Incentives in Corporations: Evidence from the American Whaling Industry

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Abstract: The use of incorporation contributed to the development of many nineteenth-century industries, but whaling was not one of them. Of the whaling ventures that received corporate charters in the 1830s, none survived for more than 9 years, at a time when unincorporated whaling ventures enjoyed growing success. This paper analyzes the historical origins of the contracts and organizational forms employed in the American whaling industry, and examines their development in response to moral hazard problems. Most whaling ventures were owned by a small number of investors, and were configured to provide powerful incentives. It is argued that the corporate form of ownership, as implemented in the 1830s, was incapable of providing the incentives requisite for success in whaling. The analysis of a newly-collected panel of 874 whaling voyages from 222 different ports supports the main conclusions of the paper.

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Consider the problems faced by a prospective investor in a nineteenth-century whaling venture. His stake in the venture would be managed by an "agent," a managing partner, who would purchase supplies and hire a captain and crew, and plan the voyage on behalf of the investors. The agent's management of these responsibilities may have been difficult for the investor to evaluate, or even observe. Then the vessel was entrusted to the captain and crew and sent on a voyage to seas tens of thousands of miles away for periods of three years or longer, often circumnavigating the earth in the process. The actions of the crew would have been nearly impossible to observe while the voyage was underway, as would the efforts of the agent hire a good captain, and supervise the voyage. Incentive problems arise in the financing of any business, but in the whaling business these problems were particularly acute.

The contracts and organizational forms employed in whaling in the nineteenth century evolved in response to these problems. Most American whaling enterprises were closely held by a small number of local investors, and the allocation of ownership rights within these ventures was configured to provide powerful incentives for their managers. The industry's agents, to whom the planning and management of voyages was delegated, usually held substantial ownership shares as well, thus aligning their interests with those of the other investors. Organized as unincorporated partnerships, these enterprises dominated the industry from its inception in the seventeenth century, through its decline in the late nineteenth century.

In the 1830s, a completely new mode of organization was introduced into the industry: the corporation. These whaling corporations were created at a time when the use of incorporation began contribute to the development of many nineteenth century industries.[2] Indeed, some have argued that the growth of corporations was "the most important and conspicuous feature of the development of society in Europe and America" (Davis, 1905, p. 1). These early whaling corporations attempted to create diffusely-owned enterprises, governed by a formal structure including a board of directors and a committee of executive officers. This represented a significant departure from the traditional reliance on

[2]The evolution of the use of the corporation as an organizational form in the late ninteenth and early twentieth century is documented by Kim (2003), Lamoreaux (2003), and Atack and Bateman (1995).

concentrated ownership to resolve incentive conflicts in the industry, and it failed: none of the whaling corporations survived beyond the 1840s, and few experienced much financial success, at a time the American whaling industry as a whole continued to expand.

This paper will analyze the failure of incorporation in the American whaling industry. The whaling corporations of the 1830s and 1840s were ambitious and innovative enterprises, whose governance structure, disclosure requirements, and shareholder voting rights offered many potential benefits to small investors. However, these ventures were unable to create the incentives requisite for success in the industry. Their managers, who were no longer their largest investors, did not perform as well as their peers in unincorporated ventures, and as a result, the enterprises "failed to yield the profit anticipated," and were abandoned.[3]

In order to identify the determinants of the performance of incorporated whaling ventures empirically, an analysis of a newly-constructed panel of 874 whaling voyages from 22 different ports is presented. The dataset was compiled from early customs records, which include detailed information on the ownership of vessels, and the output from the voyages. The voyages in the sample sponsored by corporations were significantly less productive than voyages sponsored by unincorporated investors.

This effect is consistent with the notion that whaling corporations were unable to create the necessary incentive structures, but it does not have a causal interpretation. The entrepreneurs who formed corporations were certainly a self-selected group, they may have simply lacked the requisite talents or experience, or their locations in ports with little whaling activity (in a business dominated by a few large ports that specialized in whaling) may have doomed their ventures irrespective of their organizational form. However, many whaling corporations were founded and managed by entrepreneurs who had previously managed (or would subsequently manage) unincorporated partnerships with the usual ownership structure. The dataset contains a number whaling voyages managed by these entrepreneurs, both within unincorporated partnerships, and within corporations. The effect of incorporation can thus be identified in an individual-fixed-effects framework. The estimated results indicate a robust negative effect on productivity in the entrepreneurs' incorporated enterprises, compared to their unincorporated partnerships. Thus, even if only

[3]Ruttenber (1875), referring to the Newburgh Whaling Co. of Newburgh, NY.

a self-selected group of less successful entrepreneurs formed corporations, their corporate ventures were even less successful.

The American whaling industry presents an ideal setting in which to analyze the effects of organizational forms on productivity in the development of the American economy. The entrepreneurs of the business—the agents—often managed dozens voyages over their careers, each of which can be regarded as separate business units, and many of which might have had different investors. The customs records that were created for each voyage contain detailed information not typically available for early-nineteenth-century firms, that present a unique opportunity to follow the different ventures of entrepreneurs over time. As unusual as this extinct industry may seem, its participants faced incentive problems that investors in most other industries at the time, and also today, would find familiar.

The paper proceeds as follows. In the next section, the evolution of the organizational forms of whaling enterprises is examined, with a particular focus on the role of the provision of incentives, and the allocation of rights of control in financial contracts. The history is followed through the many phases of the industry's development, into the 1830s, when whaling corporations were formed. The section that follows—Section 2—a presents a discussion of the experience of whaling corporations, and an analysis of their governance structures. Section 3 suggests some explanations for the failure of these corporations, and Section 4 presents an empirical analysis of the performance of whaling corporations. Section 5 discusses the results and concludes the paper.

The contracts between the investors and managers of whaling ventures in the nineteenth century evolved from earlier schemes used in 18th century whaling voyages, which, in turn, had evolved from contracts used in the much earlier shore whaling industry. The next section presents a brief description of the evolution of the contracts employed in the industry.

1 History of Whaling Enterprises and their Organization

In the earliest British settlements in Massachusetts and on Long Island, the commercial exploitation of whales commenced almost immediately upon the colonists' arrival. A small number of merchants usually owned the capital employed by the "companies" of men who

were based on shore, and pursued whales in small craft. Rather than owning a stake in a formally-organized firm, these "adventurers uppon the whale designe" might each have contributed some of the goods and supplies involved in whaling, and received a commensurate share of the proceeds.[4] In general, the sailors were paid in shares of the oil they produced, with the owners of the vessel and equipment receiving the balance; usually they received half the oil, and the owners received the other half. The shares paid to the different sailors appear to have been equal; each member of a six-person crew would have received a "sixthe part of a halfe fish."[5] The shore whaling companies on Long Island and in Massachusetts all seem to have used this arrangement, with a "half share" paid to the crews, and the balance retained by the owners.[6]

In order to pursue larger, more distant populations of whales, the passive shore-based approach was gradually supplanted by voyages in larger craft capable of travelling greater distances. This early deep-sea whaling, which began in the late seventeenth century, was carried out in small vessels of around 30 to 50 tons, on voyages lasting a few weeks, with crews of twelve or thirteen.[7] The companies would hunt whales from the decks of these vessels, or, in the case of the larger schooners, might carry small whaleboats on board, which would be launched when whales were spotted. These "offshore" whalers pursued populations of right whales that roamed farther from their home ports, a transition that was accelerated as local whale populations began to decline due to the predations of the industry.[8] But they also began to pursue another species of whale that remained far offshore, unreachable to the shore whaling companies: the sperm whale.[9]

[4] *Records of the Town of East Hampton*, December 2 1675.

