The Thompson Shipbuilding FIVE Data

by

Peter Thompson

Professor of Organization and Management
Goizueta Business School
Emory University

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2. Data Set Author

Peter Thompson
Professor of Organization and Management
Goizueta School of Management
Emory University
http://pthompsonecon.com

3. Data Set Summary

The data describe firms that launched at least one metal vessel in the U.S. over 20 gross tons (minimum requirement for registration) between 1825 and 1914. The data set also includes all metal (iron and steel) vessels produced by these firms, regardless of tonnage. The sample contains 273 firms (Data File 1) and over 4,000 vessels (Data File 2). See Data Description for an explanation of the process used to identify metal vessels and the firms that produced them. Seven Word documents (Data File 3) contain the raw information collected in the process of constructing the data set.

4. Author's Research Using This Data Set

Thompson Peter 2005. Selection and Firm Survival: Evidence From The Shipbuilding Industry, 1825-1914 *The Review of Economics and Statistics 87(1):26-36*.

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6. Data Set Sources

Since the 1789 Act to Regulate Shipping (September 1, 1789, 1 Stat. 55), all merchant vessels built in the United States have been required to be registered or enrolled. A ship had to be registered if the owner intended to employ it in foreign trade, and it had to be enrolled if it had a capacity in excess of 20 tons and was intended to be employed in the domestic coastal and river trades. As

the capacity of commercial ocean-going vessels invariably exceeds 20 gross tons, the capacity requirement is binding for documentation to exist[1].

Fortunately, maritime historians have long had an obsession with making lists. The most famous of these, the Lytle list (Lytle, 1932; Lytle and Holdcamper, 1952; Lytle, Holdcamper and Mitchell, 1975) tabulates register and enrollment records for all U.S.-built steamships from 1790 to 1868, and contains approximately 8,000 steam vessels with details of equipment (including form of propulsion), hull material, tonnage, place built, port of first registration, and its eventual fate. After 1868, the America Bureau of Shipping began to publish annually complete ship registries.[2] Although the Lytle list and the ABS registries are valuable, they do not contain the name of the builder even when this was recorded on a document.

The study therefore takes as a starting point a rather fortunate find in the National Archives. Around 1920, the Bureau of Navigation constructed a register of metal vessels built in the United States between 1825, the year the first iron vessel was built, and 1919. The register, a hand-written leather-bound volume contains the key technological details from the vessel documents. But, remarkably in view of the work it must have entailed, the register also lists the builder for most of the vessels. The register suffers some omissions that I have filled from other sources. First, some of the earliest vessels, often of quasi-experimental vessels for which legal registration requirements were not fully satisfied, are omitted. I have been able to fill in these gaps with vessel descriptions from diverse sources, especially Brown (1951) and typescript vessel lists held in various specialized manuscript collections. Second, the register reports only merchant vessels. I have added to the register vessels built for the U.S. Customs Service and the U.S. Navy by private companies using official records provided in Bauer and Roberts (1991), Benham and Hall (1913), Canney (1993, 1995, 1998), Conway (1979), Still (1996), and US Coast Guard (1989).

7. Data Description

In industrial competition, as in war, history is written by, or for, the winners. Firms for which I have been able to code reliably their backgrounds and their destinations after exit from metal shipbuilding are consequently more likely to

[1] Vessels between five and twenty tons had to be licensed, but few licenses from the 19th century survive today. An act of June 7, 1918 (40 Stat. 602) extended the registration requirements. After this date, all mechanically powered vessels, except those under 16 feet powered by an outboard motor, were required to be numbered and recorded.

[2] The ABS registries are tedious to use, however, because a vessel appears in every volume issued in a year when the vessel was still registered or enrolled.

be among the successful. Firms for which I have adequate histories produced many more, and larger, vessels, and survived on average five times as long as the average uncoded firm.

The differences are sufficiently large that, although I have been able to completely code for background and exit destination for only a little over 60 percent of the firms that appear in the database, the contribution of the coded firms to vessel production is much larger. The sample coverage of the coded firms, whether measured by number of vessels produced, tons of production, or the number of firm by year observations in the panel, is about 90 percent.

While it is gratifying to be able to account for so much of the production, the bias towards the more successful firms evidenced in the coverage of the textual histories raises serious questions about sample selection bias in statistical analyses. Simply including "unknown" as one of the categories into which a firm may fall is problematic when these categories are used as regressors. For example, negative idiosyncratic shocks cutting short the life of a firm or reducing its output, increase the likelihood that the firm falls into the "unknown" category. Survival analysis on the dataset is therefore especially susceptible to endogeneity problems.

