 Whitby	2	51	0.5			1434625	1858071
1774 Rising Sun	361	73 London	9	125	0 Phew	08/16/74	Lloyd's List 1774-75, No. 563, supplement	5611919	6605150
1774 Rockingham	189	10 London	4	73	0			1823285	2282353
1774 Sea Horse	291	86 London	5	55	0			2474973	3148794
1774 Siren	239	3 London	3	75	0 Gilbert	07/26/74	Lloyd's List 1774-75, No.557, supplement	2415287	3002391
1774 St. George	374	57 London	3	75	0 Robertson	08/16/74	Lloyd's List 1774-75, No. 563, supplement	4077476	5007838
1774 Suffolk	295	41 London	0	0	0			-1120769	-693111.9
1774 Tryton	294	91 Hull	3	60	0			2649743	3344048
1774 Unity	402	28 London	5	115	0 Brown	08/23/73	Lloyd's List 1772-73, No. 452, p2	5973321	7062994
1774 Volunteer	302	61 Whitby	2.5	88	0			3536749	4309484
1774 Ward	351	56 London	3	62	0			3337048	4174370
1774 Weymouth	266	77 London	0	87	0.5			3048040	3726461
1774 Whale	198	40 Liverpool	0	72	0.5			1913572	2395155
1774 Winnington	119	25 Liverpool	1	35	0.5			682937.37	924374.77
1774 Young Eagle	432	68 London	5	71	0			4689210	5755421
1775 Addinson	313	31 Whitby	1	20	0			1122110	2019107
1775 Adventure	281	40 London	0	6	0.5			285770.19	881985.92
1775 Albion	308	14 London	1	2	0.5 ???	07/28/75	Lloyd's List 1774-75, No. 662, p2	12488.611	243335.14
1775 America	302	42 Gravesend	3.5		Horsey	09/22/75	Lloyd's List 1774-75, No. 678, p2	1974015	3599968
1775 Ann Elizabeth	220	17 Hull	0	0	0			-225954.3	-511082.7
1775 Archangel	348	5 Lynn	2	40	0.5			1641729	3286665
1775 Auckland	371	34 Liverpool	1	39	0.75 Wheatly	07/07/75	Lloyd's List 1774-75, No. 656, p2	1770816	3515120

1775 Benjamin	305	67 Hull	2	22	0.75			902734.52	2097030
1775 Berry	314	15 Hull	0	0	0			-326708.1	-738703.8
1775 Betty	286	16 Liverpool	3	55	0.5 Bell	08/11/75	Lloyd's List 1774-75, No. 666, p2	1612498	3095637
1775 Blessing	221	62 London	1	26	0.5 Horner	08/25/75	Lloyd's List 1774-75, No. 670, p2	650453.16	1566925
1775 Britannia	392	92 London	1	7	0.5			544588.86	1452781
1775 British King	279	24 Whitby	0	0	0			-289128.9	-653805.2
1775 Delight	259	6 Whitby	4	56	0			1431212	2777970
1775 Dolphin	274	28 Liverpool	0	0	0			-283805.6	-641778.8
1775 Duke of Bedford	319	63 London	1	19	0			845821.61	2011850
1775 Duke of York	288	33 London	0	12	0 Petrie	05/19/75	Lloyd's List 1774-75, No. 642, p2	517234.91	1380638
1775 Dundee	304	15 Dundee			Robson	08/15/75	Lloyd's List 1774-75, No. 667, p2	-315924.6	-714341.8
1775 Edward	289	42 London	1	27	0.5 Patterson	08/22/75	Lloyd's List 1774-75, No. 669, supplement	959288	2169002
1775 Elizabeth	371	0 London	0	5	0.5 ???	07/28/75	Lloyd's List 1774-75, No. 662, p2	351680.86	1045362
1775 Empress of Russia	425	27 London	3	44	0 ???	07/28/75	Lloyd's List 1774-75, No. 662, p2	2304079	4361213
1775 Esk	303	68 London	1	22	0.5			887355.9	2069152
1775 Esk	302	42 Whitby	1	0	0			764020.92	1848732
1775 Exeter	328	28 Exeter	1	21	0			944566.07	2188714
1775 Experiment	276	13 Lynn	1	45	0.5			1315224	2668351
1775 Favourite	285	41 London	0	3	0.5 ???	07/28/75	Lloyd's List 1774-75, No. 662, p2	106768.93	458694.24
1775 Fly	444	62 Liverpool	1	28	0.5 Cock	08/11/75	Lloyd's List 1774-75, No. 666, p2	1817985	3692092
1775 Forbes	374	27 London	0	0	0			-391810.1	-885782.5
1775 Frances	334	9 London	0	0	0			-348245.4	-787360.9
1775 Freedom	302	90 Hull	0	0	0			-314625.2	-711406.1
1775 Freelove	341	38 Whitby	1	21	0			999402.76	2292740
1775 Friendly Adventure	286	32 London	1	30	0 Sellers	09/08/75	Lloyd's List 1774-75, No. 674, supplement	1007388	2239819
1775 Friendship Resolution	215	49 Scarborough	2	24	0			581642.54	1442388
1775 General Conway	456	43 London	3	52	0.5 ???	07/28/75	Lloyd's List 1774-75, No. 662, p2	2889502	5211330
1775 Golden Lyon	310	44 Liverpool	0	0	0			-322724.3	-729703.5
1775 Grampus	318	13 Liverpool	0	0	0			-331002.3	-748405.3
1775 Hawke	308	68 London	1	29	0.5 McCloud	08/15/75	Lloyd's List 1774-75, No. 667, p2	1103282	2423861
1775 Hazard	241	77 Sunderland	1	14	0.5			465691.52	1256543
1775 Henrietta	323	43 London	4	90	0 Bell	07/28/75	Lloyd's List 1774-75, No. 662, p2	2815810	4714074
1775 Hercules	263	30 Whitby	3	80	0			1975135	3477894
1775 Hilston	298	84 Hull	1	58	0.5			1777736	3348868
1775 Hope	267	61 London	0	0	0			-276670.2	-625658.7
1775 Hope	289	43 Whitby	0	0	0 ???	09/08/75	Lloyd's List 1774-75, No. 674, supplement	-300094	-678577.4
1775 Humber	221	9 Hull	1	17	0.5 Hebden	08/22/75	Lloyd's List 1774-75, No. 669, supplement	475151.17	1258219
1775 James and Mary	285	90 Whitby	0	0	0			-296327.7	-670068.5
1775 Jenny	314	34 Whitby	0	0	0 ???	09/08/75	Lloyd's List 1774-75, No. 674, supplement	-326925.2	-739194.2
1775 John & Margrett	397	45 Newcastle	1	22	0.75			1320448	2869426
1775 John and Ann	340	14 Whitby	1	29	0			1249324	2694856
1775 Kelso	342	24 London	2	36	0.5 ???	07/28/75	Lloyd's List 1774-75, No. 662, p2	1486333	3053228
1775 Kingston	348	40 Hull	0	0	0			-363754.8	-822399.6
1775 Leviathan	422	59 London	0	2	0.5 ???	07/28/75	Lloyd's List 1774-75, No. 662, p2	2328.5299	313902
1775 Liberty	241	48 London	2	38	0 ???	08/25/75	Lloyd's List 1774-75, No. 670, p2	959428.23	2081728
1775 Liverpool	289	7 Liverpool	1	1	0.5			-126707.1	-120670.7
1775 Lord Mollineaux	190	10 Liverpool			Cox	07/05/74	Lloyd's List 1774-75, No. 551, p2	-194035.6	-438973.2
1775 Lord Rochford	334	8 London	0	0	0 Lambert	09/08/75	Lloyd's List 1774-75, No. 674, supplement	-348234	-787335
1775 Loyal Club	349	27 Whitby	3	55	0.5			2091630	3899549
1775 Lyon	300	11 London	0	1	0 ???	07/28/75	Lloyd's List 1774-75, No. 662, p2	-251628.6	-419766
1775 Manchester	266	74 Hull	2	22	0.5			740027	1779247
1775 Maria	293	20 London	1	7	0.5			352041.84	1032812
1775 Marianne	320	18 London	6	85	0 Brown	08/15/75	Lloyd's List 1774-75, No. 667, p2	2647722	4500814
1775 Mary	283	38 London	0	12	0.5 ???	07/28/75	Lloyd's List 1774-75, No. 662, p2	520805.48	1386100
1775 Medway	141	81 London	0	10	0			168182.54	558546.59
1775 Mellish	320	89 London	1	25	0.5 Clark	08/22/75	Lloyd's List 1774-75, No. 669, supplement	1048903	2354511
1775 Mentor	240	29 London	0	0	0 ???	09/08/75	Lloyd's List 1774-75, No. 674, supplement	-247412.5	-559560.3
1775 Mermaid	300	92 London	1	20	0 ???	07/28/75	Lloyd's List 1774-75, No. 662, p2	804554	1925101
1775 Molly	290	47 Hull	0	0	0			-301215.2	-681110.5
1775 Neptune	341	43 Liverpool	0	34	0.5			1421879	2957659
1775 Neptune	300	39 London	1	31	0.5 ???	07/28/75	Lloyd's List 1774-75, No. 662, p2	1114933	2428405
1775 Noble Ann	192	83 Newcastle	1	26	0.75			546050.8	1346817
1775 Otter	148	46 Liverpool	1	22	0.25 ???	07/05/74	Lloyd's List 1774-75, No. 551, p2	339353.48	917518
1775 Pegasus	400	65 London	0	5	0.75			417524.73	1191005

