1. Introduction

More than three decades ago, John Hughes and Stanley Reiter published an article that has been widely recognized as a major milestone on the path to the “Clometric Revolution.” In “The First 1,945 British Steamships” (1958), Hughes and Reiter, employing both the techniques of marine engineering and Purdue University’s then newly installed mainframe computer, analyzed the technical characteristics of the British steam mercantile fleet in 1860. The authors concluded that, because maritime historians had badly underestimated the carrying capacity of the steam driven fleet, the degree of the new technology’s market penetration was much greater than had been thought. Moreover, they suggested that, current historiography aside, steam had become the dominant maritime technology by the beginning of the sixth decade of the nineteenth century.

The argument is compelling, but it leaves the reader somewhat perplexed. If steam capacity were so large and the cost of steam power so low, why did the number of sailing ships continue to increase, and why, as late as the 1880s, did those vessels still carry the bulk of
commercial shipments? A part of the answer undoubtedly turns on the problem of fuel, but a part involves an often ignored aspect of technological competition.

It is a popularly held belief, one most likely rooted in casual empiricism, that the invention and subsequent innovation of a new technique leads quickly to the replacement of an old technology by a new one. While that scenario may correctly describe the displacement of the mechanical by the electronic calculator, it is not always so apt. Often the competitive pressure induced by the "new way of doing things" leads to a series of improvements in the traditional technology that keeps the "old way" competitive—perhaps more than competitive—for a substantial period of time. Such was the case for sailing vessels. Far from being driven from the seas by the advent of steam, the apogee of technological development and the peak in the number and importance of vessels that depended on wind for power was reached more than half a century after ocean-going British steamships began to regularly arrive at continental ports.

This paper examines technical change in sailing ships and in whale hunting techniques in the period from 1820 to 1900, and, utilizing data from the New Bedford whaling fleet, it attempts to measure the impact of those changes on the whaling industry's productivity.

Fulton's *Clinton*, a river steamboat, was launched in 1807. By the 1820s steam powered vessels had begun to ply the English Channel and the Irish Sea. A decade later, regular service was established between England and Egypt; and, in 1835, scheduled service between the UK and India was inaugurated, and, within a decade, between the UK and the United States. Finally, in the middle of the 1840s, a steamship (the British naval sloop *Driver*), after a five-year passage, succeeded in circumnavigating the globe.²

In the early years, however, steamers provided no viable commercial threat to the merchant sailing ship. Although their variance in time of passage was less, on average, steamers were slower and much more expensive to operate than the ships and barks of the merchant service. For passengers and mail, the new technology may well have been superior. However, it was not until the screw replaced the paddle wheel, the price of iron had fallen sufficiently to make iron ships competitive with those built of wood, and, most importantly, the prime mover had evolved to a point where the space required to store coal did not preempt the majority of the vessel's cargo capacity that the steamship proved itself a dominant technology. The last development was particularly long delayed. It depended both on the gradual evolution of the engine—from the