7.1. Product/Industry Definition

The product is a metal ship. For each vessel, certificates of enrollment and registration were drawn up in triplicate. One copy was held aboard the vessel, which was surrendered at the end of the vessel's life and submitted for archival purposes to the Office of the Register of the Treasury or its successor agencies. The second copy was held by the issuing customs office, and the third as a reference copy by the Office of the Register of the Treasury or its successor agencies. Registration and enrollment certificates provide a rich source of data on the date and place of construction, dimensions, rig, hull material, and other basic technological details of the ship, whether the vessel was intended for domestic use or for foreign trade, and the names of the first owners and master.

The attractiveness of such an extensive technological record will be readily apparent to students of technological change and industry evolution. There are, however, two limitations to be overcome. The first is that metal and wooden vessels are mixed by vessel name in these sources, and there are far too many records of wooden vessels for the extraction of metal vessels to be a reasonable

endeavor. The second is that there was no requirement for vessel documents to record the name of the builder, a particularly desirable piece of information.[3]

All surviving documents of ships built prior to W.W.I are held by the National Archives, but it is a daunting task to systematically tabulate the records. In 1814, fire destroyed all existing surrendered and reference certificates of enrollment and registration;[4] in 1913, the Bureau of Navigation destroyed the reference copies for vessels built between 1815 and 1913; surrendered copies of documents held in Washington are incomplete, especially when vessels were lost at sea; and many of the customs copies are scattered throughout the country in regional offices of the National Archives. Yet despite this shrinkage of the data, the National Archives continues to hold over 10,000 linear feet of vessel documentation records.

The criteria for inclusion of vessels in the final sample were as follows. Because cost-plus contracts initiated during the Great War are of only marginal interest for the study of industry evolution, the database excludes vessels launched after 1914. Second, the sample was restricted to producers who launched at least one vessel in excess of the 20 gross tons capacity required to trigger enrollment or registration. Third, in order to track more precisely the dates of activity of the included firms, all metal vessels known to have been produced by them are included regardless of gross tonnage. The restricted sample contains exactly 4,000 vessels and 273 producers. Data File 1 includes only these 273 producers. Data File 2 includes additional vessels not included in the restricted sample.

For the period 1825-1914, the US Department of Commerce's (USDC) official tally of metal vessels built during the period reports 3,222 documented merchant vessels. To facilitate comparison with the USDC tally, the figure excludes the 370 military vessels in the sample, all vessels under 20 gross tons capacity, and all vessels for which no gross tonnage is available. Even so, there remains an excess of 260 merchant vessels that should have been included in the USDC record.

I believe that, subject to the minimum size requirement, the database is the most complete record in existence of metal shipbuilding in the United States prior to 1915. The only major omission that I am aware is a failure to systematically include vessels constructed for export, and which therefore were

[3] One can often identify the builder from a vessel's registration document when he was a co-owner of the vessel; granting part ownership to the builder was a common way to finance part of the ship purchase during the 18th and 19th centuries.

[4] On August 24, 1814, British forces under Major General Robert Ross set fire to all the public buildings in Washington except the Patent Office.

not documented in the United States. Few firms exported vessels and, for most of those that did, export activity formed a minor part of their total production. There are a couple of exceptions, however. Between 1878 and 1914, James Rees and Sons of Pittsburgh, PA, produced hundreds of knock-down iron and steel steamboats for service on South American rivers (Rees and Sons, 1913), but only fourteen of their vessels are recorded in the United States. Marine Iron Works of Chicago, IL, also sold an unknown number of knock-down iron vessels to South America, although in their case the majority of their export trade consisted of the sale of machinery along with plans for wooden hulls to be built locally (Marine Iron Works, 1902).

7.2. Firm Definition

There were several challenges to overcome in constructing the basic count of firms and in assigning vessels to them. First, the source database contained many vessels assigned to individuals, although these individuals turned out to be employed by another firm. Second, it was not always a straightforward matter to decide when a reorganization or relocation constituted the creation of a new producer or the continuation of the old one.

Addressing the first difficulty required only detective work. The individual to whom a vessel had been attributed often proved to be the superintendent of construction, an owner of the firm, or even an owner of the vessel. Often, I was able to find biographies of the individuals that placed them in a firm at the right time. In other cases, I was able to cross-check vessel lists from multiple sources to link the individual to a firm. Sometimes, company records provided employee lists. And in one case, genealogical records linked multiple individuals with the same surname to a single family. It is certain that some individuals who continue to be named in the sample were, in fact, employed by another firm. On the other hand, I have documented that many individual names did indeed own their own foundry, engine works, or boatyard. My approach in this case has been to identify in the sample all individuals about whom I am suspicious (generally individuals who appear from nowhere, build one large vessel, and then vanish), and to conduct the statistical analyses with and without these individual observations.