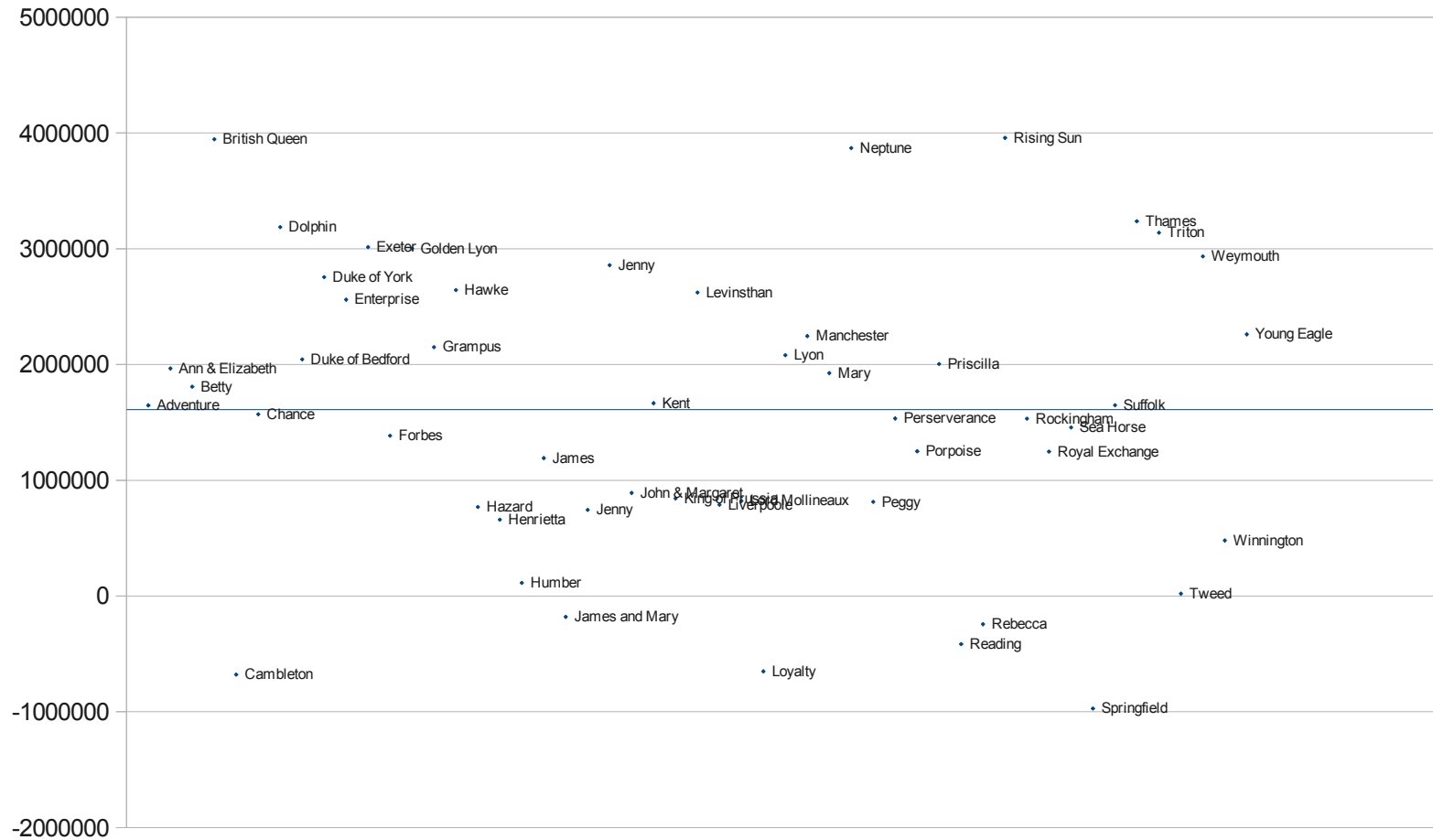


1775 Perseverance	332	0 Liverpool	0	2	3	0.75 Smith	08/11/75	Lloyd's List 1774-75, No. 666, p2	155116.89	595433.88
1775 Polar Star	373	14 Liverpool	0		3	0.75			182018.13	675281.09
1775 Priscilla	347	80 Newcastle	1		24	0			1127408	2511322
1775 Providence	188	43 Whitby	3		42	0 ???	08/15/75	Lloyd's List 1774-75, No. 667, p2	759160.82	1663043
1775 Prudence	289	53 London	1		15	0 Hutchinson	08/15/75	Lloyd's List 1774-75, No. 667, p2	617138.79	1576499
1775 Rising Sun	361	73 London	0		15	0 ???	07/28/75	Lloyd's List 1774-75, No. 662, p2	854961.94	2050705
1775 Rockingham	189	10 London	0		13	0 ???	07/28/75	Lloyd's List 1774-75, No. 662, p2	305722.63	895924.25
1775 Seahorse	291	86 London	0		0	0			-302735.4	-684544.8
1775 Siren	239	3 London	1		28	0 Gilbert	07/28/75	Lloyd's List 1774-75, No. 661, p2	750243.41	1756830
1775 Speedwell	297	73 Whitby	1		24	0			903875.85	2090198
1775 St. George	374	57 London	3		61	0 ???	07/28/75	Lloyd's List 1774-75, No. 662, p2	2469566	4458147
1775 Suffolk	211	74 Liverpool	1		11	0 Bowers	08/11/75	Lloyd's List 1774-75, No. 666, p2	311318.23	921129.59
1775 Swan	302	42 Gravesend	1.5			Jenkins	09/22/75	Lloyd's List 1774-75, No. 678, p2	1026298	2286260
1775 Thames	91	10 London	1		6	0 Stuart	08/29/75	Lloyd's List 1774-75, No. 671, p2	59194.463	243596.5
1775 Triton	294	91 Hull	0		0	0			-306020.9	-691967.4
1775 Triton	288	10 Liverpool	0		13	0			550094.92	1445737
1775 Two Sisters	392	18 Whitby	0		0	0			-411276.8	-929761.7
1775 Union	315	37 London	2		20	0.5 Dryden	08/22/75	Lloyd's List 1774-75, No. 669, supplement	876358.24	2061188
1775 Unity	402	28 London	0	1	0	0 Dixon	09/08/75	Lloyd's List 1774-75, No. 674, supplement	-422279.3	-954618.8
1775 Volunteer	302	61 Whitby	1		27	0.5			1020186	2284626
1775 Ward	351	66 London	1		22	0.5 Hutchinson	08/25/75	Lloyd's List 1774-75, No. 670, p2	1094936	2461587
1775 Weymouth	276	7 London	1	3	40	0 ???	08/15/75	Lloyd's List 1774-75, No. 667, p2	1190144	2492166
1775 Whale	198	40 Liverpool	4		63	0 Bell	08/11/75	Lloyd's List 1774-75, No. 666, p2	1139300	2205546
1775 William	342	63 Liverpool	2		34	0 Swinhoe	08/11/75	Lloyd's List 1774-75, No. 666, p2	1413568	2947613
1775 Winnington	119	25 Liverpool	0		3	0.75 ???	07/05/74	Lloyd's List 1774-75, No. 551, p2	42030.487	203239.74
1775 Young Eagle	432	68 London	0		2	0 ???	07/28/75	Lloyd's List 1774-75, No. 662, p2	-118817.1	61709.57

