The Jones Act Liner Trade

by

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ABSTRACT

The Shipping Act of 1920, more commonly known as the "Jones Act," has become the backbone of the our nation's maritime policy. The restrictions it imposes on the commercial sector of the nation's merchant marine are the source of a heated debate. Two organizations have formed to lobby congress on the direction of future maritime policy, one for continued support of the Jones Act, the other against. A brief analysis was undertaken to determine the viability of a new Jones Act vessel in a time where the restrictions are perhaps the most costly. Conclusions are made as to the proper course of action given the current circumstances.

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NOMENCLATURE PAGE

CDS-	**Construction Differential Subsidy**
CSCA-	**Coastal Shipping Competition Act**
GAO-	**General Accounting Office**
JARC-	**Jones Act Reform Coalition**
ICC-	**Interstate Commerce Commission**
ITC-	**International Trade Commission**
MARAD-	**Maritime Administration**
MCTF-	**Maritime Cabotage Task Force**
MSP-	**Maritime Security Program**
NPV-	**Net Present Value**
ODS-	**Operating Differential Subsidy**

Introduction

During World War I the U.S. built up its fleet of ships for battle and transport. When the war ended, the government was left with a surplus of ships. Congress reacted to protect the U.S. shipping industry and to maintain a well equipped merchant marine for national defense. They passed The Shipping Act of 1920. This Act is better known as the "Jones Act" after its chief sponsor, Senator Jones of Washington. Since 1920 the Jones Act has guided the formation of the United States maritime policy.[1] Although it was meant to have a lasting effect, there is some question whether or not it has achieved the desired effect and whether or not it is time to change our maritime policy to better suit the current global climate.

Recently, two organizations have formed to lobby congress on future legislation which would affect maritime policy and in turn, the maritime industry. These organizations are debating maritime policies which will mainly affect the U.S. maritime industry which is under the jurisdiction of the Jones Act. The first organization is the Maritime Cabotage Task Force which basically supports the Jones Act and claims that the law has been more successful than envisioned. The second organization is the Jones Act Reform Coalition (JARC) which is seeking to revise maritime laws by supporting a bill called the Coastal Shipping Competition Act. This paper will examine the views of both organizations and develop an independent view on possible action and recommendations to remedy this controversy. A brief Net Present Value case study is included in determining the viability of a new Jones Act vessel versus an old one.

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[1] Leback, Warren G. and McConnell, John W. Jr., "The Jones Act: Foreign Built Vessels and the Domestic Shipping Industry," SNAME Transactions, Vol. 91, 1983, 169.

Maritime Policy Through the Ages

It is important to examine the history of our nation's maritime policy in order to fully understand the Jones Act and its effects on the maritime industry. It is also insightful to study how our government has responded, sometimes unsuccessfully, to the changing global climate since the birth of our nation just a couple of centuries ago.

Independence to Civil War

Fundamentally the maritime policies that the United States adopted after achieving independence were policies similar to those held by the British. Mercantilism was the prevailing philosophy which was driving economic policy at the time.[2] This philosophy suggested that a nation is strengthened by having a majority of exports over imports. To strengthen the economy governmental interference and control over industry and trade was justified and exercised in order to increase the wealth of a nation. The efforts of government were therefore directed toward the elimination of internal trade barriers and to encouragement of the growth of industry. Industry in turn provided a source of taxes to support and strengthen the large armies and other organizations of national government. These were the generally held beliefs and policies of the time but they were not characterized by a consistent or formal doctrine.

Mercantilism flourished in the new world. The American colonies unwittingly provided ideal conditions for the shipbuilding industry and shipping to thrive. First, the location of the colonies on the coast provided for easy access by ship. Second, a large number of the colonists came to the new world with skills in shipbuilding and operation.

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[2] Leback, Warren G. and McConnell, John W. Jr., "The Jones Act: Foreign Built Vessels and the Domestic Shipping Industry," SNAME Transactions, Vol. 91, 1983, 170.

They provided a supply of low wage and skilled workers. Third, the colonies had a large supply of timber, the raw material necessary for ship construction.

The sale of ships to England and other nations provided a substantial portion of the early income for many of the colonies. By 1776 the American colonies supplied England with one third of its ocean-going merchant marine.[3]

The first Congress began writing laws to both raise revenue and protect U.S. shipbuilding and shipping. On July 4, 1789, Congress favored U.S. interests by imposing preferential duties on imports that were carried in vessels built in the U.S. and wholly owned by United States citizens.[4] Lesser duty preference was given to shipments on vessels built in the U.S. but owned by foreigners. These port tonnages were designed to favor U.S. shipbuilding. Vessels built in and belonging wholly to citizens of the United States paid a tonnage free of only six cents per ton, whereas vessels built in the United states but belonging, wholly or in part to foreign citizens paid thirty cents per ton, and all other vessels paid fifty cents per ton. Vessels built in and owned by citizens of the United States while engaged the coasting trade paid the tonnage duty only once a year, whereas all others paid such duty each time they entered a U.S. port.[5] This variable rate structure demonstrates how shipbuilding was favored over shipownership and operation, and exemplifies the mercantilist influence at that time.

The first statute limiting the registration of a vessel built in the United States was enacted in 1797. This stated that no vessel registered under the laws of the United States and which thereafter is seized or captured and condemned under the authority of any

[3] Leback, Warren G. and McConnell, John W. Jr., "The Jones Act: Foreign Built Vessels and the Domestic Shipping Industry," SNAME Transactions, Vol. 91, 1983, 170.
[4] Leback, Warren G. and McConnell, John W. Jr., 171.

foreign power, or is sold to a foreigner, is entitled to a new register, notwithstanding such ship or vessel shall afterwards be U.S. owned. In 1804 the law was changed to further limit registration of ships in the U.S.[6] Registration of U.S. owned and U.S built ships was rescinded if a naturalized U.S. citizen owner resided for more than one year in his country of origin or two years in another foreign country.

In 1817 the first law was enacted which actually prohibited the transportation of merchandise from one port to another port of the United States in vessels belonging to a foreign person. This act additionally favored vessels manned by U.S. citizens. It provided that U.S. registered vessels shall pay a duty of fifty cents per ton unless, in the case of trading from a foreign port, the officers and two-thirds of the crew were U.S. citizens, or in the case of trading coastwise, three fourths of the crew were U.S. citizens.[7]

During the first part of the nineteenth century shipping and shipbuilding in the United States grew and prospered. There was steady growth in foreign trade. American ships cost less and were better built than those produced elsewhere. The tonnage of the U.S. merchant fleet increased from 667000 tons in 1800 to 2,380,000 in 1860.[8] The end of this period of prosperity coincided with two technological developments. The first was the use of steam instead of sails. The second was the construction of ships with iron and steel rather than with wood.[9] U.S. shipbuilding no longer had its previous cost advantage. By 1846 there were more iron than wooden ships in the world fleet, a position not reached in the United States until 1861.

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[5] Leback, Warren G. and McConnell, John W. Jr., 171.
[6] Leback, Warren G. and McConnell, John W. Jr., 171.
[7] Leback, Warren G. and McConnell, John W. Jr., 171.
[8] Leback, Warren G. and McConnell, John W. Jr., 171.

Civil War to World War I

The U.S. merchant fleet was significantly depleted during the Civil War. This depletion was due to both ships lost in battle and to changes in registry by U.S. owners. Many ship owners tried to avoid engagement in the conflict and transferred their registry from the U.S. to a foreign country. Almost one-third of the U.S. tonnage transferred to foreign flag. In 1866 Congress enacted a law to prevent ships from transferring back to U.S registry after the war if they had transferred from U.S. to foreign registry during the war.

The Interstate Commerce Act was enacted in 1887. This was the first law regulating the transportation of property and passengers by rail and water between points in one state and points in another state and established the Interstate Commerce Commission to perform such regulation.[10]

The tonnage of the U.S. merchant fleet declined from 1,518,000 tons in 1865 to 817,000 in 1900. By 1894 the U.S.-owned foreign-flag steam fleet was larger than the U.S.-owned U.S.-flag steam fleet. The amount of cargo carried by U.S. owned, U.S. flag vessels also declined during the period.[11]

Other changes in maritime laws followed. These were essentially enacted to increase and improve of the U.S. merchant marine fleet. These laws eased the provisions for obtaining U.S. registry, reduced foreign competition, and gave preferential treatment to U.S. shipping.

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[9] Leback, Warren G. and McConnell, John W. Jr., 171.
[10] Leback, Warren G. and McConnell, John W. Jr., 174.
[11] Leback, Warren G. and McConnell, John W. Jr., 172.

In 1893 and 1898 laws were enacted to prevent the invasion of foreign ships into U.S. port to port shipping. These acts prohibited the foreign vessels from transferring goods from one U.S. port to another by traveling through a foreign port. In 1897 two rules were repealed: The 1797 law (re. new-registrations) and the 1804 law (re. loss of U.S. registration) thus broadening opportunity for U.S. registration of ships owned by U.S. citizens which had been "tainted" by foreign ownership.

Another law was enacted in 1904 which directed that "all supplies moved by sea for the U.S. Armed Forces were to be carried by vessels of the United States, if available and rates were not excessive or unreasonable."[12]

In 1912 a vessel of not more than five years old was allowed "to be registered under U.S. law regardless of where the vessel was built, but such vessel could not be used in the coastwise trades."[13] This statute "specifically provided rules regarding the ownership of a vessel by a corporation, which corporation must be organized and chartered under the laws of the United States or of any State thereof and the president and managing director of which must be citizens of the United States. In 1914 the free ships advocates finally achieved their goal when the 1912 statute was amended to strike the provision that a vessel must be not more than five years of age in order to be entitled to registry under U.S. law leaving it open for any foreign-built vessel to be so registered."[14]

In 1913 duties were imposed again that allowed a five percent additional reduction on goods imported on U.S.-flag vessels. However, these reductions were "nullified

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[12] Leback, Warren G. and McConnell, John W. Jr., 173.
[13] Leback, Warren G. and McConnell, John W. Jr., 173.
[14] Leback, Warren G. and McConnell, John W. Jr., 173.

because of reciprocity provisions in various treaties and the discriminating duties were repealed in 1915."[15]

Just prior to the U.S. entry into World War I, the Shipping Act, 1916 was enacted to regulate common carriers by water in the foreign and certain domestic commerce of the United States. During the war numerous statutes were enacted with regard to the construction and operation of vessels by and for the United States. To support the war effort, a law was enacted in 1917 "that the prohibition against foreign-built vessels registered under U.S. law engaging in the coastwise trade could be suspended by the United States Shipping Board during the war and for a period of 120 days thereafter."[16]

The Jones Act -1920

The importance of a strong U.S. maritime fleet for defense was very apparent during and after World War I. After much study of what should be done with the surplus vessels, "Congress found that it was necessary for the national defense and for the proper growth of its foreign and domestic commerce that the United States have a merchant marine of the best equipped and most suitable type of vessels sufficient to carry the greater portion of its commerce and serve as a naval or military auxiliary in time of war or national emergency, ultimately to be owned and operated privately by citizens of the United States and declared it to be the policy of the United States.... to do whatever may be necessary to develop and encourage the maintenance of such a merchant marine. Thus the purposes of the law were twofold; (1) national defense and (2) the proper growth of the foreign and domestic commerce of the United States."[17] The exact composition of this merchant

[15] Leback, Warren G. and McConnell, John W. Jr., 173.
[16] Leback, Warren G. and McConnell, John W. Jr., 173.
[17] Leback, Warren G. and McConnell, John W. Jr., 173.

marine and the means by which it shall be maintained are wholly open to interpretation. As a result, whether the Jones Act has achieved the goal of insuring national defense through the merchant marine, remains open to debate

Initially there were no restrictions on foreign-flag and foreign-owned vessels engaging in the coastwise trade of the United States, though there were duties levied which discriminated in favor of the U.S. shipping fleet. This lack of restrictions was "probably due to the fact that there was at that time an inadequate number of such vessels built in and owned by U.S. citizens of the United States to carry such coastwise trade, and to have prohibited other vessels from engaging in such trade would have been detrimental at that time to the commercial interests of the United States."[18].