It was frequently necessary to make judgments about the boundaries between firms. Some examples illustrate:

• On 20 July 1885, John Roach and Sons of Philadelphia, PA, declared bankruptcy in the wake of financial strains imposed by naval contracts. The yard closed for almost a year, putting 1,200 men out of work. Some negotiations allowed the receiver, George Quintard, to finish some incomplete cruisers on the stocks and

ensure payment for them. The following year, after incorporation as the Delaware River Iron Shipbuilding and Engine Works in a reorganization involving new investors, the yard reopened. The father, John Roach, who was by now terminally ill with cancer, resigned, and the yard re-opened with the son, John B. Roach, at the helm (Heinrich, 1997; Swann, 1965).

• In 1903, a devastating fire along the waterfront in Racine, WI, destroyed the plant of the Racine Boat Manufacturing Company, a specialist in the construction of pleasure boats. The site had already been getting too small for the firm and, in response to an offer of free waterfront property, a $20,000 cash payment and tax breaks from the city of Muskegon, MI, the firm relocated to Michigan while continuing to operate under the Racine name. A majority of the employees moved to Muskegon, although only two members of the management team, Walter Reynolds and Clarence Palmer, moved. In 1906, the foreman Peter Gødske, who was unhappy with the company's attempts to expand into the construction of larger vessels, returned to Racine with a number of employees to continue production of pleasure boats. Gødske's plant, doing business as the Racine Boat Company, closed some time between 1925 and 1927. In November of 1910, a boat-building combine to be known as the National Boat and Engine Company was organized, with Walter Reynolds as its president and the Racine Boat Manufacturing Company of Muskegon as its head company. The purpose of the organization was to control boat production of the United States east of the Mississippi, and subsequently to begin production of airplanes. The consolidation of the participating companies was to be financed with a large bond issue. However, the bond issue failed and on September 4, 1911, the Racine Boat Manufacturing Company was closed and put in the hands of a receiver. A new syndicate, the Racine-Truscott Shell Lake Boat Company was set up and assigned to run the Muskegon company. In March of 1912, charges of fraud were brought against the syndicate and the consolidation agreement was set aside. On November 28, 1915, foreclosure proceedings were started against the syndicate and the plant went into the hands of a receiver (Gunther, 1989; Wheeler, 1998).

• The Cleveland Ship Building Company operated a yard in Cleveland, OH from 1887 to 1898. Constrained by space, in 1898 the firm built a new yard in Lorain, OH on the Cuyahoga River, intending to use the old yard for repair work. In 1899, the Cleveland Ship Building Company joined the new trust being established under the name of the American Ship Building Company, which then operated both yards for new construction, with many of the same employees (Wright, 1969).

• In 1844, Thomas Reaney, Jacob Neafie and William Smith formed a partnership in Philadelphia, PA, to build fire engines, boilers and stationary steam engines. However, in that year they also launched four iron steamboats destined for

export to South America (Morrison, 1905). Smith died in 1845, and Capt. John P. Levy was invited to join the firm. While Neafie and Levy were experienced mechanics, their social connections and financial resources were limited. Levy brought connections and money from his shipping activities, which facilitated the firm's subsequent expansion. In 1859, Reaney left the firm and established a yard in Chester, PA, in partnership with his son (Heinrich, 1997).

In the first three examples, I chose in favor of coding multiple producers. In the first case, I relied on a decision to code any reorganized firm after bankruptcy as a new and distinct firm, but coded the pre-entry background of the new firm as metal shipbuilding. Moreover, I additionally coded the new firm as having taken over an existing metal shipbuilding yard.

The Racine and Muskegon companies were coded as four distinct firms. In 1903, plant and facilities on offer in Muskegon were clearly sufficiently distinctive to induce a move. Because age and appropriateness of plant is expected to influence firm performance, I coded the two locations as separate producers, the latter having metal shipbuilding as a pre-entry background. Peter Gødske's return to Racine is logically coded as a new firm created by spinoff. I coded the Racine-Truscott Shell Lake Boat Company as a distinct entity, because it was formed after a bankruptcy. I did not code the abortive National Boat and Engine Company consortium as a company distinct from the Racine Boat Manufacturing Company. In this case, the management remained unchanged, and the planned extensive trust never got off the ground.[5]

In the case of the Cleveland Ship Building Company, I relied on the principle of replication to code each plant as a separate economic entity, although I then provide indicators that the parent firm owned multiple plants.[6] The pre-entry background for the Lorain plant is coded as metal shipbuilding. I then decided to code all plant takeovers by the new trust companies that were emerging at the turn of the century as new firms, again coded with a metal shipbuilding background and takeover of existing metal yards.