## APPENDIX II: VESSEL PRODUCTIVITY INDEX (VPI) CHARTS, 1770-1775

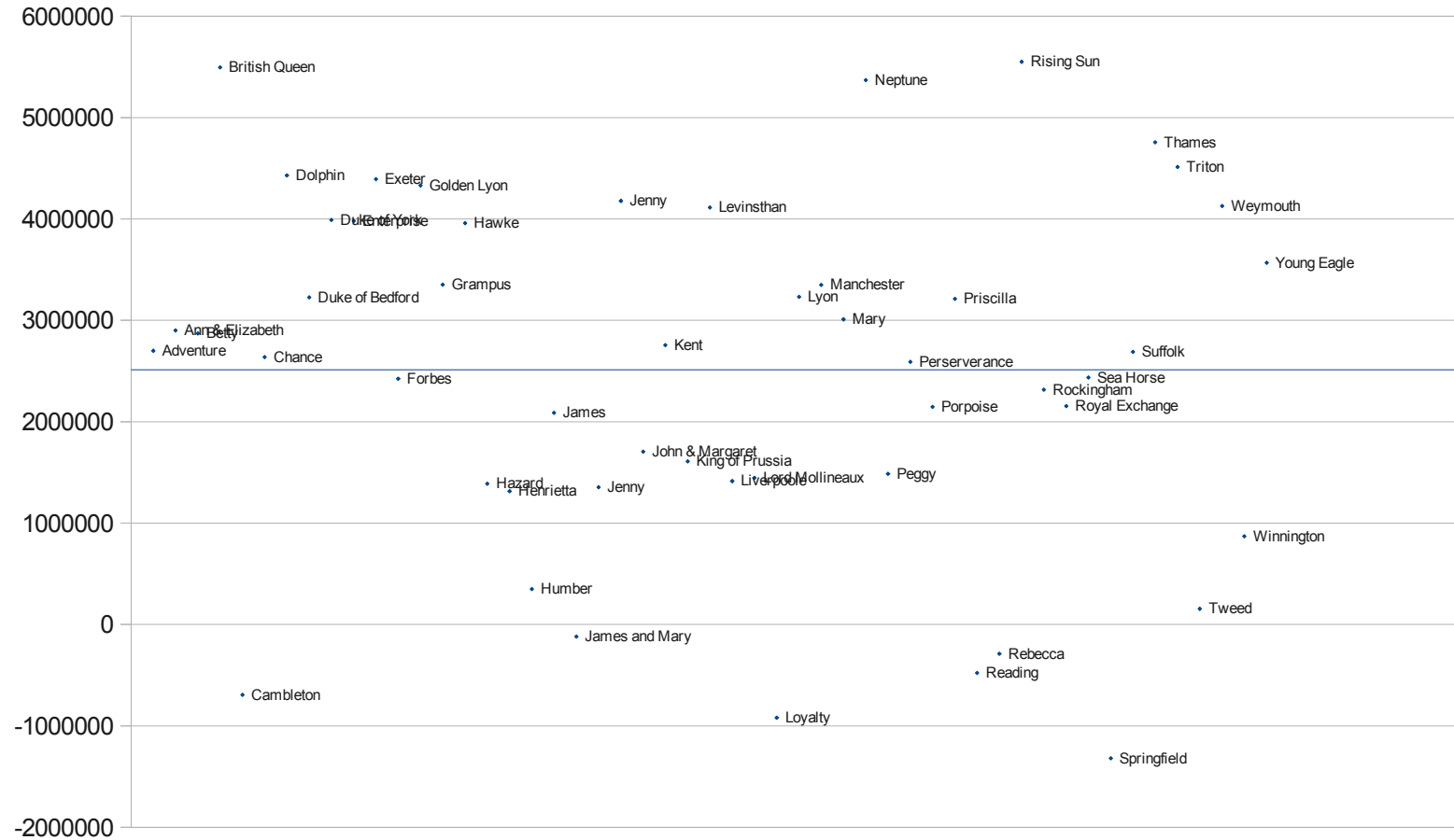
# Vessel Productivity Index- 1770

## Calculated Compared to 1770 Average



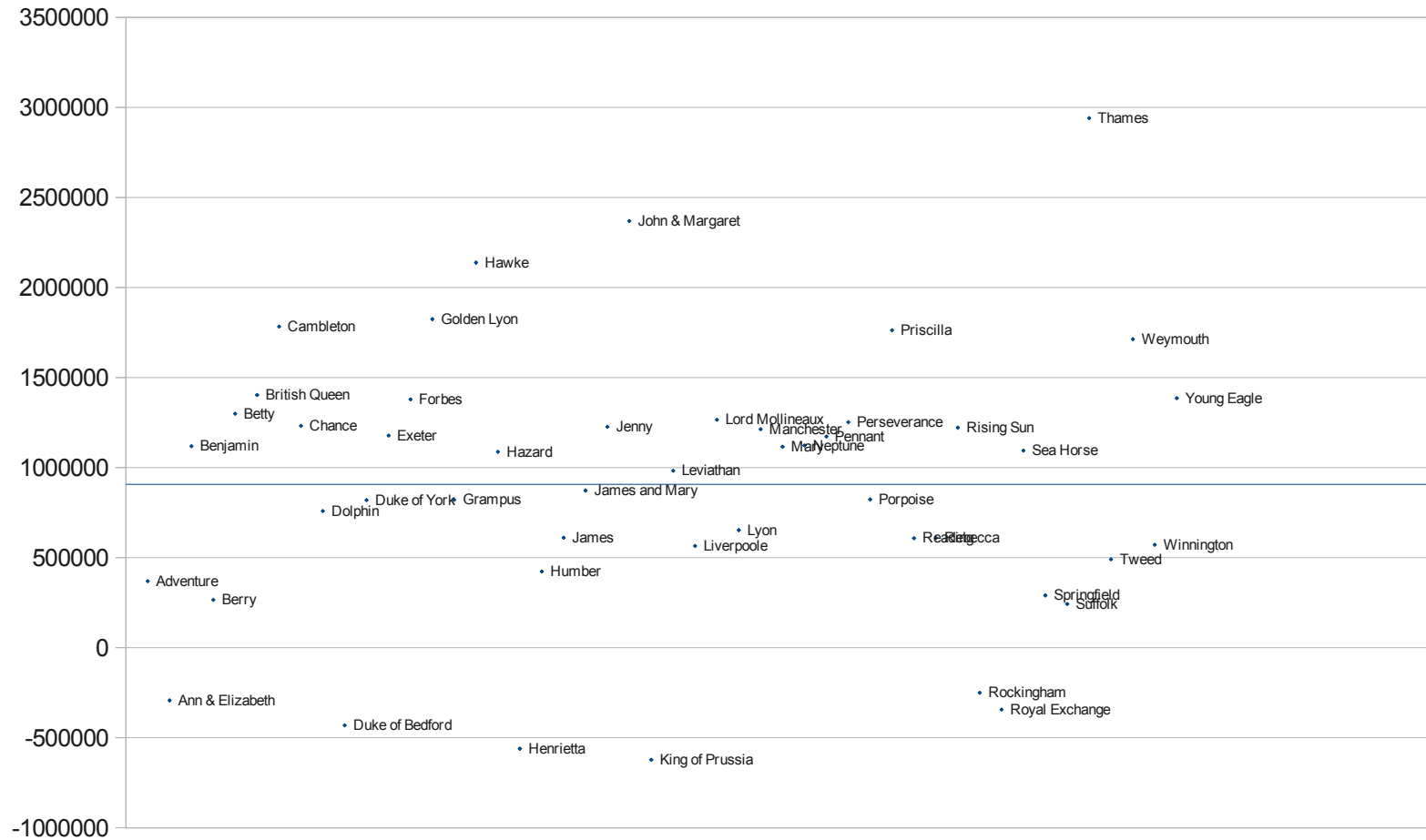