Cabotage laws refer to laws which regulate coastwise trade. Cabotage is a water transportation term applicable to shipments between ports of a nation. It commonly refers to coast-wise or inter-coastal navigation or trade. The United States cabotage laws are some of the most extensive and restrictive in the world but the U.S. is not the only country to have them. Brazil, Indonesia, and Peru also have similar cabotage laws.

The pertinent section of the Jones Act with regard to trade and commerce, containing the cabotage law portion, is stated as follows:

> No merchandise shall be transported by water, or by land and water, on penalty of forfeiture thereof, between points in the United States, including Districts, Territories, and possessions thereof embraced with the coastwise laws, either directly of via a foreign port, or for any part of the transportation, in any other vessel built in and documented under the laws of the United States and by persons

[18] Leback, Warren G. and McConnell, John W. Jr.

> who are citizens of the United States, or vessels to which the privilege of engaging in the coastwise trade is extended by sections 18 or 22 of this Act.

This particular section was not a new law but encompassed the various laws which had been evolving haphazardly since independence in 1776. It has been amended several times since its adoption. [19]

Section 27 of the Jones Act made exceptions to the 1817 law in the following manner:

> (1) changed from prohibiting such movement in vessels if belonging to a foreigner to "if not owned by citizens of the United States", (2) added the phrase "or by land and water," (3) expanded United States to include Districts, Territories, and possessions thereof embraced within the coastwise laws, (4) added vessels to which the privilege of engaging in the coastwise trade is extended by section 18 or 22 of this Act, and (5) contained two provisos, one pertaining to Alaska and the other to transportation partly over Canadian rail lines and connecting water facilities.[20]

Section 27 includes the general prohibition or limitation and eight provisos. The first proviso provided that:

> no vessel having at any time acquired the lawful right to engage in the coastwise trade, either by virtue of having been built in or documented under the laws of the United States, and later sold foreign, or placed under foreign registry, shall thereafter acquire the right to engage in the coastwise trade. At the time the legislation for this proviso was being considered, there were 174 American built

[19] Leback, Warren G. and McConnell, John W. Jr., 170.

vessels of approximately 700,000 gross tons under foreign flags and subject to such repurchase or re-registration. (Between 1921and 1934, a total of 172 American-built vessels and sold foreign had been naturalized). The intent of this proviso was to prevent further renaturalization of American-built vessels to engage in the coastwise trade. At the time, it was felt that the vessels subject to repurchase were "of very little value except to cut into existing trade, demoralize established services, produce instability and disorder and delay the building of ships in American yards where the employment would go to American labor."[21]

Section 21 of the Act provided that "the coastwise laws of the United States shall extend to the island Territories and possessions of the United States not then covered thereby, with and exception for the Philippine islands."[22]

Section 38 amended Section 2 of the Shipping Act, 1916, defining citizenship of a corporation, partnership or association.

The second Proviso included two earlier amendments which were to protect the U.S. shipbuilding industry:

The 1956 amendment provided that no vessel which has acquired the right to engage in the coastwise trade, either by virtue of having been built or documented in the United States, and later rebuilt outside the United States, its Territories or its possessions shall have the right thereafter to engage in the coastwise trade. In 1960 this proviso was amended to read "unless the entire rebuilding, including the

[20] Leback, Warren G. and McConnell, John W. Jr., 173.
[21] Leback, Warren G. and McConnell, John W. Jr., 173.
[22] Leback, Warren G. and McConnell, John W. Jr., 173.

construction of any major components of the hull or superstructure of the vessel is effected within the United States, its Territories or its possessions.[23]

In summary the Jones Act establishes the following regulations:

no merchandise may be transported by water, or by land and water, on penalty of forfeiture, between U.S. ports or points, either directly or by way of a foreign port, or for any port of the transportation, in any vessel other than one which (1) was built in the United States, (2) is owned by U.S. citizens (or in the case of corporations, at least 75 percent of the interest of which is owned by U.S. citizens), (3) is documented under U.S. laws and (4) having been built in or documented under the laws of the United States, has not been sold to foreign citizens or placed under foreign registry, or has not later been rebuilt, unless the entire rebuilding, including the construction of the hull or superstructure of the vessel, has been effected within the United States.[24]

During World War I there was a burst of shipbuilding to meet the needs of both commerce and the war effort. The result was a tremendous shipbuilding program. "Most of these vessels were constructed for and owned and operated by the Government during and for a period after the war."[25]

Vessels which had been obtained by the government during the war were transferred to the Shipping Board for sale by the Shipping Act of 1920:

(1) transferred from all governmental agencies to the Shipping Board all vessels acquired during the war (with certain exceptions) and (2) authorized and directed

[23] Leback, Warren G. and McConnell, John W. Jr., 173.
[24] Leback, Warren G. and McConnell, John W. Jr., 173.
[25] Leback, Warren G. and McConnell, John W. Jr., 177.

the Board to sell such vessels, subject to certain conditions and to the objects and purposes of the Act, to U.S. citizens and, under other conditions to aliens.[26]

The great shipbuilding effort resulted in a glut of vessels in the U.S. fleet and in turn a tremendous decline in their monetary value. Many shipping merchants were left with excessive debts on ships that had lost market value and their businesses faced bankruptcy. The shipping industry and the wages of its workers were adversely affected. This economic problem was not foreseen and subsequently not addressed by the Jones Act. In summary, the Jones Act attempted to strengthen the U.S. merchant marine by: (1) imposing additional requirements for U.S. registration, ownership, and construction of ships used in the domestic trade, (2) supporting the training of U.S. citizens as officers and crew, and (3) granting preferential duties for U.S. owned and operated ships.

Subsequent Acts and Legislation

The Merchant Marine Act of 1928 was an act of Congress which revised and reinforced the 1920 act by:

> (1) giving to the Shipping Board the power to recondition and repair vessels, which vessels shall be documented under U.S. laws for at least five years thereafter and during which period they could not operate on exclusively coastwise voyages, (2) increasing the construction loan fund to $250 million (3) providing for subsidies for ocean mail services, and (4) providing for increased percentages of crew members of U.S. citizenship on vessels with an ocean mail subsidy.

[26] Leback, Warren G. and McConnell, John W. Jr., 177.

The 1928 Act had a positive effect on the industry since it provided for the construction of 64 new ships and reconditioned 61older vessels. Unfortunately most of these were passenger vessels.

The Merchant Marine Act of 1936 was an attempt to reverse the decline in the U.S. merchant marine engage in foreign commerce. This Act supported another shipbuilding program but failed to provide assistance to merchants involved in coastwise trade. Congress recognized that there was a material difference in the costs of vessels constructed in U.S. shipyards and of those built abroad. Congress also recognized that the U.S. merchant marine, manned by U.S. citizens, was at a cost disadvantage, in terms of the operating cost of the vessel. The law established two subsidy systems to equalize those costs and remove or lessen disadvantages, a construction differential subsidy (CDS) and an operating-differential subsidy (ODS). The vessel built with CDS must operate exclusively in foreign trade, with certain specific exceptions.[27] Even though foreign built and foreign owned and operated vessels could not be used in the domestic trade, the adverse effect of high operating costs of shipping and rates of such vessels in the domestic trades was seen in increased competition by land modes of transportation.

Exceptions were made where vessels participated in both intercoastal and foreign trade provided that the operator pay back CDS in the proportion that the gross revenue derived from the domestic trade bears to the gross revenue derived from entire voyages. The ICC could also consent to the temporary transfer of a subsidized vessel to the domestic service for periods not exceeding three months in any year, subject to payback of CDS as stated earlier. ODS was authorized for vessels operating in the foreign trade by

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[27] Leback, Warren G. and McConnell, John W. Jr., 175.

not for voyages in which the vessels engage in coastwise or intercoastal trade, subject to the same exceptions as in the case of CDS, when the ODS would be reduced in the same proportion as CDS.[28]

Additionally the Interstate Commerce Commission can remove the restrictions on domestic trading on a CDS vessel if the proportion of the subsidy is paid off for the remaining economic life of the vessel. Any difference in capital costs necessary to place a vessel of equal value if it had originally been constructed without the subsidy would have to be paid.

The "Jones Act Fleet" was not rebuilt, increased or modernized as a result of the 1936 Act or of any other legislation. The domestic fleets were rebuilt and modernized through two massive Government shipbuilding programs during World Wars I and II. These programs provided the domestic operator at the termination of hostilities, with modern, efficient vessels at relatively low capital cost and fixed interest rates.[29]

More relief was given to shipowners in 1938 with the addition of Title XI. This loan program provided a fund for the government to insure the payment of the interest on and the unpaid balance of the principal of any obligation eligible for financing construction, reconstruction or reconditioning of a commercial vessel or vessels owned by U.S. citizens designed for use in foreign or domestic trade.[30]

The end of World War II presented a similar glut of ships seen at the conclusion of Word War I. This was addressed by the Merchant Ship Sales Act of 1946 which was an extensive plan for dispensation of war-built vessels. This time Congress attempted to

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[28] Leback, Warren G. and McConnell, John W. Jr., 175.
[29] Leback, Warren G. and McConnell, John W. Jr., 178.
[30] Leback, Warren G. and McConnell, John W. Jr., 177.

preclude the problems seen with the devaluation of the fleet after World War I and set a "statutory sales price." Congress compared "wartime construction costs with prewar construction costs, that CDS is allowed under the 1936 Act for vessels constructed for service in foreign commerce, and the setting of a price which would place the largest number of ships that could be efficiently operated in the hands of private operators and yet which would not be so low as to adversely affect the future stability of the American merchant marine."[31]

Reestablishing the shipping routes and restoring a market which had changed drastically during the war was of major importance. Additionally the railroad industry had absorbed a majority of the trade that ship operators had to leave in order to support the war effort. It was decided that:

> (1) a price equal to 50 percent of the prewar domestic costs would meet the current construction costs in foreign yards, which become the statutory sales price of such vessels (except in the case of tankers which was set at 87.5 percent of the prewar domestic costs), subject to certain specified charges to be made in that price to fit the particular vessel of the type being sold; (2) a floor price be established below which sales could not be made after such adjustments; (3) trade-ins of older vessels for the war-built vessels be allowed; (4) adjustments be made in the sales prices of vessels sold prior to the enactment of the Act and; (5) any vessel sold or chartered to a U.S. citizen under the Act would not be prohibited from

[31] Leback, Warren G. and McConnell, John W. Jr., 178.

engaging in the coastwise trade because it was under foreign registry, if otherwise entitled to engage in such trade.[32]

Under the 1946 Act, 1,956 vessels were sold, of which 843 were to U.S. citizens, 29 of which were coastal-type dry cargo vessels.