[5] *Records of the Town of East Hampton*, June 1675 (vol. 1, p. 376). See also contracts entered July 4, 1675; December 2, 1675; December 27, 1677; and March 13, 1678. Similar contracts are found in the *Records of the Town of Southampton*, in April 7, 1675; January 30, 1677; and January 20, 1676.

[6] Some of the owners may have also held indentures of men, usually Indians, who were employed as sailors in the company. See, for example, *Records of the Town of East Hampton*, March 13, 1678. Vickers (1983) describes the importance of indentured Indian labor, and the use of debt peonage, in the whaling industry on Nantucket. There is some evidence that enslaved Africans were also employed in whaling in the eighteenth century; see Palmer (1959).

[7] The tonnage figures are from Starbuck (1878, p. 22). See also Macy (1835).

[8] Right whales are baleen whales, meaning that they have keratinous strands of this substance in their mouths. The oil produced from their blubber is denoted "whale oil," in contrast to the oil from sperm whales.

[9] The blubber of sperm whales produces an oil of superior quality to (right) whale oil, and is odorless, whereas even refined right whale oil emits a fishy smell. Moreover, encased in their enormous heads is a waxy substance, which the whalers called "head matter," which was even more valuable.

Whaling enterprises evolved along with whaling techniques. Deep-sea whaling required a greater amount of capital, both in the form of the larger vessel, and in the supplies and equipment that was necessary for the larger crews on their longer voyages. A precise description of the configuration of whaling enterprises from this era is found in a letter written by Micajah Coffin, a whaling merchant (and former whaling captain) on Nantucket. In response to an inquiry from a friend in another city, who was considering entering the whaling business, about the organization of a whaling voyage, Coffin wrote:

> In the first place, a whale voyage is performed with Thirteen men which forms the said voyage into thirteen shares because we have our men on shares that all the men on board may have an interest in the success of said voyage. The master has for his wages one share of the whole, that is $\frac{1}{13}$ of said voyage. The mate has $\frac{1}{20}$ of the voyage, the third man or harpooner has one twentysixth of ditto the fourth man or harpooner has one Thirtieth of said voyage and nine men more have half shares of three quarters which in a good voyage is tolerable good wages; in a poor voyage there is no wages to pay. The vessel Draws for her share fore ware & tare one fourth of said voyage. The remainder is for them that lay in the Stores or pay for them (which we call with us adventurers) stores such as provisions Boats oars whale Irons barrels &c. The charge commonly Expended with us on a voyage is about one hundred & Eighty five pounds which voyage is performed in about six months heretofore but I conceive a voyage to the coast of Guinea & Brazille will be nine months sailing...Find partners agreeable to own a vessel of about one hundred; or one hundred ten or twenty Tons...[10]

The basis for the crew's pay was a modified form of the "share" system from the early shore whaling companies: for a crew of thirteen, the proceeds were divided into thirteen shares. The letter also indicates that the owners of the vessel received one fourth, as they did in shore whaling, and the the other investors or "adventurers," who paid for the supplies and equipment used in the voyage, received the balance, or around one fourth.[11] But because the productive process now occurred onboard the vessel, rather than taking place partly on land, the owners of the vessel itself assumed greater control over the enterprise. As maritime law grants the owners of the vessel the right to control its voyage[12], this implied that the investors who paid for the supplies and equipment of the voyage—the very materials that

[10] Micajah Coffin, letter to Capt. Nath. Bacchus, August 13 1773 (Coffin, 1773).

[11] The amount paid to the owners of the vessel, one fourth, seems to be relatively constant among different vessels at the time. See Vickers (1983).

[12] See Blunt's (1829) discussion of the rights of vessel owners (ch. 8).

would be expended—had no rights of control or, in the language of Grossman and Hart (1986), *residual rights.* In exchange for a fixed share of output, the investors paid to finance a voyage whose conduct and expenses they could not control.

Conflicts between the investors and the vessel owners under this arrangement were inevitable. In a 1769 printed broadside, Boston merchants who had financed whaling voyages listed quantities of supplies they agreed were necessary for a whaling voyage, and wrote:

> Inasmuch as it is found from several Years Experience in the Whale-Fishery, that the Method of fixing out for that Business has been unequal, and much to the Prejudice of the Fixers: Wherefore, in Order to put the same upon a more just and equal footing in the future, We the Subscribers do agree to grant...such Stores...as is specified above, *and no more.*[13]

Unless the vessel owners granted rights to the investors, these outsiders did not have a legal basis to influence the conduct of the voyage, or, for example, to recall their equipment if they felt it was improperly used. Such rights of control would have been important because they could affect the bargaining power of the investors, which would, in turn, influence the incentives to invest in a whaling voyage.

In the late eighteenth and early ninteenth centuries, American whaling vessels began to venture into more distant oceans, on ever longer voyages.[14] The size of the vessels employed increased, and reached an average of more than 300 tons; the size of the crews increased with the vessels, growing from around thirteen in the 1770s to around 30 after 1815; and the length of voyages increased to around two years by 1815.[15] These voyages required much larger investments in vessels and in supplies, and the allocation of rights of control in the industry's financial contracts evolved in response.[16]

[13] Anon., "Articles of Agreement relative to the Whale Fishery," 10 February 1769, *Early American Imprints*, first series, no. 11162. Emphasis in original.

[14] Starbuck (1878, p. 168) presents a detailed tabulation of American whaling voyages in the eighteenth century; his tables include statistics for vessel tonnages and voyage lengths. The innovation that facilitated these longer voyages was the introduction of on-board "tryworks," the apparatus used to render the oil from blubber, sometime during the mid-eighteenth century.

[15] In their sample of New Bedford voyages, Davis, Gallman and Gleiter (1997) carefully document average vessel tonnages and lengths of voyages for this period.

[16] Data on the costs of early whaling voyages are scant, but in the 1770s, the cost of the equipment and provisions for whaling voyages was generally around £180, and the vessels and rigging cost between £200 and £1000 (Alden, 1774-1816; Rotch, 1771). By the 1830s, By 1835, the cost of the supplies for a voyage had risen to $18,000, and the cost of a typical 300-ton vessel was $20,000 (Macy, 1835).

In particular, the class of investors who financed a voyage's expenses in exchange for a share of profits, with no rights of control, disappeared. Instead, investors in whaling voyages purchased ownership shares in the vessels themselves. As co-owners, maritime law guaranteed them rights of control over the voyage, in proportion to their stake in the vessel. The were also collectively responsible for the expenses of the voyage, in proportion to their ownership stakes, and, after the crews were paid, received the profits from the voyage. It is likely that this change in the structure of the contracts used in financing whaling voyages was important in facilitating the larger investments that were made in the industry during the nineteenth century.