# Vessel Productivity Index- 1770

Calculated Compared to 1770-1775 Average



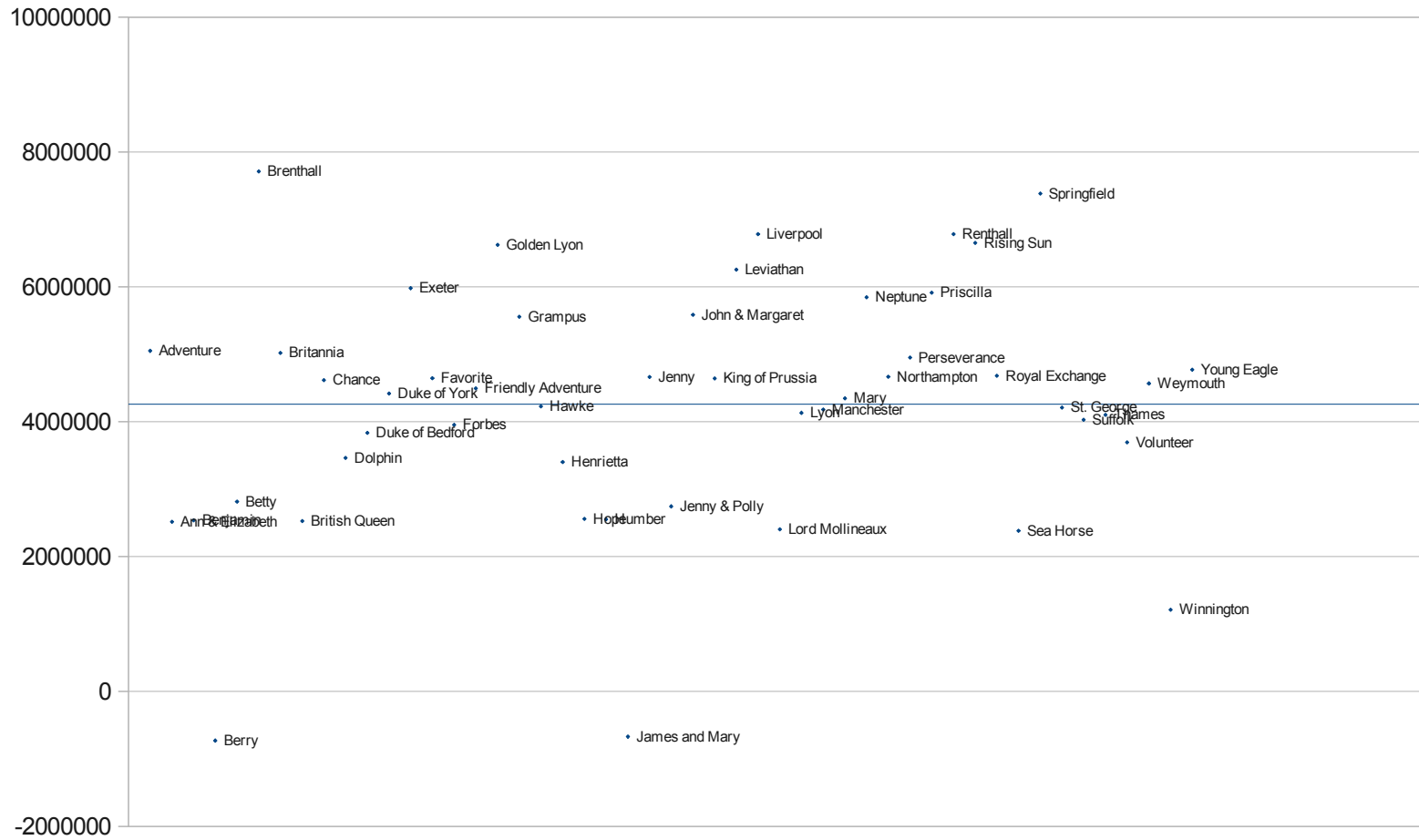
# Vessel Productivity Index- 1771

Calculated Compared to 1771 Average



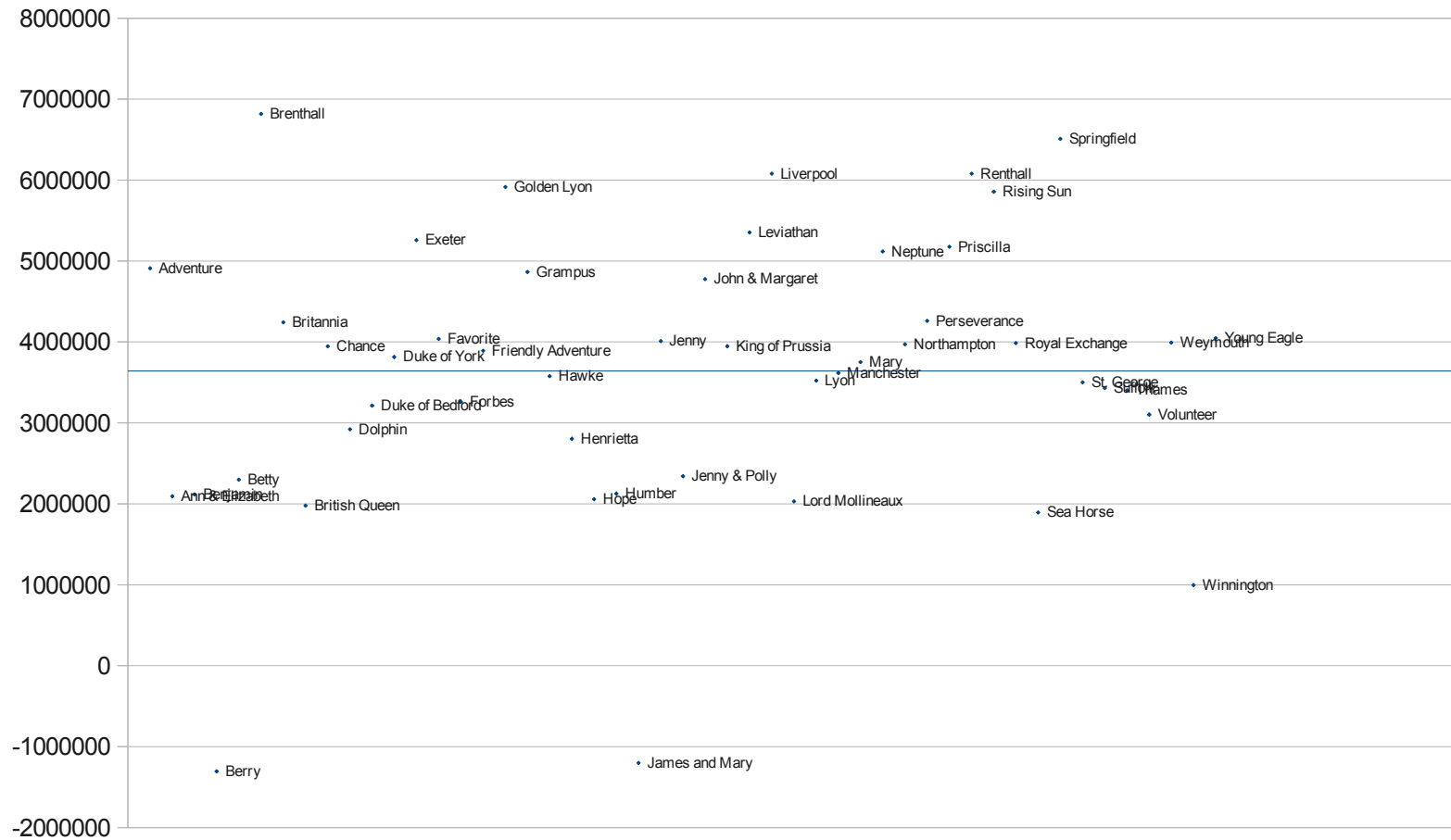
# Vessel Productivity Index- 1771

Calculated Compared to 1770-1775 Average