In 1951 Congress appropriated $350 million for the construction of a new type of dry cargo vessel, the Mariner class. With this money 35 vessels were constructed in seven U.S. shipyards of which 29 ultimately were sold to U.S. operators for use in the foreign trades at a price computed on the basis that such vessels had been constructed with CDS. However, the price of such vessels if sold for used in the domestic trade was the actual cost of construction. None were sold for domestic use.

To further encourage Jones Act construction, the 1936 Act was amended in 1956 to allow a vessel operated in the domestic, as well as foreign, trade to be traded in to the government with the trade-in payment to be applied on the cost of construction of a replacement vessel and to allow a domestic operator to establish a construction reserve fund for the purpose of construction, reconstruction, reconditioning, or acquisition of new vessels.

In 1954 a law was enacted providing that at least 50 percent of the gross tonnage of any equipment, material commodities procured, furnished or financed by the United States and transported on ocean vessels shall be transported on privately-owned U.S.-flag commercial vessels to the extent such vessels are available at fair and reasonable rates for such vessels. This law could be temporarily waived in case of an emergency by the Congress, the President or the Secretary of Defense. In 1961 this provision was amended

[32] Leback, Warren G. and McConnell, John W. Jr., 178.

to add more support to the domestic shipping industry. It defined the term, "privately owned United States-flag commercial vessels" as not including any vessel which shall have been either built outside the United States, rebuilt outside the United States, or documented under the laws of the United States for a period of three years.

The Merchant Marine Act of 1970 allowed operators in noncontiguous but not other domestic trades to establish a capital construction fund through deposit of operating income and deferral of taxes thereon for construction and reconstruction of vessels to be used in that trade. In 1981 operators receiving ODS were authorized, if no CDS funds were available to construct, reconstruct, or acquire vessels built abroad until September 30, 1983, which would, if U.S. registered, be eligible for ODS to carry preference cargoes.

In 1996 the Maritime Security Act was passed. CDS has been eliminated and the remaining ODS contracts will not be renewed when they expire. The Maritime Security Act established the Maritime Security Program (MSP) under which the U.S. Government contracts with U.S.-flag, U.S.-owned merchant ships for standby vessels. The MSP maintains a modern U.S.-flag fleet providing military access to vessels and vessel capacity, as well as a total global, intermodal transportation network. This network includes not only vessels, but logistics management services, infrastructure, terminals and equipment, communications and cargo-tracking networks, 16,000 well-trained, professional U.S. citizen seafarers, and 22,000 shoreside employees located throughout the world.[33]

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[33] MARAD, Maritime Security Program Brochure, 1998.

Competing Modes of Transportation

Five modes of transport are used in the U.S. and while this paper's primary focus is only one of those modes (water carriers) the four remaining are worthy of some discussion. Those four are motor carriers, rail carriers, air carriers, and pipelines. The table below shows the relation of the amounts of cargo carried by each mode.

Tons of U.S. Domestic Cargo Transported (1980)

Truck	2,007,000	(36%)
Rail	1,589,000	(28%)
Domestic waterborne	1,097,459	(20%)
Pipelines	919,000	(16%)
Air	4,000	
Total	5,616,459	(100%)

Table 1, Source: Leback, Warren G. and McConnell, John W. Jr., 177.

Motor Carriers

Transportation of cargo by motor vehicles developed rapidly after World War I. During that period it became an active competitor of the railroads, particularly on short hauls. Rapid growth of the industry continued, but its fragmented condition and the economic conditions brought about by the Great Depression, caused Congress to enact the Motor Carrier Act in 1935, which amended the Interstate Commerce Act by adding Part II to bring motor carriers under the regulation of the ICC.[34] In the U.S. motor carriers are divided into distinct categories: common carriers, contract carriers, private carriers, and exempt carriers. The ICC has the power to regulate rates if it deems carriers are charging unfairly.

[34] Leback, Warren G. and McConnell, John W. Jr., 176.

Because motor carrier transportation is more competitive over short hauls than long ones, it may not take as much traffic from the water carrier as does the railroad. However, both are major competitors of the domestic water carrier.[35] It is also important to note that the roadways the motor carriers require are the responsibility of Federal and State governments.

Rail Carriers

During the period between the Civil War and World War I the shipping industry saw a steady decline. At the same time rail transportation saw its greatest increase. With advances such as double stacked trains, improved speed, and a lack of competition with water carriers, the rail carriers are a significant alternative, especially for long haul shipments. Water carriers also realize this and have aligned themselves with rail carriers to form a vast intermodal network.

Air

Air transport is the most rapidly developing form of modern transportation. Except in the noncontiguous trades where the air carrier is the only competitor of the water carrier, there is little competition between common carriers. In general the air carrier carries cargo of high value, light weight, small size and that needs expedited or quick delivery. Cargo of this nature is quite attractive to the water carrier and, if the costs of the water carrier were less and its rates correspondingly lower, perhaps the water carrier could attract some of such cargo away from the air carrier.[36]

[35] Leback, Warren G. and McConnell, John W. Jr., 176.
[36] Leback, Warren G. and McConnell, John W. Jr., 176.

Pipelines

Initially transportation of oil and gas products by pipeline did not compete in general with domestic ocean shipping. However, with the spread of the oil and gas industry, large movements of oil and gas products by tankers developed. This movement by water grew tremendously during the period 1930 through 1950, although a large portion of such products still moved by rail. Today more oil and gas products are carried by pipeline than by either rail or water carriers.[37]

The pipeline system of the United States comprises more than 435,000 miles of line and it is still growing. The discovery of oil in Alaska in the 1970's led to the construction of a new oil pipeline crossing approximately 789 miles. Completed in 1977, the cost of the pipeline has been estimated at about $5,980,000,000. It is capable of transporting more than 2,000,000 barrels of oil per day. Plans have been made to construct a new system from Alaska to the continental United States.

Pipelines face strong opposition from conservationists who fear its potential harmful effects on the ecology of regions that they pass through and the effect an accident would have on the environment.

Summary of Competing Modes of Transportation

All of the competing modes of domestic transportation share the characteristic that their employees are generally citizens of the United States (although only the ocean mode has a law requiring that a percentage of officers and crew manning the vessels be U.S. citizens). Generally they are members of labor unions which bargain collectively on

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[37] Leback, Warren G. and McConnell, John W. Jr., 176.

their behalf with the employers as to wages and work conditions (hours, division of labor, manning, and similar rules). Thus as to labor, the competing modes operate under quite similar circumstances.

Differences in costs of operation should vary only with the characteristics of the mode and are not particularly affected by any labor, statutory, or regulatory requirements. Only as to the acquisition of the capital equipment (and the costs thereof) is there a material difference between the competing modes. Taxes are placed on equipment of the other modes of transportation constructed outside the United States and brought in for domestic use. However, the meager amounts (generally 10% or lower) collected as duties are not equitable to the exorbitant difference in cost one must pay as a Jones Act water carrier. Vessels built in the United States are approximately three times the cost of a similar vessel at world market prices.[38]

Intermodal transportation, the moving of commodities in the same closed unit over two or more different modes of transport, is a major focus of carriers today. Advantages are that products are sealed in containers at their place of origin and not disturbed until the seal is broken by the recipient when the freight is unloaded at destination. The container is locked against pilferage and sealed from the weather. Usual packing requirements are relaxed and freight is billed as a volume shipment, requiring only one bill of lading. If foreign countries are involved, the freight moves under international treaties, eliminating inspection by customs at national border points before final destination is reached. Interchange is expedited. Disadvantages are that the initial cost of specialized equipment is substantial. Labor organizations are generally opposed to the automation, and need for

[38] Leback, Warren G. and McConnell, John W. Jr., 176.

less workers. Also there can be problems with countries with whom international treaties have been established. Despite these problems carriers seem to be moving in the direction of creating extensive intermodal networks.

The Current Debate Concerning the Jones Act

Maritime Cabotage Task Force

This organization argues that the Jones Act has been extremely successful in fulfilling its goal of maintaining a strong U.S. domestic fleet. They claim this is made evident by the large productivity gains which have been achieved over the past thirty years. The U.S. fleet is larger, faster, and significantly more productive. One major measure of this enhanced productivity is the immense growth seen in the use of barges. The opposition's failure to recognize the U.S. barge fleet is a major point of contention.

Effect on the U.S. Economy - Loss of Jobs and Revenue

According to the Maritime Cabotage Task Force, the Jones Act contributes some $15 billion annually to the U.S. economy, including $4 billion in direct wages to U.S. citizens. Those wages generate $1.4 billion in tax revenues for the U.S. Treasury and state governments each year.[39] They are clear to point out that Jones Act vessels are barred by law from receiving operating or construction subsidies from the U.S. government.

The value of Jones Act cargoes transported annually amounts to some $222 billion, or about 3.3 percent of national GNP, while the Jones Act freight bill totals less than $12 billion annually less than 0.2 percent of national GNP.[40] The Maritime Cabotage Task Force claims that these numbers provide a good measure of how efficient and cost effective the Jones Act trade is and provides good value to the consumers.

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[39] Maritime Cabotage Task Force homepage, www.mctf.com

[40] Maritime Cabotage Task Force homepage, www.mctf.com

Despite the sharp decrease in numbers of liner vessels, the liner trades have grown. The Maritime Cabotage Task Force claims that the decline in number of domestic deep draft liner vessels is a result of their replacement by larger, more reliable, and more efficient vessels. Additionally the group claims some 124,000 jobs under the Jones Act, 80,000 of which are on-board positions. Although the more modern fleet has 65 percent fewer vessels, from its customers' perspective Matson's 8 ships today offer over 3 times the combined cargo lift capability, a more than one-third increase in frequency of service, nearly a tenfold increase in vessel productivity and a fifteenfold increase in productivity measured on the basis of tons of cargo deliverable per crewmember.[41] This is illustrated further in the table below.

1950	1990
23 Ships	8 Ships
Avg. Crew: 47	Avg. Crew: 30
150 Round Voyages Annually	196 Round Voyages
1.4 Million Tons Lift	4.7 Million Tons Lift

Vessel Productivity:	+960 percent
Crewmember Productivity:	+1,500 percent

Table 2, Source: Full Speed Ahead, March 1997, p19

The Effect on Business

The Maritime Cabotage Task Force acknowledges that the U.S. shipping industry is highly competitive. They claim that barriers to entry are a result of narrow margins provided by current freight rates and not the high capital costs associated with Jones Act vessels.

[41] Full Speed Ahead: A Report on the Dramatic Growth of America's Domestic Fleet: 1965-1995, MCTF, Washington D.C., March 1997,19.

Retention of the Deepwater Fleet and Shipbuilding Industry

The Maritime Cabotage Task Force credits the Jones Act in spurring innovative maritime technologies through the competition it has created with other modes of transportation. Such innovations include the containership, the doublehulled tank barge, the Great Lakes self-unloader, and the chemical parcel tanker.

There are more than 44,000 vessels in the U.S. Jones Act fleet, ranging from containerships to coastal tankers to inland grain tows to dredges, Great Lakes self-unloaders, and passenger ferries. Together, these vessels move more than one billion tons of cargo and some 80 million passengers annually.[42]

According to the Maritime Cabotage Task Force a lack of freighters operating on the East Coast is a result of a market-driven modal shift not the Jones Act. Shipping costs and capabilities along the U.S. East Coast make the transporting of merchandise by water along the U.S. East Coast not always a logistical or economical choice. Significant costs would be ensued by transporting goods from inland plant to the coast and again from the coast to an inland port, plant or distribution center. These costs can be avoided by direct overland transportation due to advances such as doublestack trains and superhighways. Further to this point is that merchandise is generally moved along the U.S. East Coast in small volumes which make truck trailer lot sizes or railcar more efficient.