Most whaling vessels of this era therefore had many owners.[17] But they were sent on voyages that were far more complex than their shorter, eighteenth-century predecessors, and the successful management of these ventures required substantial expertise. In response, the planning and management of these voyages was delegated to a merchant or merchant firm, known as the vessel's "agent," who specialized in managing whaling voyages.[18] The agent would handle all of the important decisions for the voyage: he would purchase the supplies; hire the captain and crew; keep all the vessel's accounts; give the captain his orders for the voyage, which included the locations where he was to seek whales; supervise the captain while at sea, to the extent this was possible; and determine the timing of the sale of the vessel's output. Essentially, the agent served the same role as the vessel owner in the previous arrangement, except that his co-owners possessed the same rights of control as he did.

The management of whaling voyages was not governed by any articles of agreement. The co-owners simply delegated management of the vessels' day-to-day operations to the agent, and participated only in the most crucial decisions for the voyage, such as its itinerary over the oceans. In order to ensure that the agent had strong incentives to act in the owners' interests, the agent usually retained a substantial ownership share in the vessel, and in some ports the agents retained, on average, 44% of the equity in their vessels.[19] Given the wide

[17] In the sample of voyages from the 1830s and 1840s presented below, the average number of owners of the vessels is around 9.

[18] This arrangement is similar to the position of managing owner or "ship's husband" employed in other maritime trades with jointly-owned vessels.

[19] Systematic data on the size of ownership shares of agents becomes available on the late 1840s, when this

range of responsibilities held by the agent, this was particularly crucial for the financial success of the venture. For example, agents commonly owned businesses which supplied provisions to whaling ships, and thus when purchasing supplies for their own voyages found themselves in the position of purchasing from themselves on behalf of the vessel's owners.

Other complimentary mechanisms were employed to create the necessary incentives for the agents. The relatively small number of owners, each holding a substantial share in the vessel, each had strong incentives to monitor the agent's activities. In addition, most of the investors in whaling voyages lived in the same towns as the agents whose voyages they helped finance.[20] Personal, and sometimes even familial, relationships between the investors and the agents probably helped create additional incentives for the agent. Moreover, Davis, Gallman and Gleiter (1997, chapter 10) document that groups of investors tended to invest in voyages together, usually with the same agent. Thus the prospect of repeated interaction, and in particular, future investments, probably also created an important source of incentives for the agent, which complemented the incentives arising from his ownership share.

In the many port cities in which whaling became an important industry in the nineteenth century, whaling voyages were owned and managed in this way. This highly successful mode of organization survived through the late nineteenth century, when the whaling industry itself became nearly extinct in the United States. The only significant deviation from this model occurred in the 1830s, when a number of whaling firms were organized as corporations.

2 Whaling corporations

Although most of the firms that served as agents for whaling voyages were partnerships, and thus typical of other New England merchants, the whaling vessels they managed were

information was recorded on the vessels' registers. In Davis, Gallman and Gleiter's (1997) sample of New Bedford vessels from 1846-60, the average ownership share of the agents was more than 30%. Hilt (2003) finds that in New London during this period, the agent's retained 44% on average. On the effectiveness of concentrated ownership in resolving incentive conflicts, see for example, Jensen and Meckling (1976) and Shleifer and Vishny, (1986).

[20] In a sample of major whaling ports, Hilt (2003) documents that about 75% of vessel owners resided in the city in which the voyages were managed.

separate business entities that were not formal partnerships, and were in fact without legal form.[21] Whaling vessels resembled partnerships in some respects, in that the assets of the vessel owners and the assets of the vessel were not considered legally distinct. As such, the owners of the vessel were personally liable for whatever debts or legal judgements the vessel incurred. But there were important features of the shipowning arrangements used in whaling, as well as other maritime trades, that enabled the vessels to enjoy many of the privileges normally reserved for corporations.[22] For example, the vessels were treated by their agents as distinct business entities, and accounts were kept in the vessels' names. More importantly, whereas partnerships usually terminated upon the death or withdrawal of a partner, ownership shares in vessels could be transferred without affecting the vessel.

In the 1830s, a few whaling entrepreneurs—some with experience as agents, and others simply wishing to enter the business—applied to their state legislatures for charters of incorporation. The formation of whaling corporations in the 1830s coincided with a large increase in incorporations generally, as state legislatures became willing to grant charters to increasingly broad ranges of organizations.[23] Initially, they met with some resistance, as legislators were particularly wary of granting charters to maritime firms that might eventually develop into monopolistic entities like those

> under the European governments that have been considered an evil, and such is the British East India Company, such was the South Sea Company, and such the Dutch East India Company...[24]

Eventually, however, the charters were granted.

The content of the charters of whaling corporations in different states varied somewhat,

[21] For a description of partnerships and a discussion of their prominence among early business enterprises, see Lamoreaux (1995; 1997), Bodenhorn (2000), and Kim (2003).

[22] An exploration of shipowning in general is presented in Albion (1941). Boyce (1992) describes similar institutions in Britain.

[23] In general, the kinds of organizations that states were willing to charter evolved slowly after the Revolution, beginning first with non-business organizations (churches, libraries, schools, etc.), then adding businesses such as banks, insurance companies, and land companies, and finally, railroads and manufacturing companies. Massachusetts, for example, began to charter manufacturing companies on a wide scale only after 1809. See, for example, Dodd (1954, p. 226). Wallis (2003) documents the differences across states in the willingness of governments to grant corporate charters to businesses.

[24] "Report of the Committee on Trade and Manufactures,on an engrossed bill from the Senate, entitled 'An Act to Incorporate the North River Whaling company'," New York Assembly, April 16, 1833. Most bills to incorporate whaling firms encountered some resistance of this nature.

but in general they included: the right to own land, up to some specified amount; the right to perpetual existence; the right to act in law, or to sue and be sued as a separate entity; a clear governance structure; the right to transfer ownership shares; and some limitations, in the form of minima and maxima, on the firm's capital stock. Although synonymous with incorporation today, limited liability was not granted to any of the whaling corporations of this era.[25] The Massachusetts whaling corporations were in fact required to print an admonishment of unlimited liability on their stock certificates.