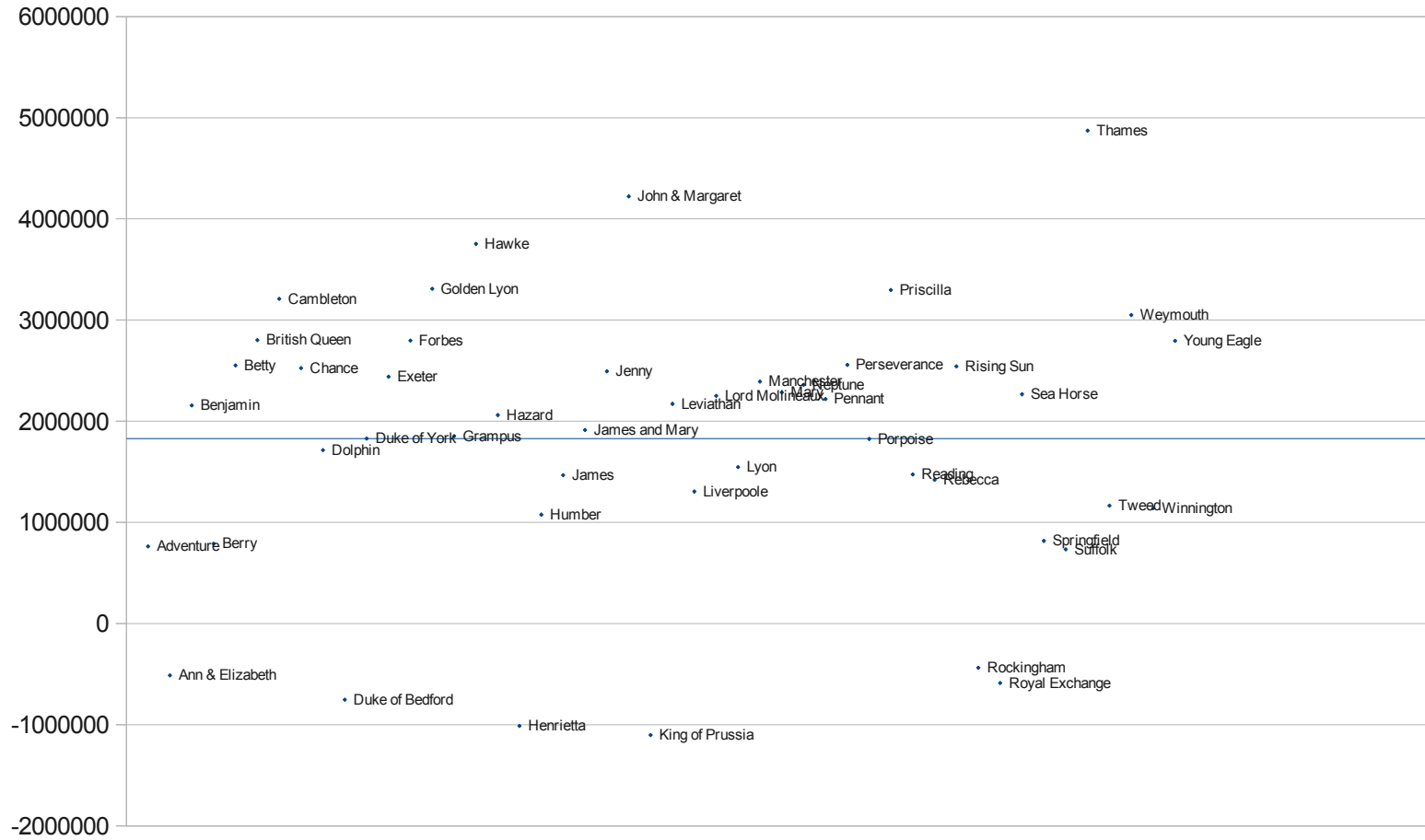
# Vessel Productivity Index- 1772

Calculated Compared to 1772 Average



# Vessel Productivity Index- 1772

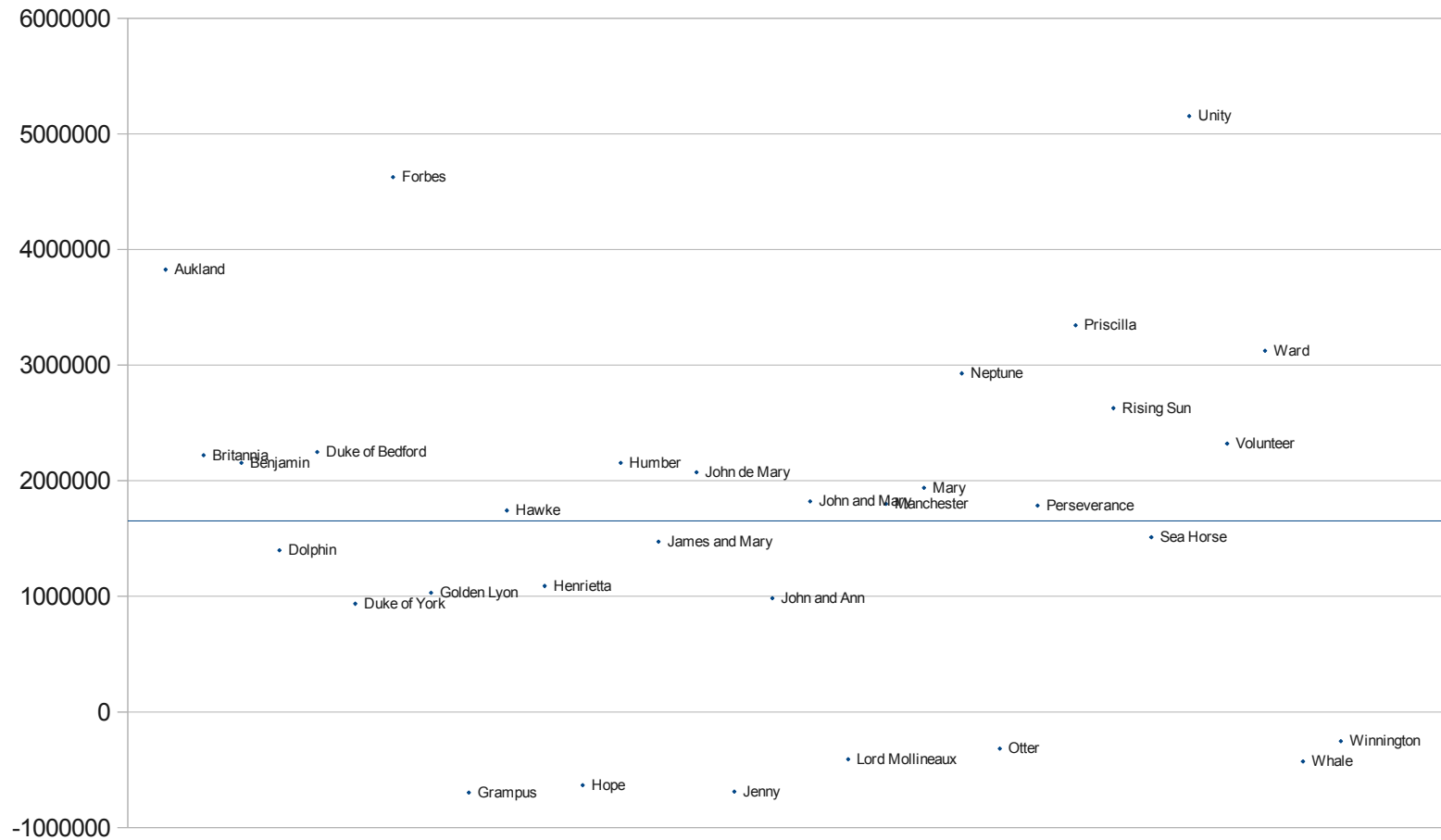
Calculated Compared to 1770-1775 Average