In contrast, I treated the Philadelphia plant owned by various permutations of Reaney, Neafie, Smith and Levy, as a single firm created in 1844. Although Levy joined the firm after the company had launched its first vessels, the captain brought his connections to the firm at a sufficiently early stage that I include his shipping background as part of the firm's pre-entry experience. The Chester firm formed by Reaney and his son in 1859 is a new spin-off with metal shipbuilding

[5] This example illustrates that coding decisions can be dependent to some extent on the success of new ventures. If the new consortium had become established and led to different management practices, I would have coded November 1910 as the date of formation of a new firm.

[6] Very few firms in our sample operated multiple plants.

as a pre-entry background, but the loss of Reaney from the Phildelphia partnership did not persuade me to code the surviving partnership of Neafie and Levy as a new firm.

In summary, my preference was to code more, rather than fewer producers. However, I did not code as firm changes the many recorded instances when partners left firms and were replaced by new partners, as long as some key partners remained in place. These criteria, although inevitably subjective, led me to code as a new firm any organization where I had reason to believe the operation of the firm had been substantively affected by a reorganization, or where the technological capabilities of the plant were believed to be substantively different.

8. Variable List and Definitions: File 1: ThompsonShipfirmFIVEdata

8.1. Firm Identifiers:

Firm Name

[Variable name: *firmname*; character string variable]: Name of shipyard.

FIVE Firm ID (unique firm identifier for the FIVE Project)

[Variable name; *fivefirmID*; 6 digit numeric variable]: Unique identifier for each Firm Name that appears in the FIVE data sets. Firm Names and FIVE Firm IDs may appear in more than one FIVE data set. If a firm's name changed over time, the FIVE Firm ID for the firm sometimes may change as well. In addition, different FIVE data set authors may have coded different firm names for the same company, which could result in different FIVE Firm IDs for the same firm in different data sets.

Data Set Firm ID (firm identifier assigned in the original data set)

[Variable name: *firmID*; 3 digit numeric variable]: Unique identifier that I created for each firm in the original data set.

CUSIP ID (firm identifier assigned by Compustat)

[Variable name: *CUSIPID*; 8 digit numeric variable]: Unique identifier for each firm assigned by Compustat for 2012. The following procedure was used to assign CUSIP numbers to companies in the data set. Each Firm Name was matched with an identical or similar name in Compustat where possible. For firms where no match was found, a search was conducted for the names of any companies that acquired or merged with companies in the data set, including subsequent to the time period covered by the shipbuilding data. This included

searching Compustat, the CRSP history files, the Standard & Poor's CUSIP dataset, and the website http://shipbuildinghistory.com. Where the information from these sources conflicted, additional maritime histories and web sources were consulted in order to obtain as accurate information as possible. The name of each acquiring or merged company was then matched with an identical or similar name in Compustat where possible. If a company was acquired by or merged with multiple companies during its history, only one of these was used and the other acquisitions or mergers are indicated in the CUSIP Explanation. There is no guarantee that these matches and CUSIP numbers are accurate. There also are many firms in the data set for which no match was found. If no match was found, the CUSIP ID field is blank.

CUSIP Firm Name (company name assigned by Compustat)
[Variable name: *CUSIPname*; character string variable]: Name of company given in Compustat for the CUSIP ID.

CUSIP Explanation (explanation of CUSIP Firm Name)
[Variable name: *CUSIPnote*; character string variable]: Explanation of CUSIP Firm Name for companies that were acquired by or merged with other firms for which a CUSIP number was found, including subsequent to the time period covered by the shipbuilding data.

8.2. Entry/Exit Variables:

Year of Founding
[Variable name: *foundingdate*; 4 digit numeric variable ranging from 1813 to 1912]: Year company was founded, where known. This can be many years before entry into iron and steel shipbuilding.

Entry Year
[Variable name: *entryyear*; 4 digit numeric variable ranging from 1835 to 1914]: Year first metal vessel was built.

Last Year
[Variable name: *lastyear*; 4 digit numeric variable ranging from 1835 to 1914]: Last year of metal shipbuilding recorded in dataset.

Exit Year
[Variable name: *exityear*; 4 digit numeric variable ranging from 1825 to 2001]: Last year of production in shipbuilding if production ceased, where known.

Closing Year

[Variable name: *closingyear*; 4 digit numeric variable ranging from 1856 to 1987]: Year company closed if this occurred, where known. This can be many years after exit from shipbuilding.