Service Outside the Contiguous U.S.

There are more than 120 vessels serving the U.S. noncontiguous trades. At least 10 self-propelled vessels and 19 tug-barge units move more than 15 million tons of

[42] Maritime Cabotage Task Force homepage, www.mctf.com

products to and from Puerto Rico each year, with a total cargo value of $22 billion. More than 67 vessels, including 16 tug-barge units, serve the Alaska trade, transporting more than 105 million tons of products worth approximately $21 billion annually. Twenty vessels serve the Hawaiian trade, moving some 21 million tons of cargo at a value of approximately $46 billion annually.[43] The numbers given here portray a healthy market.

The Transition From Ships to Barges

The Maritime Cabotage Task Force credits the emergence of the barge as the vessel of choice in revolutionizing shipping in the domestic trades. Table 3 below shows an increase by a factor of four in the number of barges in the U.S. domestic fleet over the past 30 years.

Large Non-Self Propelled Vessels In U.S.-Flag Domestic Cargo Fleet (Number of vessels >250 ft)			
	1965	1995	
		250-400ft	>400ft
Dry Cargo		394	71
Tank Vessels		1,118	62
Miscellaneous		53	5
Subtotal		1,565	138
Total	438		1,703

Table 3, Source: Full Speed Ahead, March 1997, p 21

75 percent of the dry cargo deadweight tonnage is now carried in barges as shown in Table 4 below.

Current U.S.-Flag Domestic Dry Cargo Fleet (Vessels > 1,000 grt/250ft)			
	Self- Propelled (>1,000 grt)	Barges (>250ft)	
		250-400'	>400'
Numbers of Vessels	34	394	71
		465	
DWT (000)	724	2186	

Table 4, Source: Full Speed Ahead, March 1997, p 22

[43] Full Speed Ahead: A Report on the Dramatic Growth of America's Domestic Fleet: 1965-1995, MCTF, Washington D.C., March 1997, 1.

Parallel Equipment Changes in Other Modes of Transportation

In looking at Table 5, below, it is evident that under the Jones Act the maritime industry exhibited that it can maintain itself as a competitive and productive mode of transport. The Maritime Cabotage task force claims this is the result of fierce competition created by the Jones Act and the trend towards intermodalism.

Selected Transportation Units (1965-1995)				
Mode/Unit		1965	1995	% change
Highway	Tractor Trucks	736,302	1,315,005	179%
	Full/Semi Trailers	1,357,746	4,120,994	304%
Rail	Freight Cars	1,800,962	1,192,412	-34%
	Locomotives	30,061	23,444	-25%
Aviation	3-Engine Aircraft	180	1,987	1104%
	4-Engine Aircraft	1,488	844	-43%
Maritime	Barges (total)	17,033	30,500	179%
	Barges (>250 ft)	438	1,703	389%
	Towboats	4,054	5,200	128%
	Ships (>1,000grt)	423	191	-55%
Combined Units				
Aviation	(3+4 Engine Aircraft)	1,668	2,831	170%
Maritime	(Barges+Ships)	17,456	30,691	176%
	(Lrg Barges+Ships	861	1,894	220%

Table 5, Source: Full Speed Ahead, March 1997, p32

Jones Act Reform Coalition

The Jones Act Reform Coalition is seeking reform in legislation for a number of reasons. They claim the Jones Act imposes a cost on the U.S. economy and that the U.S. government sees a substantial loss of revenue due to these laws. Coupled to this, the number of jobs protected by the act is very small, and many jobs have been lost. The coalition believes that the few who profit from the laws enjoy a virtual monopoly and receive greater benefits from the government while small business suffers greatly. They maintain that the intent of the law to protect the shipbuilding industry, and the nation's deepwater fleet has not been successful. Especially since the most important intent of the

Jones Act was to ensure the maintenance of a strong U.S. fleet to aid in national defense. The coalition contends that the U.S. maritime laws expose ships, shipyards, terminals and others to open ended liability claims. The environmental impact is greater as more cargo is transferred by truck, rail, and pipelines than if carried by water. The Jones Act Reform Coalition disputes the claim that marine service would not exist between places such as Puerto Rico and Guam if the Jones Act did not exist. In response to these issues the Jones Act Reform Coalition is supporting a bill, the Coastal Shipping Competition Act (CSCA), which addresses the aforementioned points.

Effect on the U.S. Economy- Loss of Jobs and Revenue

According to a 1991 study by the U.S. International Trade Commission, The Jones Act has destroyed thousands of jobs across the country and costs consumers as much as $10.4 billion per year in higher prices.[44] Due to the loss of economic activity the U.S. Treasury could lose a projected $21 billion in revenue over the next seven years.

A number of companies claim that the Jones Act protects the jobs of their employees. This coalition believes the opposite to be true. They support their argument with the data that more than 40,000 merchant marine jobs have been lost under the Jones Act since 1950 alone. Prior to World War II there was more coastal than international tonnage operating in the U.S.[45] The Jones Act Reform Coalition has not been given access to employment data from supporters of the Jones Act. They have had to recreate figures from government data. Government data reports that there are 173,500 total jobs

[44] Jones Act Reform Coalition homepage, www.jarc.com, 2.
[45] Jones Act Reform Coalition homepage, www.jarc.com, 3.

in the inland waterway, coastal, and intercoastal trades. Fewer than 3,000 of these jobs -- those on deepwater, coastwise and intercoastal Jones Act vessels -- actually fall under the exclusive citizenship restrictions of the Jones Act. The remaining 170,500 jobs are on inland waterway barges, dredges and tugs or are associated with marine cargo handling and are effectively protected by US labor and immigration laws. [46] The Jones Act Reform Coalition claims that the Coastal Shipping Competition Act that they are proposing would not affect these jobs.

The Effect on Business

The very large U.S.-flag carrier companies benefit the most from the Jones Act. This is because they have nearly exclusive control over domestic deepwater transportation routes. The 1991 U.S. International Trade Commission study found that $635 million in "benefits" these companies enjoyed were derived at a society wide cost of 10.4 billion per year.[47] The financial resources these carriers have available to them enable them to weather the difficulties brought about by the Jones Act while small businesses are at a disadvantage.

Small businesses lose because of the large barriers to entry created by the Jones Act restrictions which effectively raise capital costs and labor costs. Small businesses also do not have the capacity to deal with the legal exposure the Jones Act allows.

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[46] Jones Act Reform Coalition homepage, www.jarc.com, 3.
[47] Jones Act Reform Coalition homepage, www.jarc.com, 3.

Retention of the Deepwater Fleet and Shipbuilding Industry

While there are some 50,000 jobs remaining in the shipbuilding industry today, nearly all are in defense (non-Jones Act) construction. Commercial building activities support fewer than 1,700 jobs. Except for the liquid bulk tankers, the average privately-owned Jones Act vessel is over twenty-three years old. Great Lakes vessels average over thirty seven years of age. Due to the Oil Pollution Act of 1990, the liquid bulk tankers, which were mostly built in the 1970's, will have to be replaced with double-hull tankers. However, it is unlikely that their owners will stay in the market since the costs associated with building in the United States are so high. The last order for a major Jones Act liner vessel was in 1987 for the R.J. Pfeiffer, built for Matson Navigation. The ship was estimated to cost over $150 million, or nearly 2.5 times the world price.[48] More recently, Newport News Shipbuilding has attempted to the commercial market as producer of the Double Eagle class petroleum product tankers. This attempt was miserably unsuccessful, resulting in a loss of $315 million thus far, with 4 more ships to deliver. Further to this, Newport News Shipbuilding has decided to with draw from the commercial ship construction market for good. ARCO has also ordered a number of medium-size crude carriers which will cost $165 million each, considerably more than the market price worldwide of approximately $65 million. Figure 1 shows the decline in shipbuilding capacity over the past twenty years. Totals refer to vessels over 1,000 tons. The "Merchant Ships" category is the total number of ships over 1,000 tons built for that year.

[48] Jones Act Reform Coalition homepage, www.jarc.com, 5.

U.S. Merchant Shipbuilding, 1970-1992

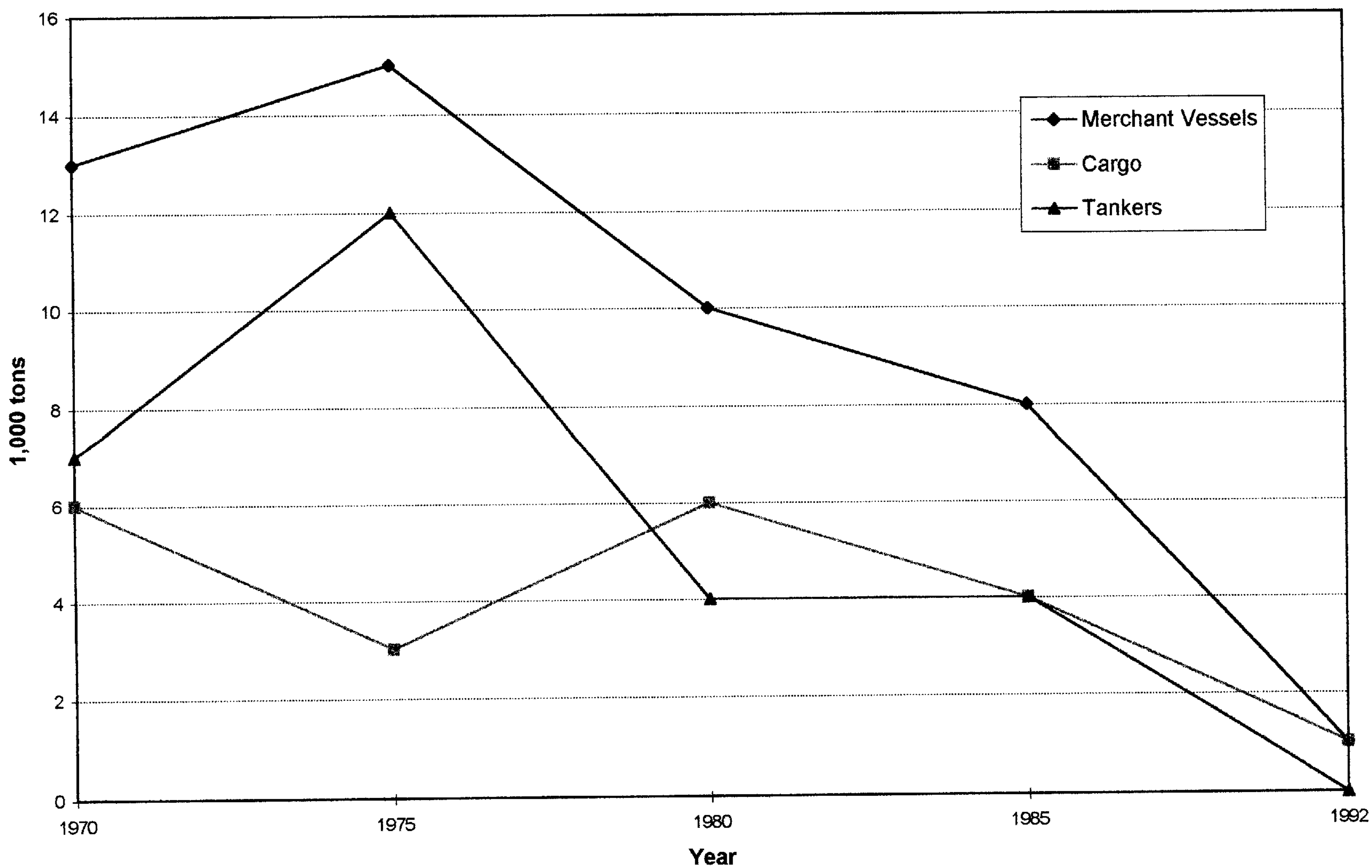

Figure 1- Source: Statistical Abstract of the United States, 1994

Increased Exposure to Liability Claims

Insurance premiums and labor costs are significantly higher for maritime operators than for competing transportation sectors. This is because maritime labor law provisions allow for increased legal exposure. Seamen and other maritime employees and their families have a right to trial by jury in cases of personal injury and can sue for wrongful death. The added costs for this protection further stifle the industry.