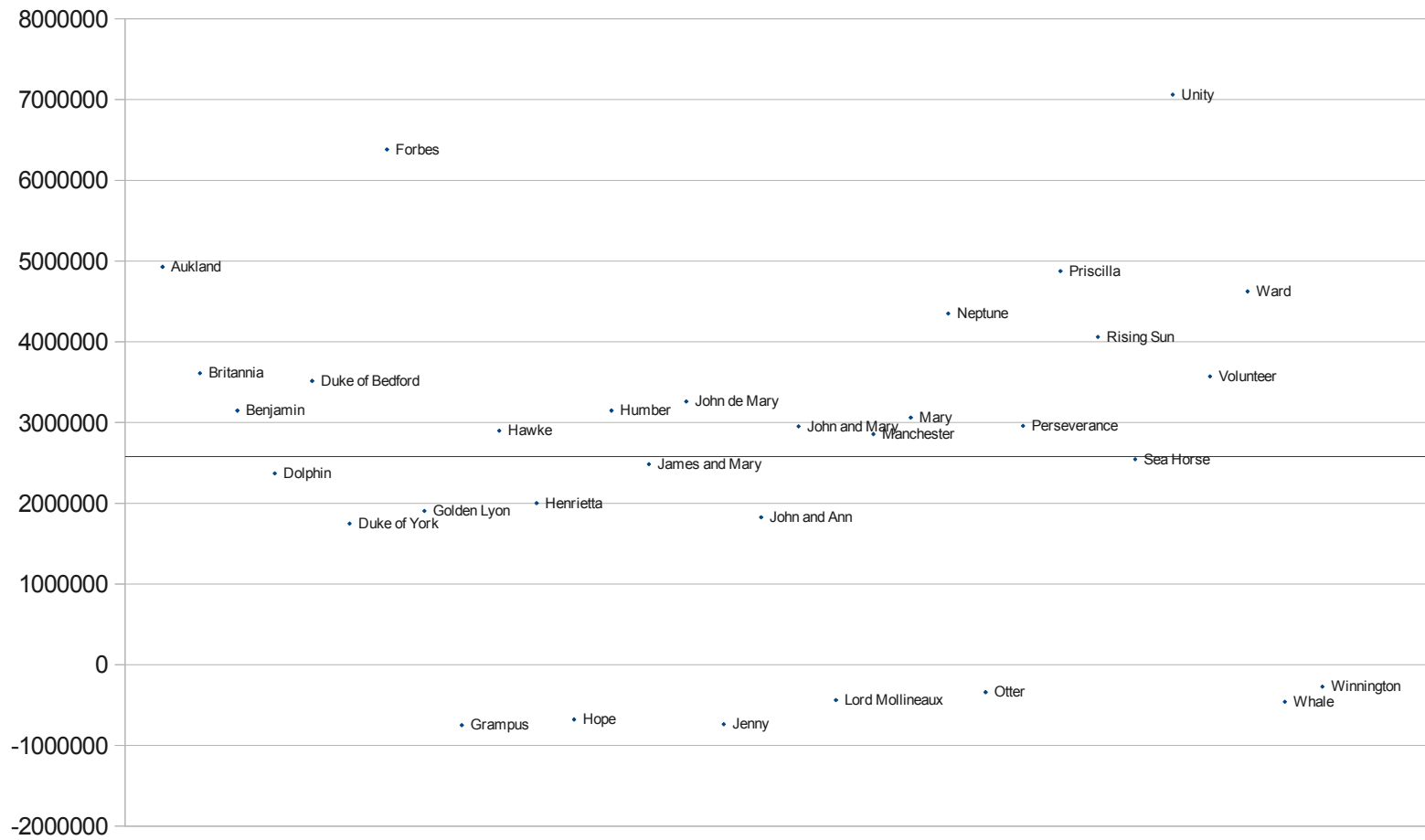
# Vessel Productivity Index- 1773

Compared to 1773 Average



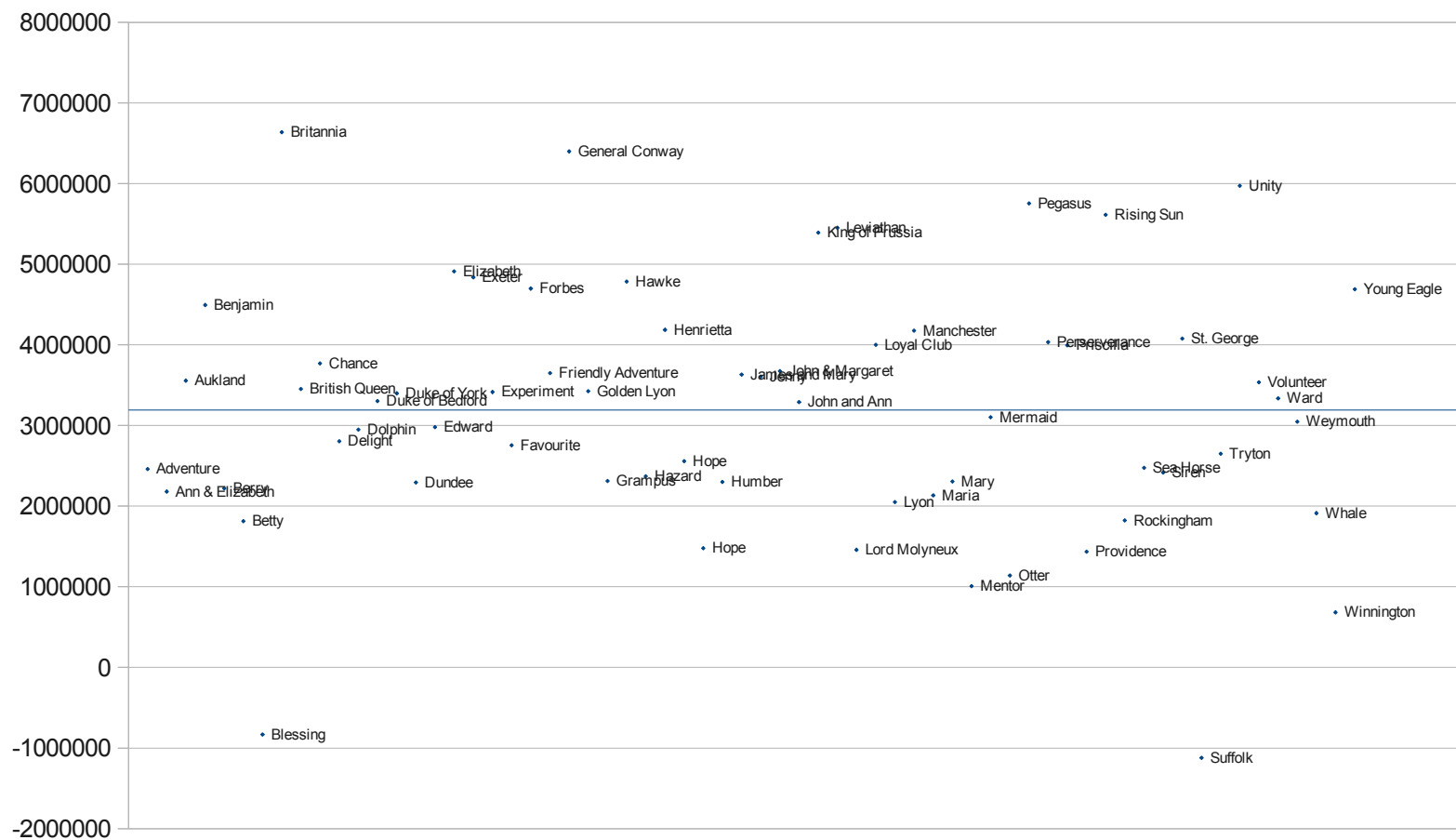
# Vessel Productivity Index- 1773

Compared to 1770-1775 Average



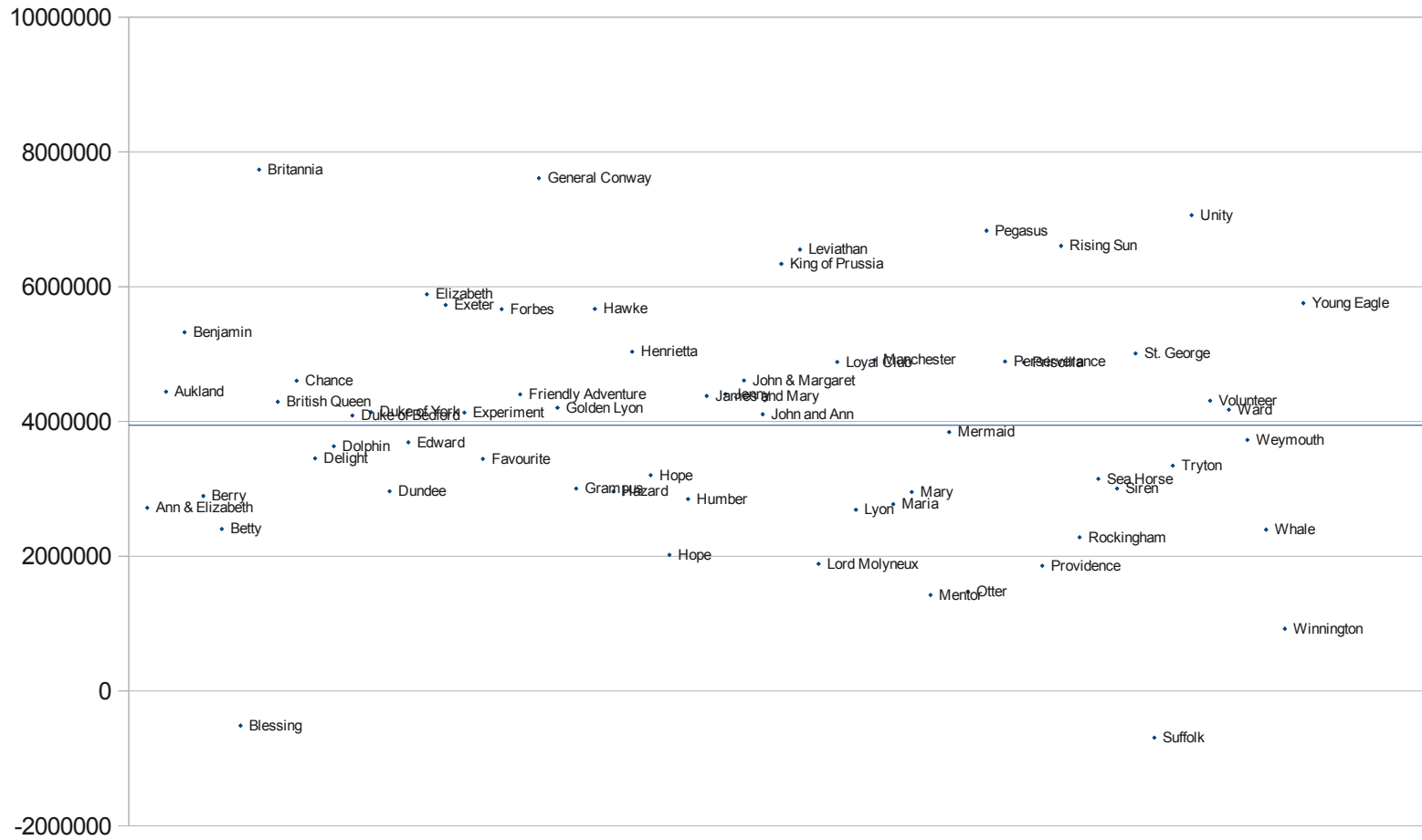
# Vessel Productivity Index- 1774

Calculated Compared to 1774 Average