Prior Background Variables:

Foundry

[Variable name: *foundry*; 1 digit numeric variable]: A dummy variable indicating whether the shipbuilder had pre-entry experience in foundry work.

Rolling Mills/Construction

[Variable name: *rolling mills/construction*; 1 digit numeric variable]: A dummy variable indicating whether the shipbuilder had pre-entry experience in rolling mills and/or construction work.

Steam Engines

[Variable name: *steamengines*; 1 digit numeric variable]: A dummy variable indicating whether the shipbuilder had pre-entry experience in the manufacture of steam engines.

Railcars/Locomotives

[Variable name: *railcars/locomotives*; 1 digit numeric variable]: A dummy variable indicating whether the shipbuilder had pre-entry experience in the manufacture of railcars/locomotives.

Railroads

[Variable name: *railroads*; 1 digit numeric variable]: A dummy variable indicating whether the shipbuilder had pre-entry experience in railroads.

Naval Engineer

[Variable name: *navalengineer*; 1 digit numeric variable]: A dummy variable indicating whether the shipbuilder had pre-entry experience in naval engineering.

Metal Shipbuilding

[Variable name: *metalshipbuilding*; 1 digit numeric variable]: A dummy variable indicating whether the shipbuilder had pre-entry experience in metal shipbuilding.

Boilers

[Variable name: *boilers*; 1 digit numeric variable]: A dummy variable indicating whether the shipbuilder had pre-entry experience in boilers.

Wood Shipbuilding

[Variable name: *woodshipbuilding*; 1 digit numeric variable]: A dummy variable indicating whether the shipbuilder had pre-entry experience in wood shipbuilding.

Shipping or Dredging

[Variable name: *shippingordredging*; 1 digit numeric variable]: A dummy variable indicating whether the shipbuilder had pre-entry experience in shipping or dredging.

Takeover of Exiting Metal Yard

[Variable name: *takeoverofexitingmetalyard*; 1 digit numeric variable]: A dummy variable indicating whether the shipbuilder entered the industry by purchasing an existing shipyard engaged in metal shipbuilding.

Unknown

[Variable name: *unknown*; 1 digit numeric variable]: A dummy variable indicating shipbuilders for which pre-entry experience is unknown.

In coding the pre-entry backgrounds of shipbuilders, my primary focus has been on distinguishing firms that entered after gaining experience in manufacturing iron and steel products, wooden vessels, or shipping[7]. Each background offered different advantages. Manufacturers of iron products were skilled in handling and shaping a relatively new industrial material. Builders of wooden vessels were experienced in hull design, marketing vessels, and had often earned a solid reputation for quality and reliability among vessel buyers. Entrants from the shipping industry had a clear understanding of buyers' needs, extensive contacts in the using industry, and in some cases they provided a market for their own output.[8]

Founders of firms often had pre-entry experience in various fields, and when this experience was significant, multiple coding was made. Firms that lacked relevant experience, hired it, or worked in close collaboration with firms having complementary experience, as the following examples attest:

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[7] Among those firms whose background has been identified, alternative routes of entry are rare.

[8] In many cases of entrants with a background in metal work, I have further been able to confirm that they manufactured steam engines. In view both of the importance of engine-building to shipbuilding and its technical difficulty, I have coded this activity as a sub-class of foundry work that merits particular attention. Most builders of wooden vessels were not equipped to manufacture engines and, although many operated small foundries to manufacture custom iron fittings, the normal practice was to sub-contract the major machinery to specialists.

• In the mid 1840s, Philadelphia engine-builders Reaney, Neafie, and Levy began to make contact with shipbuilders to help design ships and supervise the bending and mounting of frames. Because Reaney, Neafie and Levy had experience in metal work and engine work, along with the rights to the Loper propeller, collaboration with them was attractive to local shipbuilders (Heinrich, 1997).

• Charles Cramp, heir to a Philadelphia wooden shipbuilding enterprise founded in 1825 by his father, William Cramp, served his apprenticeship at the local shipyard of his maternal uncle, Jacob Birely, between 1844 and 1846. Birely was at this time buying his engines from Reaney, Neafie and Levy, and was to launch his own iron boat only two years later. On returning as a master shipbuilder to his father's yard, Cramp immediately entered into close collaboration with the engine builders, and began to experiment with screw propulsion. In 1846 he launched the country's first screw tug, Sampson, with the engine built by Reaney, Neafie and Levy. (Buell, 1906; Johnson, 1904)