What advantage, then, did the corporate form of ownership offer to whaling investors? Although the right to act in law, and to sue and be sued, would probably have simplified interactions with other firms, there does not seem to have been a pressing need for this feature of corporate charters.[26] Moreover, the owners of unincorporated vessels possessed the right to transfer ownership shares and the right to exist as an enterprise so long as the vessel existed, and so did not need to apply for a charter for these privileges. More likely, it was the formal governance structure (and with it, the carefully specified voting rights and disclosure requirements), coupled with the official imprimatur embodied in the corporate charter granted by the state. Compared to the industry's unincorporated ventures, where there were no articles of agreement and no formal procedures for decisionmaking—most decisions were simply delegated to the agent—these features offered the potential to make an investment in a whaling venture more attractive to small investors.[27]

Thus whaling corporations were formed at least in part to create an alternative mode of organization for the industry's firms, that was believed to be attractive to greater numbers of shareholders. The incorporators envisaged large enterprises, with diffuse ownership among many investors, whose interests would be protected by an elected board of directors. In some cases, perhaps in an attempt to safeguard the interest of small investors, the corporations

[25] See, for example, "An Act to Incorporate the Poughkeepsie Whaling Company," New York *Session Laws*, April 20 1832; and "An Act to Incorporate the Fall River Whaling Company," Massachusetts *General Court Laws*, April 9 1836. Many of the rights and privileges to which corporations were entitled were in flux in the early nineteenth century, and varied significantly between states, and between different industries within states.

[26] In lawsuits between whaling vessels, the vessels "and owners" were named as litigants. This would pose a problem only if some of the owners of each vessel were the same; an individual can not be on both sides of a lawsuit.

[27] This suggests another possible reason that investors in whaling ventures tended to live in the ports in which their vessels were based: these individuals probably knew one another, and may have been able to reach agreement over contentious questions more easily in the absence of a formal structure of decisionmaking.

prohibited any investor from owning more than a small number of shares.[28] In general, these firms were able to attract investments from large numbers of investors.

As with unincorporated whaling ventures, the investors owned the corporations' assets, and possessed rights of control over them. However, the investors in corporations delegated their rights of control to a substantial extent to a board of directors, and/or an executive committee of corporate officers. These directors and officers would then delegate the management of the day-to-day operations of the vessels to a single individual, who was usually called the corporation's agent. It should be noted that the configuration of production within these corporations was precisely the same as it was in the unincorporated ventures: an agent would plan and supervise the voyage, and would hire a crew, who would be paid in the same share or "lay" system used in all whaling voyages at the time. The corporations thus simply grafted a much more diffuse pattern of ownership and a more formal governance structure onto an enterprise organized according to tradition in most other respects.

But as these corporations sought to become owned as diffusely as possible, the agent was not envisaged to be a major investor in the firm, and in fact usually held only a small stake.[29] At least in one case, the agent's compensation came principally in the form of a fee of $2\frac{1}{2}\%$ on all expenses—the purchase of vessels, supplies, etc.[30] The agent's role evolved thus into something like a professional manager, whose incentives to perform his duties diligently and act in the interest of the shareholders arose chiefly from the monitoring of the directors and officers.[31]

The success of these firms depended critically on the strength of this governance structure, and its ability to create the appropriate incentives for management. This meant that the directors needed to have been capable of monitoring and evaluating the performance of the agent, and using their power to fire and replace him if necessary. Rather than relying on

[28] In the case of the Portsmouth Whaling Company, no shareholder was permitted to own more than 5 (out of a total of 100) shares. "An Act to Incorporate the Sundry Persons by Name of the Portsmouth Whaling Company," *Laws of New Hampshire*, 22 June 1832.

[29] Data on individual shareholdings are scant, but in the Cold Spring Whaling Co., Portsmouth Whaling Co., Fall River Whaling Co., and Wilmington Whaling Co., the agent owned shares equivalent to less than 5% of the firms. In comparison, Hilt (2003) documents that agents in some ports owned as much as 44% of their ventures, on average. See also Davis, Gallman and Gleiter (1997).

[30] Ichabod Goodwin, agreement with the Portsmouth Whaling Co., 30 May 1832.

[31] See, for example, the "By-Laws of the Cold Spring Whaling Company," in Cold Spring Whaling Co. (1837-51).

management's stake in the firm to provide incentives, these corporations created an alternative incentive mechanism, an example of what Williamson (1985) has termed hierarchies. After more than 100 years of deep-sea whaling from American ports, these corporations represented the first attempt to organize and govern a whaling venture in this fashion.

Of the whaling corporations that were chartered in the 1830s and early 1840s, none survived past the late 1840s. The American whaling industry continued to thrive until the Civil War, and enjoyed some years of success in the postbellum period, but most whaling corporations were unable to remain in business long enough to sponsor more than a few voyages. The next section will attempt to determine the sources of the failure of these corporations.

3 Determinants of corporations' failures

The heavy reliance on concentrated ownership throughout the history of the American whaling industry suggests a need for powerful incentives that a corporation may not have been capable of providing. However, there were many other forces, unrelated to incentive problems, that undermined the success of the whaling corporations. The founders of whaling corporations, for example, generally had little experience in whaling, and simply may not have possessed the requisite knowledge or skills to succeed. Incompetence may have doomed these firms, irrespective of their ownership structure.

The locations in which the corporations were founded suggest another possible explanation for the failure of whaling corporations. Whaling activity was concentrated among a relatively small number of American ports: Nantucket, New Bedford, and Fairhaven Massachusetts; Sag Harbor, New York; and New London, Connecticut, together accounted for 78% of whaling voyages in the 1820s. If there were significant agglomeration externalities in the industry, either in the form of better prices for supplies, or more accurate information about the past success of potential captains or the location of whale populations, then firms located outside these ports would suffer a natural disadvantage. Table 1 presents a list of whaling corporations that were chartered before 1845, along with their locations. In none of the five largest whaling ports of the 1820s were corporations formed. Instead, whaling

Table 1:
Whaling Corporations

Name	City	State	Incorporated
New York Whaling Co.	Brooklyn	NY	1831
Newburgh Whaling Co.	Newburgh	NY	1832
Portsmouth Pier Co.	Portsmouth	NH	1832
Portsmouth Whaling Co.	Portsmouth	NH	1832
Poughkeepsie Whaling Co.	Poughkeepsie	NY	1832
Dutchess Whaling Co.	Poughkeepsie	NY	1833
Hudson Whaling Co.	Hudson	NY	1833
Newark Whaling, Sealing & Mfg. Co.	Newark	NJ	1833
North River Whaling Co.	Newburgh	NY	1833
Wilmington Whaling Co.	Wilmington	DE	1833
Westchester Whaling Co.	Peekskill	NY	1834
Wiscasset Whale Fishing Co.	Wiscasset	ME	1834
Dorchester Whaling Co.	Dorchester	MA	1836
Fall River Whaling Co.	Fall River	MA	1836
Staten-Island Whaling Co.	Port Richmond	NY	1838
Cold Spring Whaling Co.	Oyster Bay	NY	1838
Duxbury Whaling Co.	Duxbury	MA	1841

Sources: State *Session Laws* of DE, MA, ME, NH, NJ, and NY, 1830-1845.

corporations seem to have been formed in ports that were only marginal participants in the industry.

Thus, whaling corporations were often founded by new entrants into the industry, located in ports with little history of whaling activity, who may have been unable to finance a whaling voyage (or succeed in the business) using the traditional organizational structures, and who obtained a charter to help raise money. Many of the corporations chartered had difficulty attracting sufficient capital to commence operations—the charter of Dutchess Whaling Co. was amended so that its founders could have additional time to raise the required $50,000 capital stock, and the charter of the Cold Spring Whaling Co. was amended so that it could commence operations after only $40,000 had been paid in, rather than the $50,000 initially required.[32] Successful whaling entrepreneurs, who would have been able to finance their investments through the cash flows generated by their firms' existing operations, would have derived little benefit from the features of corporate charters, unless they wanted to obtain better access to capital by making their businesses more attractive to small investors.