The Effect on Environment

Due to the lack of shipping capacity and high costs incurred by operating under the Jones Act, more cargo is carried by rail and truck today. One small coastal freighter operating from Maine to Florida can carry the equivalent cargo of 100 trucks, would emit two-thirds less pollution, and could save $40,000 in road damage in a single trip.[49] The group argues that many such freighters operate in Europe and Asia, yet none operate on the East Coast and only one operates on the West Coast.

The organization disputes the claim that allowing foreign vessels into U.S. territorial waters will be detrimental to the environmental conditions along the coast. U.S. environmental laws apply to all vessels in U.S. waters. In fact, as it stands, approximately 97% of all U.S. international waterborne cargo is carried on foreign-flag vessels.

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[49] Jones Act Reform Coalition homepage, www.jarc.com, 5.

Service Outside the Contiguous U.S.

The Jones Act Reform Coalition disputes claims that service would not exist to such areas as Hawaii, Alaska, Guam, and Puerto Rico if not for the Jones Act. It is calculated that Hawaiian consumers pay an additional $800 million per year in higher prices due to the Jones Act -- $2,048 for each Hawaiian household. Puerto Rico, which has a much smaller economy and poorer population, pays, by some estimates, as much as an additional $500 million per year in higher prices due to the Jones Act. The General Accounting Office, in a 1988 study, found that the Jones Act US-build requirement alone increased the cost of transportation in the Alaskan trades by $163 million per year. Studies that include the full cost of the Jones Act estimated costs to Alaska as high as $675 million per year, or nearly $3,300 per Alaskan household in 1982 dollars.[50] These inflated rates are attributed to the Jones Act. All of these locations are along international trade routes and would stand to benefit from service from international carriers with lower rates were it not for the Jones Act.

The Coastal Shipping Competition Act

The purpose of the Coastal Shipping Competition Act is to remove the restrictive, anti-competitive business restrictions imposed by the Jones Act. It seeks to bring national laws and standards in line with international maritime standards. The provisions of this bill specify the following:[51]

[50] Jones Act Reform Coalition homepage, www.jarc.com, 4.
[51] Jones Act Reform Coalition homepage, www.jarc.com, 1.

1) US domestic coastal trade is redefined to include trade on all waters accessible by ocean-going vessels, including the Great Lakes, St. Lawrence Seaway, and inland "mixed waters." US inland waterborne trade is narrowed to include all inland waters not accessible by ocean-going vessels.

2) US-flag documentation requirements are modified to eliminate US-ownership and build requirements in coastal, intercoastal, and noncontiguous trades.

3) US-labor and build requirements are retained for inland barge, tow and tug trades. US-citizenship ownership requirements in these trades are dropped.

4) Regularly scheduled liners in coastal trades must be documented under the new requirements in the US. No documentation requirements apply to tramps or charters in US trades, or in domestic coastal and intercoastal trades that are part of international shipping movements, up to six voyages a year.

5) "Bowater's" restrictions are eliminated.

6) Domestic maritime employers may choose workman's injury coverage under the Longshore and Harbor Workers' Compensation Act or an authorized state workman's compensation program as an alternative to Jones Act (FELA) tort remedies.

7) Coast Guard rules for all vessels (US and foreign) in the coastal trades as newly defined will be harmonized with recognized international safety, manning, and marine construction standards. Other currently applicable environmental standards

and tax provisions under US law continue to apply to all vessels operating on a regular basis in US domestic trades.

The Jones Act Reform Coalition claims that the Coastal Shipping Competition Act will create more jobs, a more competitive domestic waterborne transportation industry, and eliminate the extensive penalties to the US economy incurred because of the Jones Act.

Case Study- New vs. Old

An analysis was undertaken to determine the viability of a new Jones Act ship versus an old one. Concentrating on the Liner trade, a comparison was made between two containerships. Tankers operating in the Jones Act must be replaced or retired in order to comply with OPA 90.

First a search was conducted to find an older containership that was available for sale, scrap, or in lay-up and available for charter. This was done by obtaining a vessel inventory list from MARAD. From this list ships were eliminated based on failure to meet the following criteria: (1) containership, (2) U.S. built, and (3) Jones Act qualified. Companies were then contacted to see if they had any such ships available. None were found.

The next option was to find a ship built in the U.S. that was receiving ODS and/or CDS. When an ODS contract expires there are no further obligations; however, for a ship with CDS, MARAD's approval is necessary to enter the Jones Act Trade. Approval from MARAD is not generally a problem although a slight monetary dispensation (~\$30,000-\$40,000) is necessary. Four ships were found meeting this criteria. Two of these ships were Pace Setters, built in 1973, and were chosen as candidates for this study.

It was determined that one of these ships could be acquired for \$500,000. It is expected that \$1,000,000 would be needed to recondition the vessel. Therefore the total cost to acquire the old ship and prepare it for Jones Act Trade would be \$1,540,000 (Purchase-\$500,000, Recondition-\$1,000,000, and MARAD approval-\$40,000).

Matson's *R.J. Pfeiffer* was chosen as the candidate for the new ship. It is the last containership built in the United States, delivered in 1992, and has carrying capacities very close to that of the Pace Setter. The characteristics of the ships are shown in Table 6 below:

	New	Old
Length (ft)	711.5	669.25
Beam (ft)	105.75	90
Speed (knots)	23.0	23.5
Capacity (TEU)	1970	1505
Crew	14	30
Year Built	1992	1973

Table 6, Characteristics of New and Old Vessels

A ship like the *Pfeiffer* will cost $129,000,000. A Title XI mortgage can be arranged so that a 12.5% down payment is necessary ($16,125,000). Financed at 8% for twenty five years, annual payments were calculated to be $10,573,992. This was done with the following equation:

$$A = P\left[\frac{i(1+i)^n}{(1+i)^n - 1}\right]$$

where A is the annual payment, P is the principal of the loan, i is the interest of the loan, and n is the number of years the loan is carried.

Daily operating costs are another significant factor in operating a Jones Act vessel. A conservative estimate of crew costs was derived from data published in MARAD's report, Competitive Manning on U.S. Flag Vessels. Maintenance costs were derived from a case study of a similar nature. Hull and machinery insurance (H&M insurance) was taken as one percent of the acquisition cost of the vessel. Protection and indemnity insurance would be the same for each ship. Port charges would be the same for either ship also and therefore were not included. The new ship's efficiency results in an annual savings of $2,000,000 in fuel costs. The resulting daily operating costs were determined to be $19,265 for the new ship and $32,917 for the old ship. A summary of the operating costs can be found in the table below. In addition the old vessel was infused with a million dollars every five years in order to account for the major repairs it would require due to its age.

	New	**Old**
Crew Costs ($/day)	11,731	21,895
Maintenance Costs ($/day)	4,000	5,500
H&M Insurance ($/year)	1,290,000	15,400
P&I Insurance ($/year)	same	same
Fuel Costs ($/year)	----	+2,000,000
Port Charges	same	same
Total Daily Operating Costs ($/day)	**19,265**	**32,917**

Table 7, Daily Operating Costs

Using these values a Net Present Value (NPV) calculation was performed for discount rates varying from 5-15%(see Appendix A). NPV calculations incorporate the time value of money. They are useful because they work in situations where cash flows are not always equal and can accommodate a variable rate from year to year. This flexibility has resulted in its wide popularity for use in economic evaluation.

Simply put the future value is equal to the present value multiplied by the rate of change over a certain amount of time.

$$FV = PV(1+i)^n$$

or

$$PV = \frac{FV}{(1+i)^n}$$

For purposes of this project spreadsheets were generated to compute the NPV of the expenses associated with each vessel. To compute the NPV K was calculated for each year. $K = \frac{1}{(1+i)^n}$, where n is one in each case and i is the discount rate representing the time value of money. Next a Present Value Factor (PVF) was computed for each year. $PVF_n = (PVF_{n-1})K_n$. The PVF is equal to the factor K of that year multiplied by PVF of the previous year. The present value (PV) is equal to the Cash Flow (CF) multiplied by the present value factor. $PVF_n = (PVF_{n-1})CF$. Finally the NPV is calculated by summing all of the PV's. $NPV = \sum PV$.

A comprehensive graph of the results of the NPV calculations can be found on the following page (see Figure 2). Graphs of the results of each case compared individually