• Alexander McDougall (1845-1923) began sailing at the age of 16, after limited schooling and being apprenticed as a blacksmith. By 1863 he had risen to second mate on a schooner, and in 1871 he became captain of the Japan, which in the winter of 1870-71 was one of three iron vessels being built for the Anchor Line by the William King's iron works in Buffalo, NY.[9] In his capacity as captain of the Japan, McDougall spent the winter supervising construction at the yard. When shipping business was slow during the mid 1870's, McDougall went into the fishing business in partnership with Alexander Clark of Collingwood, and in the winter of 1875-6, he built the 58-foot wooden steam fish tug Siskiwit. Then, in 1879, shipowner Thomas Wilson, who had sailed with McDougall on the Meteor, asked McDougall to supervise construction of the steamer Hiawatha and the schooner-barge Minnehaha, which were being built for him at the Linn and Craig yard in Gibralter, MI. Between 1878 and 1881, McDougall commanded the Hiawatha. It was during this period he gave thought to barge design, and on May 24, 1881 he was granted patent 241,813 for a towboat with a cylindrical hull (possibly influenced by the design of the hull built to transport Cleopatra's Needle between Egypt and London, which McDougall had an opportunity to view

[9] Most accounts call this firm the (Sidney) Shepard Iron Works, a firm established in 1848. Shephard relinquished active management of the firm in 1865, and William J. King Jr. had bought a majority share of the firm by 1871. The Anchor Line vessels were built at King's yard under the oversight of the wooden shipbuilding firm of Gibson and Craig. Shephard must have retained a minority interest in the firm: it is recorded that in 1885 he transferred to a son, C. Sidney Shepard, his interest in the old firm. By the late 1880s, the firm was owned by H.G. Trout, who had learned his trade at the King works, and then leased the property. He was a major supplier of propellers using what was known as the "Trout" pattern. In addition, the company supplied marine engines and other manufactured machinery (Buffalo Courier, 1890; Hall, 1895, vol 1, pp. 592-3; Larned, 1911, vol. 2 pp. 3-4).

on a visit to England in 1873). Design improvements, most importantly a shift from wood to iron or steel, led to a second patent, 259,889 on June 20, 1882. The familiar bow shape of the whaleback design is evident in this second patent. Further design changes during the subsequent decade led to patents in December 1883 (no. 393,997) and June 1890 (nos. 429,467 and 429, 468). Patent 429,467 was the design for McDougall's first vessel, launched in 1888; while 429,468 was the basic design for nearly all the subsequent whalebacks built by McDougall. So, when McDougall built his first steel vessel in Duluth, MN, he could draw on his experiences as blacksmith, supervisor of iron and wooden ship construction, builder of a wooden vessel, and captain of iron steamers. Nonetheless, he contracted out the difficult parts of his boat construction. In particular, the 101's conoidal bow and stern were fabricated at the Pusey & Jones Shipbuilding Company of Wilmington, DE. Only the straight mid section of the hull was built locally. In 1890, after securing financing from Colgate Hoyt of New York, who represented the John D. Rockefeller interests, and other New York financiers, McDougall established the American Steel Barge Company. He again looked elsewhere for expertise. In particular, he hired Joseph Kidd, who had been running his own iron works for several years in Linwood, PA. Kidd was an English shipbuilder from the Tyne. He had for eight years served as foreman for John Roach, one of the country's most successful large-scale shipbuilders, and certainly its most outspoken. Kidd then established his own firm, with Roach's assistance. He had been engaged for several years manufacturing iron conductors for the Union Line cable-roads in Philadelphia, and had also built several modest iron vessels. By the time McDougall approached Kidd, he had won contracts for two government lightships, but was not succeeding financially. McDougall induced Kidd to close his firm and take the position of Superintendent for $200 per month. (Ashmead, 1884; McDougall, 1892, 1968)

Inevitably, some judgment has to be made to exclude certain experiences. My choice in these instances was to favor the dominant experience, rather than code all known experiences, however slight. Thus, William Cramp and Sons has wooden shipbuilding as pre-entry experience, and the American Steam Barge Company has shipping coded as its pre-entry experience. But I cannot claim to have been dogmatic about this decision: recall that Reaney, Neafie and Levy are recorded with backgrounds in both engine-building and shipping.

Form of Exit Variables:

Bankruptcy/Unprofitable

[Variable name: *bankruptcy/unprofitable*; 1 digit numeric variable]: A dummy variable indicating whether the shipbuilder exited the industry because the firm was unprofitable and closed, or formally declared bankruptcy.

Into Trust

[Variable name: *intotrust*; 1 digit numeric variable]: A dummy variable indicating whether the shipbuilder exited the industry into a one of the shipbuilding trusts.

Merger

[Variable name: *merger*; 1 digit numeric variable]: A dummy variable indicating whether the shipbuilder exited the industry by merger with another company.