There are several potential explanations for the failure of whaling corporations. Unfortunately, detailed financial data on these firms, and on unincorporated whaling ventures from this era, are scant. However, it is possible to observe from customs records the level of success of the whaling voyages sponsored by corporations, and compare them to the voyages sponsored by unincorporated owners. If the voyages of corporations were less successful than those sponsored by other firms, then this would at least be consistent with the notion that corporations were unable to create adequate incentive structures for their agents.[33]

[32] "An Act to amend an act to incorporate the Dutchess whaling company," April 11, 1834, and "An Act to revive and amend an act to incorporate the Cold-spring whaling company," April 28, 1840, in the New York State *Session Laws*.

[33] It should be noted that, to the extent that firms in smaller ports faced higher costs, the measure of productivity presented below may understate the average difference in financial performance between corporate whaling ventures and their unincorporated counterparts.

4 Empirical Analysis

4.1 Data

In order to identify the effects of organization as a corporation on the success, or productivity, of whaling voyages, a dataset of 874 voyages from 22 different ports, from 1830-1849, was assembled. (A detailed account of the sample, and the sources employed, is presented in the Data Appendix). In order to ensure that the sample contained as broad as possible a range of whaling firms, data on agents from major whaling ports, including New London, Connecticut, New Bedford, Massachusetts, and Sag Harbor, New York, as well as many different minor ports were obtained. The voyages in the sample were sponsored by 106 different firms, of which 14 were corporations. Except for the voyages from New Bedford, New London, and Sag Harbor, where a 20% sample was taken, all voyages where data was available were included in the sample. The 874 voyages in the dataset are equivalent to 19.5% of the total population of whaling voyages initiated in the United States during the period.

The identities of the owners of each vessel, and the vessels' characteristics (their age and tonnage), were obtained from vessel registers.[34] For most vessels owned by corporations, the name of the corporation, rather than the name of each shareholder, was listed on the register. However, in some cases, the names of all the shareholders were listed on on the register; these names were compared to the names listed as founders in the charters of the corporations to identify which corporation owned the vessel. The departure date, itinerary (Atlantic, Pacific, or Indian Ocean), arrival date, and proceeds (barrels of sperm oil and barrels of whale oil) were obtained from Starbuck (1878). Data on the identity of the captain, his experience, and whether he died during the voyage was obtained from Lund (2001).

In order to compare the success or productivities of the different voyages, an index of voyage productivity was constructed. This index measures the log of output produced

[34] After 1790, registers were required of all domestic vessels engaged in foreign trade. The register listed the name of the captain, the vessel's owners and their managing owner or agent, the dimensions and age of the vessel and the place in which the vessel was built. Around 1850, these registers also began to record the fraction each owner held in the vessel.

per unit of inputs. As these voyages returned with quantities of sperm oil, whale oil, and baleen—that is, the oil of sperm whales, the oil of right whales and other similar whales, and the flexible keratinous material known as "whalebone"—these amounts (in gallons in the case of oil, and in pounds for baleen) were summed, with the gallons of sperm oil and pounds of baleen first multiplied by their relative prices at the time of arrival. The quantities are thus expressed in whale-oil-gallon-equivalent amounts. The denominator, the quantity of inputs, is measured as the vessel tonnage multiplied by the number of months at sea, and is thus expressed in ton-months.[35] The productivity index is the log of this ratio, or:

$$\text{Productivity} = ln\left(\frac{whale\ oil + (sperm\ oil \times rel.\ price) + (baleen \times rel.\ price)}{tons \times months}\right)$$

For 50 of the voyages in the sample, the vessel was lost or sufficiently damaged to be "condemned," and did not return home. For 43 of those voyages, Starbuck does not record how much, if any, of the output of the voyage had been produced until the point where it was damaged, or how much was recovered and sent home. The loss of these voyages was regarded as a separate events, and excluded from the productivity regressions. However, a dummy variable equal to one for lost vessels was recorded and analyzed separately.

Finally, the experience of each firm, measured as the number of voyages managed prior to the sample period, was also recorded from Starbuck (1878), as was the total voyages in each city from 1815-1829. For the corporations, if the founder of the corporation (as identified on the corporate charter) was a whaling agent with some experience prior to incorporating the firm, the number of voyages that agent had sponsored is recorded as the prior experience of the corporation. Summary statistics for each of the variables collected is presented in Table 2.

Some of the differences between the corporations and the other whaling firms can be observed in Table 3, which includes the means of several of the variables for the voyages

[35]The limitation of this approach is that the quantity of labor input is not measured. Unfortunately, data on the crews of voyages from small whaling towns is scant. Moreover, there was very high rates of desertion from whaling voyages, which makes the quantity of labor observed at the vessels' departures a problematic measure of total labor input. However, as the size of the crew varied with the size of the vessel—larger crews were necessary to operate larger vessels–the data on vessel tonnage should serve as a reasonable proxy for total inputs. Some verification of this is provided below. For a discussion of the determinants of crews on whaling voyages, see Davis, Gallman and Gleiter (1997).

Table 2:
Descriptive Statistics

Name	Definition	*N*	Mean	Std. Dev.	Min.	Max
Corporation	Dummy = 1: vessel owned by corp.	874	0.09	–	0	1
Firm experience	Voyages managed prior to sample	874	4.69	6.67	0	28
Port experience	Voyages from port, 1815-29	874	177.14	185.03	0	418
Owners	Number of owners of vessel	717	11.41	13.88	1	93
Vessel tons	Vessel tons (size)	874	339.71	66.03	107	699
Vessel age	Years since vessel was built	858	17.48	8.79	0	46
Captain's experience	Number of voyages as captain	860	1.58	1.85	0	13
Pacific	Dummy = 1: voyage to Pacific	874	0.56	–	0	1
Indian	Dummy = 1: voyage to Indian	874	0.19	–	0	1
Atlantic	Dummy = 1: voyage to Atlantic	874	0.25	–	0	1
Specialization in sperm	Dummy = 1: voyage specialized	831	0.31	–	0	1
Voyage Length	Months of voyage	832	28.23	11.37	4	57
Productivity	Voyage productivity index	831	2.50	0.44	1.07	4.21
Vessel lost	Dummy = 1: vessel didn't return	874	0.06	–	0	1
Captain died	Dummy=1: captain died	861	0.02	–	0	1
Crewmembers/ton	Crewmembers/vessel tons	376	0.08	0.01	0.04	0.17