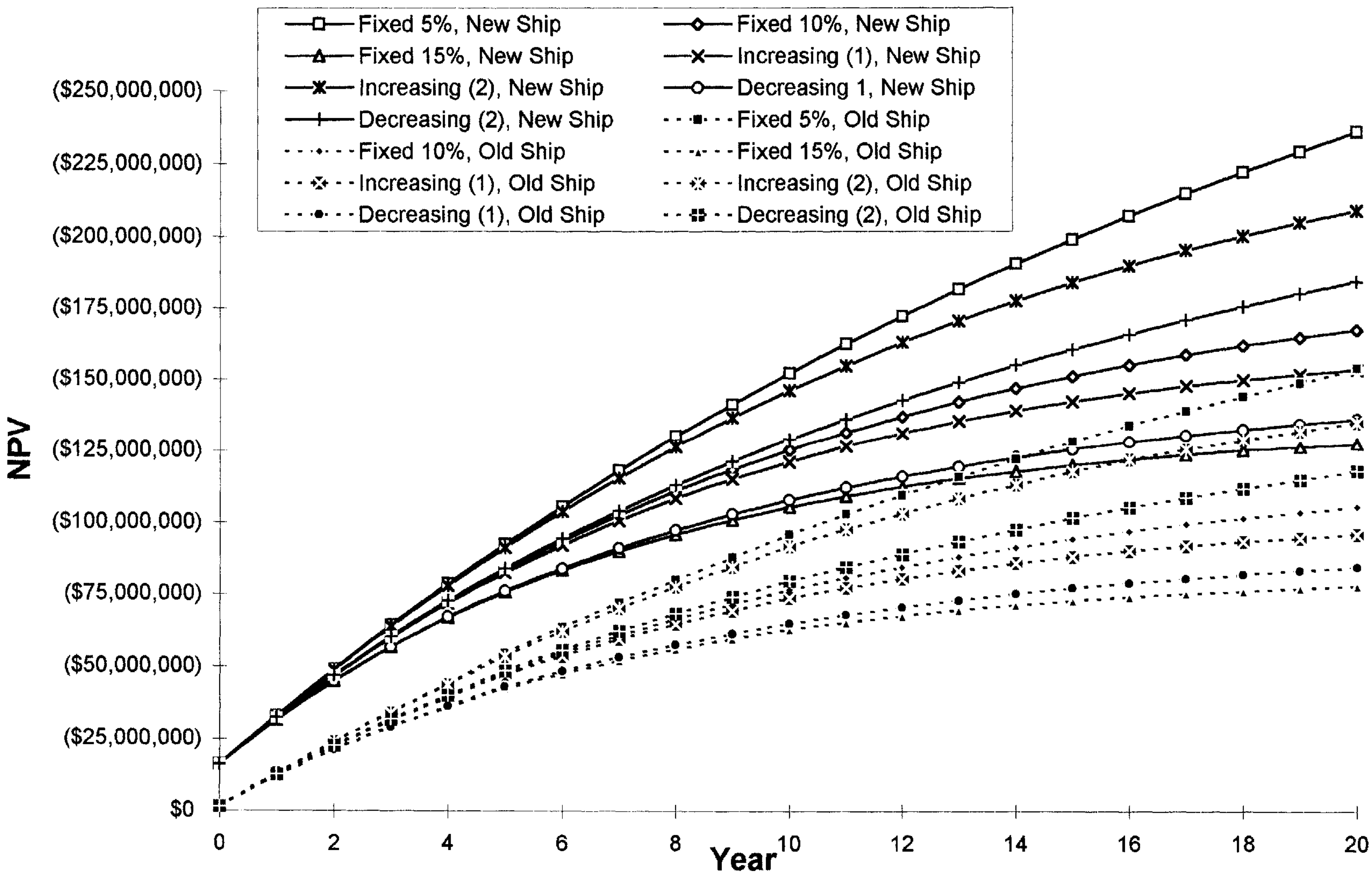

Figure 2, Results of NPV calculations

		New Ship		Old Ship		
	i	NPV, 20 years	Equal Annuity Payment	NPV, 20 years	Equal Annuity Payment	Difference
	0.05	($235,531,148)	$ (18,899,629)	($153,525,127)	$ (12,319,253)	$ 6,580,375
	0.06	($218,061,187)	$ (19,011,568)	($141,382,443)	$ (12,326,366)	$ 6,685,202
	0.07	($202,640,217)	$ (19,127,803)	($130,666,156)	$ (12,333,961)	$ 6,793,842
	0.08	($188,980,525)	$ (19,248,084)	($121,175,711)	$ (12,342,014)	$ 6,906,070
	0.09	($176,839,592)	$ (19,372,154)	($112,742,094)	$ (12,350,499)	$ 7,021,655
	0.10	($167,131,076)	$ (19,631,153)	($105,222,457)	$ (12,359,390)	$ 7,271,763
	0.11	($156,325,101)	$ (19,630,624)	($98,495,712)	$ (12,368,662)	$ 7,261,962
	0.12	($147,629,911)	$ (19,764,512)	($92,458,925)	$ (12,378,288)	$ 7,386,224
	0.13	($139,800,788)	$ (19,901,172)	($87,024,339)	$ (12,388,244)	$ 7,512,927
	0.14	($132,729,962)	$ (20,040,366)	($82,116,930)	$ (12,398,507)	$ 7,641,859
	0.15	($127,147,495)	$ (20,313,271)	($77,672,377)	$ (12,409,053)	$ 7,904,217
average, +	0.125	($153,232,974)	$ (21,160,820)	($95,630,204)	$ (13,206,123)	$ 7,954,697
average, +	0.075	($208,477,685)	$ (20,450,033)	($134,696,068)	$ (13,212,633)	$ 7,237,400
average, -	0.125	($135,808,962)	$ (18,754,638)	($84,265,849)	$ (11,636,754)	$ 7,117,884
average, -	0.075	($184,025,095)	$ (18,051,425)	($117,757,133)	$ (11,551,055)	$ 6,500,370

TABLE 8, Equivalent Annuity Payments for NPV of 20 years, New & Old can be found in Appendix B. An equivalent annuity payment was then computed using the equation stated previously to compute the mortgage payments of the new ship, with the *NPV*'s being the argument *P*. The average difference in annuity payments is approximately $7.7 million. The results of each case are shown in Table 8. In every case the old ship fares better. The cost discrepancies between a new and old vessels are merely too large to justify the building of a new ship. While the new ship is somewhat larger and could possibly generate a little more revenue it would not be enough to close this huge gap.

It is fair to say that the life of the old ship could not be twenty years. Acknowledging this, an analysis was made of the old ship with a five year life. With the discount rate fixed at ten percent a sensitivity analysis of the acquisition price was conducted (see Appendix C). Equivalent annuity payments, for both the operating and acquisitions costs, were calculated for each case and are summarized in Table 9, below:

ACQUISITION COST	EQUIVALENT ANNUITY PAYMENTS	
Original ($1,540,000)	$	(12,420,953)
$5 million	$	(13,333,692)
$10 million	$	(14,652,680)
$15 million	$	(15,971,667)
$20 million	$	(17,290,655)
$25 million	$	(18,609,642)
$30 million	$	(19,928,629)

TABLE 9, Equivalent Annuity Payments for Old Ship with 5 year life

A $30 million acquisition of a used vessel yields similar annual payments to the new ship. This is unfortunate because this is equivalent to the world market price of a new vessel. The U.S. build requirement of the Jones Act clearly creates an enormous financial burden for Jones Act carriers.

Conclusions

In the debate over whether or not to keep the Jones Act neither organization makes a strong argument as to why things should or should not change. Rather than seeking a consensus for a solution the two organizations are feuding with each other like a couple of spoiled children. A statement from the Lake Carriers Association addresses the tone of the Jones Act Reform Coalition stating, the JARC's approach also does not promote face-to-face discussions that might find solutions to problems that some mistakenly attribute to our Cabotage laws.[52] While the Lake Carriers Association is opposed to most of the actions taken by the Jones Act Reform Coalition, it is clear that this issue could be approached in a much more congenial manner.

The Maritime Cabotage Task Force appears to be on the defensive, and rightfully so, because its constituents are being threatened. Its constituents are mostly operators, shipbuilders, designers, intermodal carriers, and marine suppliers. All have made a large investment in their segment of the industry and want to protect that from the proposed changes of the Jones Act Reform Coalition. Protecting their investment should be their principal argument. Those are the rules, they've been around for a long time, we have made great efforts to abide by them, and have set up an efficient system for working within them.

Both organizations play with the numbers to make themselves look good. The Maritime Cabotage Task Force claims that 0.2 percent of the national GNP is an effective measure of the "good deal" the consumer is getting. Using the same numbers, $222 billion for the value of the cargo moved and $12 billion as the price to move it, one can calculate that the consumer is paying roughly 5 percent of the value of the cargo in the Jones Act trade. It is all in how you manipulate the numbers. Another gross statement by the Maritime Cabotage Task Force pertains to the barriers to entry being a result of the slim margins seen on freight rates, not capital costs. This is ridiculous since freight rates are directly related to capital costs. Maybe they believe this is a question of which came first, the chicken or the egg?

At the request of Congress the U.S. International Trade Commission (ITC) generated the report titled The Economic Effects of Significant U.S. Import Restraints. This report concluded that the Jones Act has substantially increased the cost of domestic waterborne commerce. This report came under heavy scrutiny, especially by proponents of the Jones Act. In turn the General Accounting Office (GAO) was asked to validate, or invalidate as the case may be, the ITC's report. The resulting GAO report, Maritime Issues: Assessment of the International Trade Commission's 1995 Analysis of the Economic Impact of the Jones Act, falls way short of settling this debate. The GAO report is very careful to not commit to any of the numbers generated by the ITC. The report is littered with statements like "we were unable to determine" and "a full assessment of the accuracy of the ITC's rate differential is not possible."[53] As a result, no conclusions can be made from which we can move forward.

[52] Lake Carriers Association homepage, www.lcaships.com, 13.

[53] Maritime Issues: Assessment of the International Trade Commission's 1995 Analysis of the Economic Impact of the Jones Act, U.S. General Accounting Office, March 1998.

The issues the Jones Act Reform Coalition takes up are pertinent but fail to drive home the true inadequacies of the Jones Act. There are some obvious flagrant violations which our government has produced, as well as obvious efforts made to evade the restrictions of the Jones Act. The Jones Act Reform Coalition's failure to address these issues, which have teeth, reflect a lack of understanding of what is at issue here and why. The decline of the shipbuilding industry is not a "direct" result of the Jones Act. The decline can be largely attributed to the focus of shipyards on higher priced government contracts. Prior to World War II, ship contracts, both Navy and commercial, were generally of a simple fixed price nature. Generally contract plans and specifications were developed, but in some cases where integrity and mutual respect existed on both sides, the contract consisted only of performance requirements, a handshake of understanding and a confirming letter contract. The best practice with respect to contract changes identified by either party was to "scope" each perceived change and estimate the cost and negotiate a price therefore before commencing work thereon. After World War II the general Navy practice was to contract for prototypes on a cost plus fee basis, and for follow on ships on a firm fixed price basis. The first constructive claims suit, by Todd Shipbuilding Corporation, in connection with overruns of approximately $100 million in 1967. This claim was settled favorably to Todd. This concept spread throughout the Navy shipbuilding industry like wildfire. The industry total for asserted but unsettled claims was to grow to $300 million in 1971 and explode to $2.7 billion by 1977. Contractor's bid prices were often deliberately set below the yard's best historical performance to come within the Navy's budget and/or to wipe out the competition, the exception being that, the yard could make up the difference in the course of negotiating change orders and by constructive claims.[54] To this day Navy contracts continue to nurse the few remaining shipyards along. The viability of the newly reopened Quincy yard, if successful, will make a profound statement here.

It is important to note that naval shipbuilding, by its nature, is performance oriented rather than cost conscious. It pays particular attention to design and the fulfillment of target specifications and scarcely concerns itself with the usual preoccupations of merchant-shipbuilders, namely, cost efficiency in ship operations. An obvious consequence of this situation is that shipyards which choose to specialize in warship work largely remove themselves from the discipline of the market.[55]

The shipbuilding industry has suffered greatly over the years. Although the Jones Act is not wholly responsible for its demise, it is nevertheless a factor. When our military buys foreign ships, as they have for the current Sealift program, it is a strong statement as to the failure of the Jones Act. It is extremely hypocritical for the government to require private companies to build U.S. and not follow the doctrine it created. It clearly shows just how bad things are.

The Sealift program itself is contradictory to the Jones Act. Its mission is to provide sea transportation needed to deploy and sustain U.S. forces worldwide. In peacetime this command contracts with private shipping companies to meet its

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[54] Bergeson, Lloyd, "Shipbuilding and Shipbuilding Management, 1943-1993- One Man's Perspective," SNAME Transactions Vol. 101, 1993.
[55] Todd, Daniel, The World Shipbuilding Industry, Billing and Sons Lmtd., Worcester, Great Britain, 1985, 313.

requirements. The Navy has deemed it necessary to create its own fleet of supply ships, thus taking away the need for vessels from the private sector.

To add insult to injury the formation of the Maritime Security Program, which currently serves as an auxiliary when needed for national defense needs, only requires vessels to be U.S. flag. Only four ships in this program are U.S. built and they are over twenty years old (see Table 10). If this does not admit the failure of the Jones Act, I don't know what does. The government has mandated the construction of Jones Act vessels in the U.S. so that they can have a Naval auxiliary. They have conveniently abandoned that plan for a newer, more economical, one that provides more advanced ships. They have done this without revoking the previous law leaving merchants with a huge cross to bear. It is simply un-American.