Owner Death/Retired

[Variable name: *ownerdeath/retired*; 1 digit numeric variable]: A dummy variable indicating whether the shipbuilder exited the industry because the owner died or retired.

Continued In Other Industry

[Variable name: *continuedinotherindustry*; 1 digit numeric variable]: A dummy variable indicating whether the shipbuilder exited the industry but continued activities in another industry.

Sold

[Variable name: *sold*; 1 digit numeric variable]: A dummy variable indicating whether the shipbuilder exited the industry due to sale of the company.

Miscellaneous

[Variable name: *miscellaneous*; 1 digit numeric variable]: A dummy variable indicating whether the shipbuilder exited the industry for a known, miscellaneous reason.

Unknown

[Variable name: *unknown*; 1 digit numeric variable]: A dummy variable indicating that the shipbuilder exit destination is unknown.

Eight categories of exit destination have been coded, as noted above. In many cases, I do not know what happened to the firm – it simply vanishes from the database. Of those for which I have information, 53 percent continued in business, having diversified out of iron or steel shipbuilding. In the majority of these cases, the firm reverted to the activity it had undertaken both before and during its life as a metal shipbuilder. Nonetheless, in a sizable minority of cases, the firm ceased to exist contemporaneously with its exit from shipbuilding: the firm was unprofitable and closed, or bankruptcy was formally declared (20 percent); or the firm was sold, without there being documentary evidence that the owner was retiring or the firm was insolvent (9 percent); or the firm exited by merger or into one of the trust companies being formed at the end of the 19th century (9 percent); or the owner died or retired (6 percent).

In two cases, I coded the exit destination as miscellaneous. One was the demise by fire, already mentioned, of the Racine Boat Manufacturing Company of Racine, WI. The second, the Winans Brothers, is more interesting:

• The Winans brothers were sons of Ross Winans, the railway pioneer. Ross Winans had begun his engineering career in 1830 as an assistant to Phineas Davis, who in 1825 had been involved in the construction of the first American iron vessel, Codorus. Winans eventually went into business on his own with the founding of the Winans Locomotive Works. His son Thomas became an active collaborator around 1840. The family accumulated considerable wealth overseeing railway development for the Russian government, traveling frequently to Russia. In 1858 the Winans brothers launched a novel ship into Baltimore harbor. Known as the cigar ship, it was built in two sections with a radial propeller amidships joined by a shroud ring over the propeller. Power was provided on a single shaft by two railroad steam engines, one in each hull. The superstructure consisted of a narrow deck with railings, a lookout tower atop the propeller shroud, and narrow smokestacks on each hull. The helmsman sat in a compartment in the bow with a small, forward-looking view port. The boat made several trial trips, but was never put into commercial use. Ross Winans designed the novel cigar boat, but Thomas Winans was responsible for its construction (Thomas' brother was at the time in Russia carrying out the contracts the family had won). Plans were laid for a second vessel. But in 1861 Ross Winans, a Southern sympathizer, built a self-propelled steam gun. It was loaded on a B&O car bound for Harper's Ferry but was intercepted by the Federal troops and dismantled. Winans was arrested for his part in the affair and jailed until November 1862. After his release, the Winans family moved to Europe. They first tried to persuade the Russian government to purchase the design for their navy, and two vessels were built in St. Petersburg. The Russians did not bite, and a third vessel was launched in La Havre in 1865. Two Winans vessels eventually made their way to England and remained moored in Southampton until late in the century, when they were sold for scrap (Shugg, 1998; Crisafulli, 2001).

Compared with pre-entry backgrounds, there were relatively few instances in which judgments had to be made about coding the exit destination. But two similar examples, in which the death of an owner is shortly followed by bankruptcy but in which different assignments were made, may shed light on the judgments that were made.

• After John B. Roach assumed the presidency of his father's yard in 1885, the firm was incorporated under the name of the Delaware River Iron Shipbuilding and Engines Works. Over the next 22 years, the firm launched 75 vessels for a total of 182,656 tons, remaining one of the most active producers in the country. The yard was receiving fewer orders by the turn of the century, and in 1903 it closed for a while, but by 1906, business picked up. Seven vessels were launched

in 1906 and 1907, for a total of 21,073 tons, far exceeding the firm's lifetime average annual production rate of 8,302 tons per year. Although orders dropped again in late 1907, and the yard closed temporarily, there is no evidence suggesting that conditions were much different than had previously been experienced. However, John B. Roach died in 1908, and his family quickly announced that they no longer wished to continue production. The yard entered receivership only five months after Roach's death. (Heinrich, 1997; Swann, 1965)