Table 3:
Firm and Voyage Characteristics: Corporations vs. Others

	Means:		
	Corporations	Unincorporated Ventures	P > |t|
Firm Characteristics			
Firm experience (voys.)	0.50	2.89	0.08
Port experience (voys.)	167.08	0.57	0.00
Voyage Characteristics			
Number of owners	40.98	8.95	0.00
Vessel tons	329.74	340.73	0.15
Vessel age	13.87	17.83	0.00
Captain's experience (voys.)	1.21	1.62	0.06
Pacific ocean	0.59	0.55	0.55
Indian ocean	0.21	0.19	0.65
Specialization in Sperm oil	0.31	0.31	0.94
Voyage length (mos.)	29.62	28.09	0.26
Crewmembers/ton	0.08	0.08	0.96

Note: P > |*t*| denotes the significance level of a two-sided test of differences in means. The statistics in the first panel, firm characteristics, are calculated as the unweighted means of the 112 different firms in the sample. For the corporations, firm experience is calculated as the number of voyages managed by the founders of the corporation. In the second panel, voyages, all of the variables except voyage length, vessel age, and crewmembers per ton, are available for all 874 observations. For voyage length, vessel age, and crewmembers per ton, this is available for 832, 858, and 376 observations, respectively.

managed by corporations and those that are managed by other firms, along with the significance level of a two-sided t-test for differences in the means. As one might expect, the greatest distinction between the corporations and the other ventures is that the corporations are much more diffusely owned than the other vessels, with an average of 41 owners compared to about 9 for the partnerships. The corporations were also located in ports with far less experience in whaling prior to the sample period, and founded by entrepreneurs who were substantially less experienced than the partnerships' agents.

However, in many respects the choices that the corporations made for their voyages were not so different from those of the partnerships. They used vessels of approximately the same

size, and roughly similar ages; they sent their vessels to the Atlantic and Pacific Oceans with roughly the same frequency as the partnerships; they managed voyages that specialized in obtaining the oil of sperm whales about as often as their counterparts did; and the average length of their voyages was just slightly longer. This is important because it suggests that any differences in the productivity among the different types of firms were unlikely to be due to differences in methods or approach, at least across these observable dimensions. At a minimum, this suggests that the whaling voyages sponsored by corporations were not different from those sponsored by partnerships in any fundamental way.

Two other features of the data are worth noting: perhaps because they were based in ports with less whaling activity, the corporations hired captains who had somewhat less experience, measured as the number of voyages on which the captain had previously been master. The difference (1.2 vs. 1.6 voyages) is nearly statistically significant at the 5% level, and suggests that an analysis of voyage productivity should control for the captain's experience.

Secondly, the number of crewmembers per vessel is the same in both groups. This is critical, because it implies that there are no systematic differences in the relationship between the quantities of labor used on board the vessels, and the size of the vessels themselves, between the corporations and the unincorporated ventures. This implies that the the size of the vessel—as used in the productivity index described above—is a consistent measure of the quantity of inputs employed on the voyages.

Table 4 presents measures of productivity for the voyages in the sample. The first measure presented, the number of months a vessel sits idle between voyages, is a general indication of the efficiency with which the firms made use of their capital. Although the corporations tended to take somewhat longer to refit their vessels and send them back out to sea, the difference is not statistically significant. Moreover, the delay might simply be the result of the fact that the corporations tended to be located in obscure ports, where supplies were somewhat more difficult to obtain.

The second and third rows of the table present the means and standard deviations of the voyage productivity index. The voyages sponsored by corporations were significantly less productive than those managed by partnerships. This is a much clearer indication

Table 4:
Productivity: Corporations vs. Others

	Means:		
	Corporations	Unincorporated Ventures	P > |t|
Vessel idle btwn. voyages (mos.)	4.05	3.92	0.72
Voyage productivity index	2.23	2.53	0.00
Standard dev., productivity	0.49	0.42	0.06
Vessel lost	0.09	0.05	0.24

Note: P > |t| denotes the significance level of a two-sided test of differences in means. The number given for differences in the standard deviations of productivity, however, is the significance level for a two-sided F (variance ratio) test. Vessel idle between voyages is defined as the number of months between successive voyages of the same vessel, and is computed for the 453 such voyages in the sample. The voyage productivity index is available for 831 voyages.

that the performance of whaling voyages was significantly different than that of the voyages sponsored by partnerships. The standard deviation of this measure is only slightly higher for the corporations, suggesting that (at least ex post) it does not appear to be the case that their voyages undertook riskier strategies. The higher rate at which corporate vessels were lost (9% vs. 5%), however, could be an indication of this, although it could also simply be an indication of poor performance and management.

These tabulations suggest that the voyages sponsored by corporations were very similar to those sponsored by partnerships, except that they were less productive. One must be careful not to infer a causal relationship from these results—the corporations do not represent a randomly-assigned treatment group, after all. The next section presents an analysis of voyage productivity in an individual-fixed-effects framework, in order to try to identify a causal effect, or at least rule out the possibility that the productivity difference observed are due purely to selection.

4.2 Estimation Results

The 874 voyages in the dataset are organized as a panel, with the groups being the 106 different agents that sponsored the voyages. Many of the corporations in the dataset were founded and managed by agent who had some prior experience in whaling, and/or would

have subsequent experience in whaling after the corporation was dissolved. The variation in productivity in the voyages managed by these agents in corporations and partnerships can therefore be used as a source of identification of the effect of the corporate structure, in an individual-fixed-effect framework.

In what follows, a simple model of the determinants of the productivity of voyages is estimated. In their careful study of the determinants of productivity of New Bedford whaling voyages, Davis, Gallman and Gleiter (1997) document that hunting pressure—the quantity of vessels on the oceans pursuing whales—had a negative effect on productivity, and these forces, combined with declining quality of the crews hired in whaling, caused productivity to decline over the period covered by the sample. Therefore, year fixed effects will be included in each specification, that should capture the effects of these and related influences on productivity over time.

The characteristics of the vessels employed, and the voyage itineraries, will also be included as covariates. Davis, Gallman and Gleiter's results indicate that there were (mildly) decreasing returns to scale in the industry; larger vessels should therefore be somewhat less productive on a per-ton basis. Therefore the tonnage of the vessels will be included, as will the age of the vessels. Only very coarse measures of the "cruising grounds" to which the voyages were sent is available; the ocean listed as the primary destination of the voyage will also be included in the regression.

The measure of the captain's experience will also be included, as it may help control for the quality of the captain commanding the vessel. The role of the captain at sea was critical in the prosecution of the voyage, and the captain's performance of his role was certainly an important determinant of the success of the voyage. On about 2% of the voyages in the sample, the captain died during the voyage, usually due to injuries sustained on board the vessel, but sometimes due to disease. The death of the captain often disrupted the progress of the voyage, as the mates would often bring the vessel into port and attempt to contact the agent to decide how to proceed. Therefore, a dummy variable measuring whether the captain died during the voyage will also be included.

Finally, a dummy variable for an incorporated enterprise will be included, and the estimated effect is hypothesized to be negative.