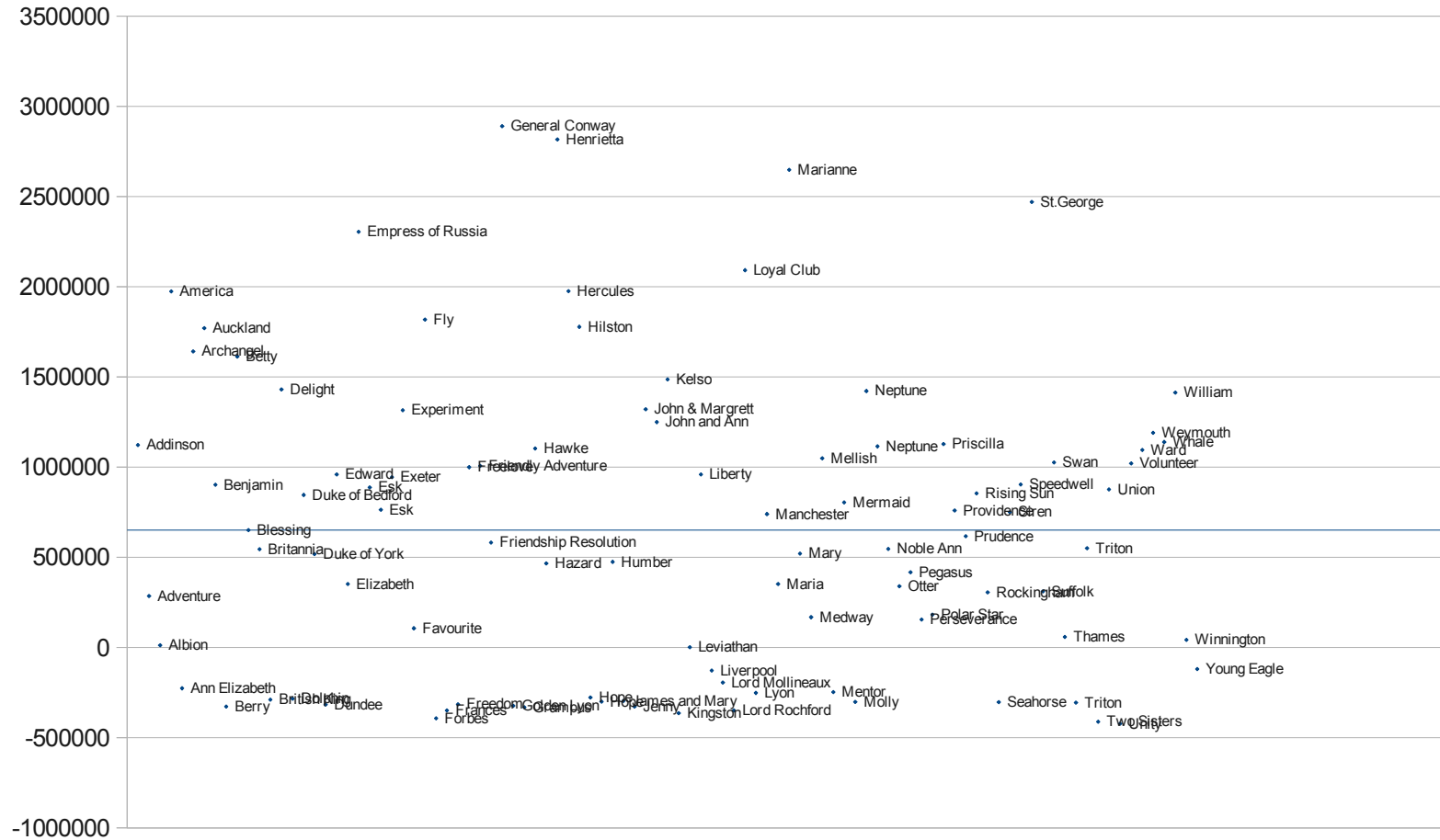
# Vessel Productivity Index- 1774

Calculated Compared to 1770-1775 Average



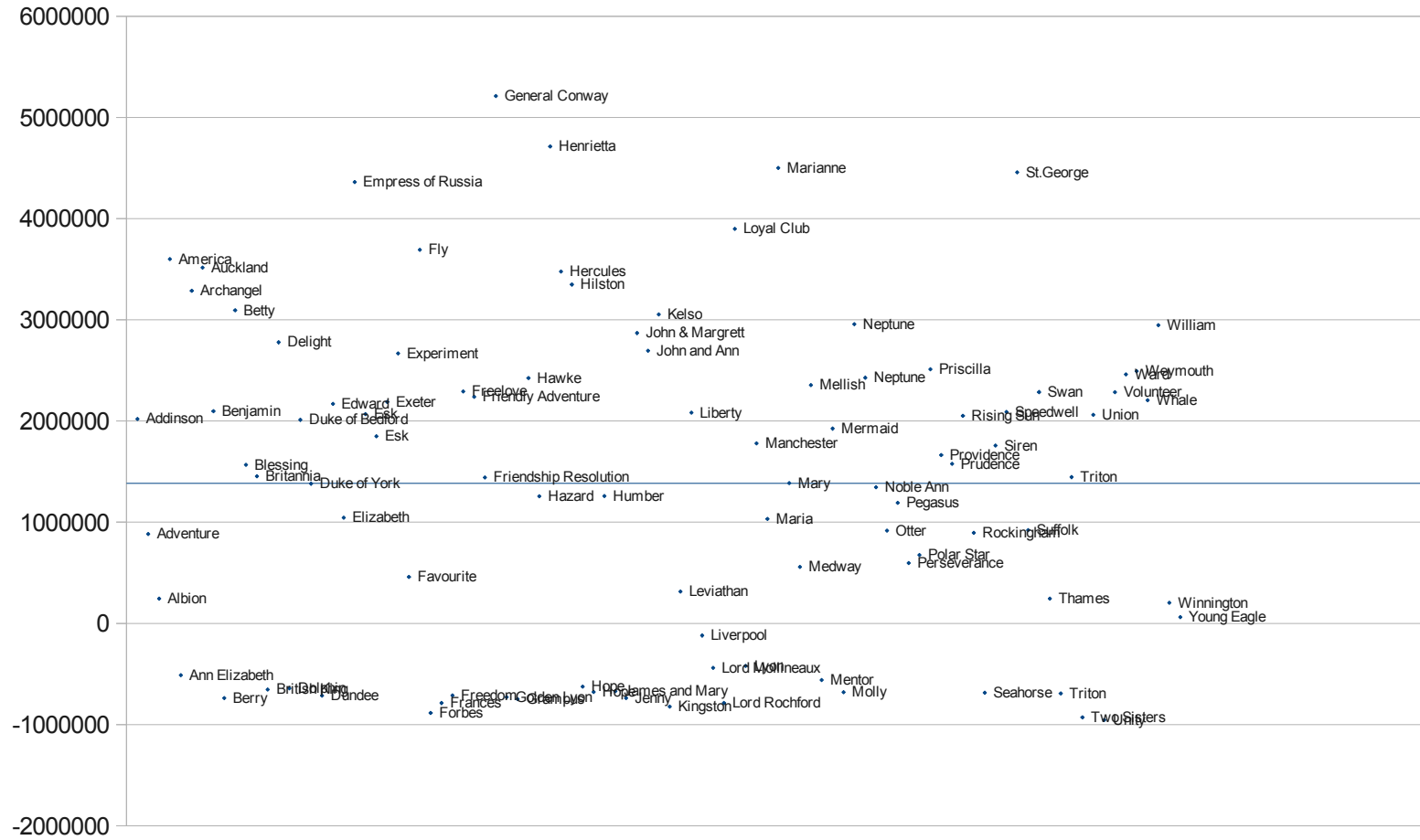
# Vessel Productivity Index- 1775

Calculated Compared to 1775 Average



# Vessel Productivity Index- 1775

Calculated Compared to 1770-1775 Average



**Port-by-Port Productivity Analysis**

	1770-75 Average	1770-75 Aggregate Production
Liverpool	2295571.21753307	125857277.235372
London	2932528.81345622	416038717.605613
Whitby	2304768.92200647	59770344.8929314
Hull	2465409.47860879	99812931.5866305
Newcastle	3519043.45707804	54533399.4695998