• In 1883, the Navy began to seek bids for a new fleet of steel ships, and a new yard, the American Shipbuilding Company,[10] was established in Philadelphia, PA, to secure some of these contracts. It was financed by New York interests with $250,000, and placed under the direction of Lieutenant-Commander H.H. Gorringe who had earned fame in 1880 by shipping Cleopatra's Needle from Egypt to Central Park. Gorringe hired 700 craftsmen, issued subcontracts for engines to Neafie and Levy, and hired foremen who had learned their trade at John Roach's yard. Unfortunately for Gorringe, a quarrel developed between him and the Secretary of the Navy, Chandler. Gorringe advocated the cause of free ships, because he was more interested in the US having a strong merchant marine than a strong shipbuilding industry. Chandler was a protectionist. In a letter to Gorringe, Chandler wrote that "there is no objection to the public expression by a naval officer of his unpurchased opinions on any subject of general interest." Gorringe took the word "unpurchased" as a slander and resigned from the Navy. Two events conspired to close the firm only two years after its creation. First Gorringe died in 1885 after attempting to board a moving train. Second, the firm's financial prospects were severely shaken by its failure to win any Navy contracts, even though it had managed to launch a dozen private vessels, and financing was withdrawn after 1885 (Johnson, 1904; Heinrich, 1997).

In the former case, I coded the exit destination as death of owner, and in the latter as bankruptcy. The different choices result from my interpretation of the textual histories. In the case of Gorringe's company, I concluded that continued financing was not conditional on Gorringe's participation—he had been central to the strategy of winning Navy contracts, but that strategy had already fallen apart by the time of his death. Gorringe also had no particularly rare shipbuilding talent. In contrast, John B. Roach had become accustomed to the cyclical nature of the demand for new construction over 35 years in the business; he had even closed the yard temporarily on more than one occasion. My reading is that Roach would not have been defeated by what appeared to be a quite typical

[10] This firm is unrelated to the American Ship Building Company formed by the merger of a number of large producers in the Great Lakes region in 1899.

lapse in new orders in late 1907, and that the family's decision to close the firm was directly predicated on Roach's death.

8.3. Location Variables:

City

[Variable name: *city*; character variable]: City in which the shipyard was located.

State

[Variable name: *state*; 2 character variable]: State in which the shipyard was located.

9. Variable List and Definitions: File 2: ThompsonShipvesselsFIVEdata

9.1. Firm Identifiers:

Firm Name

[Variable name: *firmname*; character string variable]: Name of shipyard, if known.

9.2. Product Identifiers:

Vessel Official Number

[Variable name: *officialnumber;* 6 digit numeric variable]: Official registration number of the vessel, if known.

Vessel Name

[Variable name: *vesselname;* character string variable]: Name of vessel, if known.

9.3. Entry/Exit Variables:

Year Built

[Variable name: *yearbuilt*; 4 digit numeric variable]: Year ship was built, ranging from 1825 to 1914.

Year Withdrawn

[Variable name: *yearwithdrawn*; 4 digit numeric variable]: Year the vessel stops being registered, if known.

Reason Withdrawn

[Variable name: *reasonwithdrawn*; character string variable]: Reason for the end of vessel registration (e.g., vessel was scrapped), if known.

9.4. Vessel Variables:

Vessel Type

[Variable name: *vesseltype*; character string variable]: Type of vessel (e.g., barge, steamship), if known.

Gross Tons

[Variable name: *grosstons*; numeric variable]: Gross tonnage of vessel, ranging from 2 to 31,400, if known.

Length

[Variable name: *length*; numeric variable]: Vessel length, ranging from 25 feet to 616 feet, if known.

Breadth

[Variable name: *breadth*; numeric variable]: Vessel breadth, ranging from 6 to 95.25, if known.

Depth

[Variable name: *depth*; numeric variable]: Vessel depth, ranging from 2 to 51.25, if known.

Hull Material

[Variable name: *hullmaterial*; character variable]: Material of vessel hull, if known.

Propulsion

[Variable name: *propulsion*; character string variable]: Type of vessel propulsion system, if known.

Engine

[Variable name: *engine*; character string variable]: Type of engine, if known.

Built For

[Variable name: *builtfor*; character string variable]: Who the vessel was built for, if known.

First Home Port

[Variable name: *firsthomeport*; character string variable]: First home port of vessel, if known.

10. Summary Description: File 3: ThompsonShiptextFIVEdata

This file has seven Word documents containing the raw information collected in the process of constructing Data Files 1 and 2. The Word documents are organized by geographic location of the shipyards. The documents consist of items cut and pasted from websites, copied from published histories, notes taken at regional and maritime museums, and so on. I am not a historian, so these files are rather messy, but they do contain a lot of information.