Table 5:
Voyage Productivity Regressions

The Dependent Variable is the Index of Voyage Productivity

	(1)	(2)	(3)	(4)
Corporation	-0.402**	-0.356**		-0.275*
	(0.098)	(0.096)		(0.116)
Log of number of owners			-0.066*	-0.041
			(0.035)	(0.035)
Atlantic		0.048	0.074	0.067
		(0.053)	(0.061)	(0.060)
Pacific		-0.108*	-0.098*	-0.101**
		(0.044)	(0.049)	(0.049)
Vessel tons		-0.001**	-0.001**	-0.001*
		(0.000)	(0.000)	(0.000)
Vessel age		-0.003	-0.003	-0.006
		(0.002)	(0.002)	(0.002)
Captain's experience		0.006	0.009	0.002
		(0.008)	(0.009)	(0.000)
Captain died		-0.337**	-0.410**	-0.403**
		(0.099)	(0.121)	(0.121)
Constant	2.990**	3.346**	3.352**	3.353**
	(0.109)	(0.146)	(0.176)	(0.176)
Year Effects:	yes	yes	yes	yes
Individual Effects:	yes	yes	yes	yes
Observations	831	809	677	677

Note: Standard errors in parentheses. ** denotes significance at the 1% level;
* denotes significance at 5%.

The results are reported in Table 5. Column (1) reports the results when only the corporation variable is included, along with the fixed effect for the individual agents, and for the years. The estimated coefficient is negative and highly significant, and approximately equal to 90% of a standard deviation of the dependent variable. This is a strong indication that the voyages of corporations were less productive than those of unincorporated enterprises, and this can not be attributed to selection.[36]

In column (2), the characteristics of the vessels and the captains, and the voyage itineraries, are included as covariates.[37] As expected, the size of the vessel has a negative effect on productivity, as does the vessel's age (although the latter effect is not statistically distinguishable from zero.) The captain's experience increases productivity, although again the estimate is quite imprecise.

As expected, the effect of the death of the captain is large and highly significant. It should therefore be noted that the effect of organization as a corporation, even with the various vessel and voyage characteristics included as controls, is actually *larger* than the effect of the death of the captain (-.36 vs. -.34).

Column (3) estimates a specification that attempts to identify the effect of diffuse ownership on voyage productivity. Even among the voyages sponsored by agents who were never involved in corporations, there was some variation in the number of owners of the vessels. A few unincorporated voyages had very large numbers of owners, and in some ways attempted to become somewhat more corporate-like in their emphasis on small shareholders.[38] If the productivity of these voyages was lower than that of the voyages with fewer owners (again, in the context of an individual-fixed-effect framework), this would corroborate the finding of the importance of weak incentives for productivity.

Thus column (3) includes the log of the number of owners of each vessel in lieu of the

[36]It should be noted, however, that while the observed effect is consistent with the incentive problem described above, this may not necessarily be driving the results. The voyages of corporations have performed worse than the unincorporated ventures managed by the same individuals not because of incentive problems, but because the bureaucracy of the corporation diluted the influence of the agent on the management of the voyage. This is difficult to rule out.

[37]The data on the age of the vessel is missing for 22 voyages in the sample. In many cases, this is due to the fact that the vessel entered the fleet as a prize vessel—a vessel captured from a foreign power by a privateer. For these vessels, the date it was constructed was not known or recorded in the registers.

[38]Several merchants in the port of Sag Harbor, for example, managed whaling "companies" with relatively large number of owners and some corporate-like features. See Tiffany (1840-48).

variable for corporations. The estimated effect is found to be negative and significant. Does this imply that the effects of the corporate form of organization are purely from the large number of shareholders, or are there other features of the corporate form that affect productivity? Column (4) presents an attempt to address this question, by including both the corporation variable, and the log of the number of owners, in the same specification. With both variables included, the effect of the corporation variable becomes smaller but remains significant, while the variable for the number of owners also becomes smaller, while losing its significance. This is at least consistent with the notion that corporations had some effects on productivity independent of the diffuse ownership structures they created. The fact that the agents themselves tended to hold small stakes, for example, may have played a role in diminishing productivity, independently of the fact that there were few other large shareholders within the same ventures.

Are these effects plausible? Could the efforts of the manager make such a difference? One response is to note that in their careful study of whaling agents in New Bedford, Davis, Gallman and Gleiter (1997) find substantial differences in the average productivity of the different agents. This implies that the efforts of the agents were important determinants of voyage productivity, and anything that reduced the incentives of the agents to perform their roles diligently might have a substantial effect on the outcome of the voyages. Some further evidence is found in the actions of one corporation's agent, whose letter book survivies. Rather than identifying and hiring a captain and crew himself, as would normally have been the case for whaling agents, the corporation's agent wrote to a friend in New Bedford and asked him to hire an agent for his vessel. For another voyage the agent delegated all authority to the captain for hiring the crew, and negotiating their wage contracts.[39] Certainly this agent exerted less effort in the process of hiring the captain and crew than would have normally been the case.

In the next section, the robustness of the findings is examined in more detail.

[39]Ichabod Goodwin, letter to Charles Whitredge (24 January 1836), and letter to captain Charles Barnard (14 July 1832).

4.3 Robustness of the Results

The results presented in Table 5 identified a strong negative effect on productivity from the voyages managed by agents who were involved in both partnerships and corporations. The results can persuasively refute the notion that the poor performance of corporations was due purely to selection.

However, there remains the possibility that although the same individuals were involved in both the corporations and partnerships, their management of the voyages may have been somehow fundamentally different in each case, in a way that does not relate to incentives. An agent may have formed a corporation in order to pursue riskier whaling ventures, and insure himself from the result.

Table 6 compares the characteristics of the voyages managed by the agents observed in both corporations and partnerships. There are a few differences in their voyages—they hired captains with somewhat less experience, they sent vessels to the Pacific with slightly greater frequency, and, of course, the voyage productivity was lower. But in most other respects, the voyages are similar. In particular, the standard deviation of the voyage's productivities is quite similar, so this ex-post measure of risk taking does not seem to indicate any difference between organizational types.

Another possible explanation is that agents who observed that their own profitability or productivity was declining selected into corporations in order to protect themselves from failure. If this were the case, then the lower productivity observed in corporations would be due to the declining productivity of the agents selecting into corporations, rather than the effect of the corporations themselves. In order to address this possibility, some of the regressions in Table 5 were re-estimated with individual-agent-specific time trends included as well. These time trends should control for such changes over time in the productivity of the agents.

The table reports only the estimated coefficient on the corporation variable. Columns (1) and (2) in Table 7 estimate the same equations as columns (1) and (2) in Table 5, respectively, only with the addition of agent-specific time trends. Column (3) in Table 7 considers the more complicated possibility of nonlinear time trends in the agents' productivities, by

Table 6:
Corporations vs. Unincorporated Ventures
(Agents Observed in Both)

	Means:		
	Corporations	Unincorporated Ventures	P > |t|
Vessel age	15.72	15.94	0.91
Vessel tons	335.30	354.53	0.33
Captain's experience (voys.)	0.95	1.28	0.28
Pacific ocean	0.67	0.58	0.41
Indian ocean	0.16	0.14	0.77
Specialization in sperm oil	0.21	0.19	0.87
Voyage length	28.95	21.24	0.06
Vessel idle btwn. voyages (mos.)	3.95	4.00	0.92
Voyage productivity index	2.10	2.52	0.00
Standard dev., productivity	0.48	0.51	0.75

Note: P > |t| denotes the significance level of a two-sided test of differences in means. The number given for differences in the standard deviations of productivity, however, is the significance level for a two-sided F (variance ratio) test. Vessel idle between voyages is defined as the number of months between successive voyages of the same vessel, and is computed for the 453 such voyages in the sample. The voyage productivity index is available for 831 voyages.