The Jones Act and the people it affects are a particular segment of society that is known to be outspoken and resistant to change, especially when it means letting outsiders in. Tradition means a lot to them, and they are passionately involved with their work. Knowing this, it is difficult to understand the Jones Act Reform Coalition's approach to this problem. Inciting the opponents only makes them more steadfast in their beliefs.

Sea-Land and its parent CSX illustrate further the failure of the Jones Act and the inefficiencies it has generated. Sea-Land's foreign-built containerships make port calls all along the eastern seaboard, but are only allowed to transfer cargo for foreign ports. Sea-Land is fortunate enough to have CSX as a parent company since they own an extensive system of rails, and can retain the revenue for transporting cargo within the states. However, it is extremely inefficient since the ships are making the port calls.

Vessel Name	Vessel Type	Where Built	Year Built	Operator	Design Type	GRT	DWT	Jones Act	ODS	CDS	MSP
ALMERIA LYKES	CONTAINERSHIP	JPN	1987	LYKES BROS. S.S. CO.	C9-M-F151A	39	44		Y		TBD 5/98
APL KOREA	CONTAINERSHIP	KRS	1995	AMERICAN PRESIDENT LINES	FOREIGN CONST.	64	66				12/24/97
APL PHILIPPINES	CONTAINERSHIP	KRS	1996	AMERICAN PRESIDENT LINES	FOREIGN CONST.	64	66				1/7/98
APL SINGAPORE	CONTAINERSHIP	KRS	1995	AMERICAN PRESIDENT LINES	FOREIGN CONST.	64	66				12/11/97
APL THAILAND	CONTAINERSHIP	GEU	1995	AMERICAN PRESIDENT LINES	FOREIGN CONST.	64	66				12/31/97
ENDEAVOR	CONTAINERSHIP	KRS	1991	FARRELL LINES	FOREIGN CONST.	23	31				11/17/97
ENDURANCE	CONTAINERSHIP	KRS	1991	FARRELL LINES	FOREIGN CONST.	23	31				12/8/97
ENTERPRISE	CONTAINERSHIP	KRS	1992	FARRELL LINES	FOREIGN CONST.	23	31				11/4/97
GALVESTON BAY	CONTAINERSHIP	KRS	1984	SEA-LAND SERVICE	C9-M-F141A	57	58				12/20/96
GREEN BAY	RO/RO	JPN	1987	CENTRAL GULF LINE	FOREIGN CONST.	38	13				12/20/96
GREEN HARBOUR (or replac	CONTAINER/BARGE CARRIER	USA	1974	CENTRAL GULF LINE	C9-S-81D	28	46			Y	4/1/98
GREEN ISLAND	CONTAINER/BARGE CARRIER	USA	1976	WATERMAN LINE	C9-S-81D	28	46		Y	Y	2/23/97
GREEN LAKE	RO/RO	JPN	1987	CENTRAL GULF LINE	FOREIGN CONST.	46	14				12/20/96
MAERSK CALIFORNIA	CONTAINERSHIP	DEN	1994	MAERSK LINE	FOREIGN CONST.	20	25				4/19/97
MAERSK COLORODO	CONTAINERSHIP	DEN	1992	MAERSK LINE	FOREIGN CONST.	16	21				5/5/97
MAERSK TENNESSEE	CONTAINERSHIP	JPN	1994	MAERSK LINE	FOREIGN CONST.	18	25				3/12/97
MAERSK TEXAS	CONTAINERSHIP	JPN	1994	MAERSK LINE	FOREIGN CONST.	18	25				2/25/97
MARGARET LYKES	CONTAINERSHIP	JPN	1987	LYKES BROS. S.S. CO.	C9-M-F151A	39	44		Y		TBD 5/98
NEDLLOYD HOLLAND	CONTAINERSHIP	KRS	1984	SEA-LAND SERVICE	C9-M-F141A	57	58				12/20/96
NEWARK BAY	CONTAINERSHIP	KRS	1985	SEA-LAND SERVICE	C9-M-F141A	57	58				12/20/96
OOCL INNOVATION	CONTAINERSHIP	KRS	1985	SEA-LAND SERVICE	C9-M-F141A	57	58				12/20/96
OOCL INSPIRATION	CONTAINERSHIP	KRS	1985	SEA-LAND SERVICE	C9-M-F141A	57	58				12/20/96
OVERSEAS JOYCE	RO/RO	JPN	1987	MARITIME OVERSEAS CORP.	FOREIGN CONST.	48	16				12/20/96
PRESIDENT ADAMS	CONTAINERSHIP	GFR	1988	AMERICAN PRESIDENT LINES	C9-M-F150A	61	54		Y		2/13/97
PRESIDENT JACKSON	CONTAINERSHIP	GFR	1988	AMERICAN PRESIDENT LINES	C9-M-F150A	61	54		Y		2/13/97
PRESIDENT KENNEDY	CONTAINERSHIP	GFR	1988	AMERICAN PRESIDENT LINES	C9-M-F150A	61	54		Y		2/13/97
PRESIDENT POLK	CONTAINERSHIP	GFR	1988	AMERICAN PRESIDENT LINES	C9-M-F150A	61	54		Y		2/13/97
PRESIDENT TRUMAN	CONTAINERSHIP	GFR	1988	AMERICAN PRESIDENT LINES	C9-M-F151A	61	54		Y		2/13/97
ROBERT E. LEE	CONTAINER/BARGE CARRIER	USA	1974	WATERMAN LINE	C9-S-81D	28	41		Y	Y	3/29/96
SAM HOUSTON	CONTAINER/BARGE CARRIER	USA	1974	WATERMAN LINE	C9-S-81D	28	41		Y	Y	4/26/97
SEA FOX	CONTAINERSHIP	DEN	1985	CROWLEY AMERICAN TRANSPORT	C6-M-F145A	34	24				12/20/96
SEA LION	CONTAINERSHIP	DEN	1985	CROWLEY AMERICAN TRANSPORT	C6-M-F145A	34	24				12/20/96
SEA WOLF	CONTAINERSHIP	DEN	1984	CROWLEY AMERICAN TRANSPORT	C6-M-F145A	34	24				12/20/96
SEA-LAND ATLANTIC	CONTAINERSHIP	KRS	1985	SEA-LAND SERVICE	C9-M-F141A	57	58				12/20/96
SEA-LAND DEFENDER	CONTAINERSHIP	JPN	1980	SEA-LAND SERVICE	PRIVATE	32	23				12/20/96
SEA-LAND ENDURANCE	CONTAINERSHIP	KRS	1980	SEA-LAND SERVICE	PRIVATE	32	23				12/20/96
SEA-LAND EXPLORER	CONTAINERSHIP	JPN	1980	SEA-LAND SERVICE	PRIVATE	32	23				12/20/96
SEA-LAND INNOVATOR	CONTAINERSHIP	KRS	1980	SEA-LAND SERVICE	PRIVATE	32	30				12/20/96
SEA-LAND INTEGRITY	CONTAINERSHIP	JPN	1984	SEA-LAND SERVICE	C9-M-F141A	57	58				12/20/96
SEA-LAND LIBERATOR	CONTAINERSHIP	KRS	1980	SEA-LAND SERVICE	PRIVATE	32	30				12/20/96
SEA-LAND PATRIOT	CONTAINERSHIP	JPN	1980	SEA-LAND SERVICE	PRIVATE	32	30				12/20/96
SEA-LAND PERFORMANCE	CONTAINERSHIP	KRS	1985	SEA-LAND SERVICE	C9-M-F141A	57	58				12/20/96
SEA-LAND QUALITY	CONTAINERSHIP	KRS	1985	SEA-LAND SERVICE	C9-M-F141A	57	58				12/20/96
STELLA LYKES	CONTAINERSHIP	JPN	1987	LYKES BROS. S.S. CO.	C9-M-F151A	39	44		Y		TBD 5/98
STONEWALL JACKSON	CONTAINER/BARGE CARRIER	USA	1974	WATERMAN LINE	C9-S-81D	28	41		Y	Y	3/8/97
TILLIE LYKES	CONTAINERSHIP	KRS	1985	NICHOLAS BAHKO CO., INC.	C6-M-F146A	31	36		Y		1/1/99
TYSON LYKES	CONTAINERSHIP	KRS	1985	NICHOLAS BAHKO CO., INC.	C6-M-F146A	31	36		Y		1/1/99

Table 10. List of MSP Vessels

Disney's *Big Red Boat* is another example of the failure of the Jones Act. The cruise ship is of foreign build and therefore does not meet Jones Act regulations. Disney has bought an island for the sole purpose of making a port call and thus circumventing the restrictions imposed by the Jones Act.

One must realize that while it is true to say that U.S. shipbuilding is influenced by conditions in the world shipbuilding business environment, it is influenced more by the circumstances peculiar to U.S. shipbuilding alone - that is, by federal policy, statute, and regulation with respect to naval shipbuilding, subsidized commercial shipbuilding, and cabotage.[56] Additionally, trade is the life blood of all economic activity, whether it be of raw materials or natural products or of manufactured or finished products. Trade involves the movement of merchandise or products, whether for short or long distances. Thus trade generates transportation. However, it is important to remember that transportation exists for trade, not vice versa. Anything that encourages and assists trade will do likewise for transportation.[57]

Despite the efficiencies that can be gained by a new vessel the cost of U.S. built vessel is far to great to justify them. Kvaerna Masa, a Finish company, has recently acquired the old Philadelphia Naval yard. This now foreign owned yard was acquired with the aid of $500 million in state and federal subsidies. The owners intend to go into the commercial market and can perhaps produce a Jones Act ship at a more reasonable price. The Jones Act makes no stipulations as to who owns the yard.

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[56] Todd, Daniel, The World Shipbuilding Industry, Billing and Sons Lmtd., Worcester, Great Britain, 1985, 310.

In conclusion the Jones Act Reform Coalition and its bill CSCA are the proper direction for the industry. Not for the reasons the Jones Act Reform Coalition gives, but because the U.S. government has acknowledged that the Jones Act restrictions do not promote the conditions they desire for national security. The government should encourage this same freedom in the commercial sector in order to remain an economic force in the ever increasing global market.

[57] Leback, Warren G. and McConnell, John W. Jr., 169.