Table 7:
Voyage Productivity Regressions

The Dependent Variable is the Index of Voyage Productivity

	(1)	(2)	(3)
Corporation	-0.379**	-0.352**	-0.340**
	(0.106)	(0.105)	(0.112)
Year Effects:	yes	yes	yes
Individual Effects:	yes	yes	yes
Individual-Specific Trend:	yes	yes	yes
Individual-Specific Quadratic Trend	no	no	yes
Observations	831	809	809

Note: Column (1) reports only the estimated coefficient on the corporation variable from the same specification as column (1) in Table 5, with the addition of a firm-specific trend. Columns (2) and (3) report the results for the same specification as column (2) in Table 5, with the addition of a firm-specific trend, and a firm-specific quadratic trend, respectively. Standard errors in parentheses. ** denotes significance at the 1% level; * denotes significance at 5%.

estimating the same equation as column (2) in Table 5, with the addition of linear and quadratic agent-specific trends. None of the results are meaningfully different from those reported in Table 5. The issue of agents selecting into corporations in anticipation of poor performance, at least as far as it can be captured by agent-specific trends, does not seem to have played a role in the productivity differences documented above.

5 Discussion and Conclusion

The analysis of a panel of whaling voyages has shown that whaling corporations were less productive than their unincorporated counterparts, and the result and not be attributed to selection. Does this demonstrate an inherent problem with the corporate form of organization? Perhaps not. In the 1830s, the use of the corporate form for business enterprises was still in its infancy, and the charters of these corporations contained many provisions designed by state legislators, rather than entrepreneurs requesting the charters. The flexibility of the corporate form certainly improved over time, and may have created organizations

more amenable to resolving incentive conflicts.

In their classic 1932 study of the rise of large corporations, *The Modern Corporation and Private Property,* Berle and Means identified the harmful consequences of the separation of ownership and control, or what they called the "splitting of the property atom," in corporations. They found that among the large corporations of 1929 and 1930, there was a great degree of dispersion in stock ownership, and with it a decrease in the influence of shareholders and an increase in the power and authority of professional managers with negligible ownership stakes. They suggested that this mode of organization would have harmful consequences for efficiency.

The analysis of this paper has shown that the problems identified by Berle and Means in the large firms of the 1930s were likely to have been endemic in much earlier corporations as well. About 100 years before the publication of Berle and Means' study, the first whaling voyages sponsored by an American corporation were launched. The corporations that sponsored these voyages represented a significant departure from the usual mode of organization of whaling ventures. Rather than a small handful of owners, with the manager holding the largest stake, these corporations were diffusely owned, and were run by agents whose role began to resemble that of professional managers. Whaling was a business where consistent success was very difficult to achieve, and the weaker incentives produced by these corporations led to poor performance. Perhaps because of their organizational forms, these enterprises proved themselves to be "nothing but land lubbers."[40]

[40]Wilmington *Gazette,* 6 May 1834.

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Data Appendix

Ports in the dataset

The dataset contains 874 voyages initiated in 22 different American ports. These include Salem, Dorchester, Fall River, Fairhaven, Duxbury, and New Bedford, Massachusetts; Newport, Bristol, Warren and Providence, Rhode Island; Sag Harbor, Poughkeepsie, Newburgh, Hudson, Port Richmond, and Oyster Bay, New York; Wiscasset and Portland, Maine; and Newark, New Jersey; Portsmouth, New Hampshire; Wilmington, Delaware, and New London, Connecticut.

Vessel Characteristics and Vessel Owners

Vessel registers were used to identify the agent or firm managing each whaling voyage, and also for the vessels' tonnage and age, and the number of owners. (A description of the purpose and content of vessel registers is found in Stein, 1992.) For the voyages originating in the states of New York, New Jersey, Delaware, New Hampshire, Connecticut, and Maine, these registers were found at the National Archives, Washington D.C. (Records of the Bureau of Marine Inspection and Navigation—Group 41). For the vessels originating from the ports of Massachusetts and Rhode Island, the compilations of vessel registers produced by the Survey of Federal Archives of the Works Progress Administration were used. These volumes included: *Ship Registers and Enrollments of Dighton-Fall River, Massachusetts 1789-1938* (1939), *Ship Registers of New Bedford, Massachusetts, 1796-1850* (1940), *Ship Registers and Enrollments of Bristol-Warren, Rhode Island, 1773-1939* (1941), *Ship Registers and Enrollments of Providence, Rhode Island, 1773-1939* (1941), and *Ship Registers and Enrollments of Boston and Charlestown* (1942). For the vessels originating from Salem, Massachusetts, the source used was Hitchings and Phillips, *Ship registers of the district of Salem and Beverly, Massachusetts, 1789-1900*, Salem: Essex Institute (1906).

Usually, the registers of vessels owned by corporations listed the name of the corporation as the owner on the register. However, in some cases, the names of all the shareholders were listed on on the register; these names were compared to the names listed as founders in the charters of the corporations to identify whether a corporation owned the vessel. In cases where the individual shareholders were not listed on the vessel registers, the names of the shareholders (used to compute the number of owners) were obtained from stock certificates or stock transfer ledgers. These included: the Cold Spring Whaling Co. "Ledger of Stockholders;" the Portsmouth Whaling Co. stock certificates, the Fall River Whaling Co. "Stock Transfer Ledger," and the Wilmington Whaling Co. "Stock Ledger."

Finally, few vessel registers survive for the port of Sag Harbor. The vessel characteristics and the identity of the managing agent of each vessel was obtained from the manuscript "List of Shipping Owned in Sag Harbor in 1839" in the John Jermain Library, Sag Harbor NY.

Other Data on the Voyages

The number of crewmembers on board the vessel at its departure was obtained for vessels originating in the ports of Hudson, Poughkeepsie, and Newburgh, NY; New London, CT; Newport, RI; and Salem, Fall River, Fairhaven, and Newbedford, MA. For the ports in New York, these were taken from the crew lists of vessels from the port of New York, in the National Archives, New York (Records of the Customs Service—Group 36). For the

ports in Connecticut, Rhode Island, and Massachusetts, these were taken from the crew lists of the various ports in the National Archives, Boston. (A description of the purpose and content of official crew lists is found in Stein, 1992.)

The departure and arrival dates of the voyages, the number of barrels of whale oil and sperm oil taken, the dummy variable for whether the vessel was lost, the voyage itineraries, and the characteristics of the different ports were all compiled from Starbuck (1878).

Data on the identity of the captain, his experience, and whether he died during the voyage was obtained from Lund (2001).