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APPENDIX A - Net Present Value Calculations

Fixed 5%

New

Capacity (TEU)	1970
Average Speed (knots)	23
Crew Size	14
Construction/Acquisition Costs	$129,000,000
Daily Operating Costs ($/day)	$19,265
annual loan payments	$10,573,992

Year n	Cash Flow CF	Discount Rate i	K 1/(1+i)	PV factor PVFn=(PVFn-1)*Kn	PV PV=CFn*PVFn	NPV Sum of PVn's
0	($16,125,000)	0.05	0.952	0.000	($16,125,000)	($16,125,000)
1	($17,605,717)	0.05	0.952	0.952	($16,767,350)	($32,892,350)
2	($17,605,717)	0.05	0.952	0.907	($15,968,904)	($48,861,254)
3	($17,605,717)	0.05	0.952	0.864	($15,208,480)	($64,069,734)
4	($17,605,717)	0.05	0.952	0.823	($14,484,267)	($78,554,001)
5	($17,605,717)	0.05	0.952	0.784	($13,794,540)	($92,348,541)
6	($17,605,717)	0.05	0.952	0.746	($13,137,657)	($105,486,198)
7	($17,605,717)	0.05	0.952	0.711	($12,512,054)	($117,998,252)
8	($17,605,717)	0.05	0.952	0.677	($11,916,242)	($129,914,495)
9	($17,605,717)	0.05	0.952	0.645	($11,348,802)	($141,263,297)
10	($17,605,717)	0.05	0.952	0.614	($10,808,383)	($152,071,680)
11	($17,605,717)	0.05	0.952	0.585	($10,293,698)	($162,365,378)
12	($17,605,717)	0.05	0.952	0.557	($9,803,522)	($172,168,900)
13	($17,605,717)	0.05	0.952	0.530	($9,336,688)	($181,505,588)
14	($17,605,717)	0.05	0.952	0.505	($8,892,083)	($190,397,671)
15	($17,605,717)	0.05	0.952	0.481	($8,468,651)	($198,866,322)
16	($17,605,717)	0.05	0.952	0.458	($8,065,382)	($206,931,704)
17	($17,605,717)	0.05	0.952	0.436	($7,681,316)	($214,613,020)
18	($17,605,717)	0.05	0.952	0.416	($7,315,539)	($221,928,559)
19	($17,605,717)	0.05	0.952	0.396	($6,967,180)	($228,895,739)
20	($17,605,717)	0.05	0.952	0.377	($6,635,410)	($235,531,148)

OLD

Capacity (TEU)	1505
Average Speed (knots)	23.5
Crew Size	30
Construction/Acquisition Costs	$1,540,000
Daily Operating Costs ($/day)	$32,917
Overhaul every 5 years	$1,000,000

Year n	Cash Flow CF	Discount Rate i	K 1/(1+i)	PV factor PVFn=(PVFn-1)*Kn	PV PV=CFn*PVFn	NPV Sum of PVn's
0	($1,540,000)	0.05	0.952	0.000	($1,540,000)	($1,540,000)
1	($12,014,705)	0.05	0.952	0.952	($11,442,576)	($12,982,576)
2	($12,014,705)	0.05	0.952	0.907	($10,897,692)	($23,880,268)
3	($12,014,705)	0.05	0.952	0.864	($10,378,754)	($34,259,022)
4	($12,014,705)	0.05	0.952	0.823	($9,884,528)	($44,143,549)
5	($13,014,705)	0.05	0.952	0.784	($10,197,362)	($54,340,911)
6	($12,014,705)	0.05	0.952	0.746	($8,965,558)	($63,306,469)
7	($12,014,705)	0.05	0.952	0.711	($8,538,627)	($71,845,096)
8	($12,014,705)	0.05	0.952	0.677	($8,132,025)	($79,977,121)
9	($12,014,705)	0.05	0.952	0.645	($7,744,786)	($87,721,907)
10	($13,014,705)	0.05	0.952	0.614	($7,989,900)	($95,711,807)
11	($12,014,705)	0.05	0.952	0.585	($7,024,749)	($102,736,556)
12	($12,014,705)	0.05	0.952	0.557	($6,690,237)	($109,426,793)
13	($12,014,705)	0.05	0.952	0.530	($6,371,655)	($115,798,448)
14	($12,014,705)	0.05	0.952	0.505	($6,068,242)	($121,866,690)
15	($13,014,705)	0.05	0.952	0.481	($6,260,296)	($128,126,986)
16	($12,014,705)	0.05	0.952	0.458	($5,504,075)	($133,631,061)
17	($12,014,705)	0.05	0.952	0.436	($5,241,976)	($138,873,037)
18	($12,014,705)	0.05	0.952	0.416	($4,992,358)	($143,865,395)
19	($12,014,705)	0.05	0.952	0.396	($4,754,627)	($148,620,021)
20	($13,014,705)	0.05	0.952	0.377	($4,905,105)	($153,525,127)

Fixed 6%

New

Capacity (TEU)	1970
Average Speed (knots)	23
Crew Size	14
Construction/Acquisition Costs	$129,000,000
Daily Operating Costs ($/day)	$19,265
annual loan payments	$10,573,992

Year n	Cash Flow CF	Discount Rate i	K 1/(1+i)	PV factor PVFn=(PVFn-1)*Kn	PV PV=CFn*PVFn	NPV Sum of PVn's
0	($16,125,000)	0.06	0.943	0.000	($16,125,000)	($16,125,000)
1	($17,605,717)	0.06	0.943	0.943	($16,609,167)	($32,734,167)
2	($17,605,717)	0.06	0.943	0.890	($15,669,025)	($48,403,192)
3	($17,605,717)	0.06	0.943	0.840	($14,782,099)	($63,185,292)
4	($17,605,717)	0.06	0.943	0.792	($13,945,377)	($77,130,669)
5	($17,605,717)	0.06	0.943	0.747	($13,156,016)	($90,286,685)
6	($17,605,717)	0.06	0.943	0.705	($12,411,336)	($102,698,020)
7	($17,605,717)	0.06	0.943	0.665	($11,708,807)	($114,406,828)
8	($17,605,717)	0.06	0.943	0.627	($11,046,045)	($125,452,872)
9	($17,605,717)	0.06	0.943	0.592	($10,420,797)	($135,873,669)
10	($17,605,717)	0.06	0.943	0.558	($9,830,940)	($145,704,610)
11	($17,605,717)	0.06	0.943	0.527	($9,274,472)	($154,979,082)
12	($17,605,717)	0.06	0.943	0.497	($8,749,502)	($163,728,584)
13	($17,605,717)	0.06	0.943	0.469	($8,254,247)	($171,982,831)
14	($17,605,717)	0.06	0.943	0.442	($7,787,026)	($179,769,857)
15	($17,605,717)	0.06	0.943	0.417	($7,346,251)	($187,116,107)
16	($17,605,717)	0.06	0.943	0.394	($6,930,425)	($194,046,532)
17	($17,605,717)	0.06	0.943	0.371	($6,538,137)	($200,584,669)
18	($17,605,717)	0.06	0.943	0.350	($6,168,054)	($206,752,723)
19	($17,605,717)	0.06	0.943	0.331	($5,818,919)	($212,571,641)
20	($17,605,717)	0.06	0.943	0.312	($5,489,546)	($218,061,187)

OLD

Capacity (TEU)	1505
Average Speed (knots)	23.5
Crew Size	30
Construction/Acquisition Costs	$1,540,000
Daily Operating Costs ($/day)	$32,917
Overhaul every 5 years	$1,000,000

Year n	Cash Flow CF	Discount Rate i	K 1/(1+i)	PV factor PVFn=(PVFn-1)*Kn	PV PV=CFn*PVFn	NPV Sum of PVn's
0	($1,540,000)	0.06	0.943	0.000	($1,540,000)	($1,540,000)
1	($12,014,705)	0.06	0.943	0.943	($11,334,627)	($12,874,627)
2	($12,014,705)	0.06	0.943	0.890	($10,693,045)	($23,567,672)
3	($12,014,705)	0.06	0.943	0.840	($10,087,778)	($33,655,450)
4	($12,014,705)	0.06	0.943	0.792	($9,516,772)	($43,172,222)
5	($13,014,705)	0.06	0.943	0.747	($9,725,345)	($52,897,566)
6	($12,014,705)	0.06	0.943	0.705	($8,469,893)	($61,367,459)
7	($12,014,705)	0.06	0.943	0.665	($7,990,465)	($69,357,924)
8	($12,014,705)	0.06	0.943	0.627	($7,538,175)	($76,896,099)
9	($12,014,705)	0.06	0.943	0.592	($7,111,485)	($84,007,584)
10	($13,014,705)	0.06	0.943	0.558	($7,267,343)	($91,274,928)
11	($12,014,705)	0.06	0.943	0.527	($6,329,197)	($97,604,124)
12	($12,014,705)	0.06	0.943	0.497	($5,970,940)	($103,575,065)
13	($12,014,705)	0.06	0.943	0.469	($5,632,963)	($109,208,027)
14	($12,014,705)	0.06	0.943	0.442	($5,314,116)	($114,522,143)
15	($13,014,705)	0.06	0.943	0.417	($5,430,582)	($119,952,724)
16	($12,014,705)	0.06	0.943	0.394	($4,729,544)	($124,682,268)
17	($12,014,705)	0.06	0.943	0.371	($4,461,834)	($129,144,102)
18	($12,014,705)	0.06	0.943	0.350	($4,209,277)	($133,353,380)
19	($12,014,705)	0.06	0.943	0.331	($3,971,016)	($137,324,396)
20	($13,014,705)	0.06	0.943	0.312	($4,058,047)	($141,382,443)

Fixed 7%

New

Capacity (TEU)	1970
Average Speed (knots)	23
Crew Size	14
Construction/Acquisition Costs	$129,000,000
Daily Operating Costs ($/day)	$19,265
annual loan payments	$10,573,992

Year n	Cash Flow CF	Discount Rate i	K 1/(1+i)	PV factor PVFn=(PVFn-1)*Kn	PV PV=CFn*PVFn	NPV Sum of PVn's
0	($16,125,000)	0.07	0.935	0.000	($16,125,000)	($16,125,000)
1	($17,605,717)	0.07	0.935	0.935	($16,453,941)	($32,578,941)
2	($17,605,717)	0.07	0.935	0.873	($15,377,515)	($47,956,456)
3	($17,605,717)	0.07	0.935	0.816	($14,371,509)	($62,327,966)
4	($17,605,717)	0.07	0.935	0.763	($13,431,317)	($75,759,283)
5	($17,605,717)	0.07	0.935	0.713	($12,552,633)	($88,311,916)
6	($17,605,717)	0.07	0.935	0.666	($11,731,433)	($100,043,348)
7	($17,605,717)	0.07	0.935	0.623	($10,963,956)	($111,007,304)
8	($17,605,717)	0.07	0.935	0.582	($10,246,688)	($121,253,992)
9	($17,605,717)	0.07	0.935	0.544	($9,576,344)	($130,830,335)
10	($17,605,717)	0.07	0.935	0.508	($8,949,854)	($139,780,189)
11	($17,605,717)	0.07	0.935	0.475	($8,364,349)	($148,144,538)
12	($17,605,717)	0.07	0.935	0.444	($7,817,149)	($155,961,687)
13	($17,605,717)	0.07	0.935	0.415	($7,305,747)	($163,267,434)
14	($17,605,717)	0.07	0.935	0.388	($6,827,801)	($170,095,234)
15	($17,605,717)	0.07	0.935	0.362	($6,381,122)	($176,476,356)
16	($17,605,717)	0.07	0.935	0.339	($5,963,665)	($182,440,022)
17	($17,605,717)	0.07	0.935	0.317	($5,573,519)	($188,013,541)
18	($17,605,717)	0.07	0.935	0.296	($5,208,896)	($193,222,437)
19	($17,605,717)	0.07	0.935	0.277	($4,868,127)	($198,090,565)
20	($17,605,717)	0.07	0.935	0.258	($4,549,652)	($202,640,217)

OLD

Capacity (TEU)	1505
Average Speed (knots)	23.5
Crew Size	30
Construction/Acquisition Costs	$1,540,000
Daily Operating Costs ($/day)	$32,917
Overhaul every 5 years	$1,000,000

Year n	Cash Flow CF	Discount Rate i	K 1/(1+i)	PV factor PVFn=(PVFn-1)*Kn	PV PV=CFn*PVFn	NPV Sum of PVn's
0	($1,540,000)	0.07	0.935	0.000	($1,540,000)	($1,540,000)
1	($12,014,705)	0.07	0.935	0.935	($11,228,696)	($12,768,696)
2	($12,014,705)	0.07	0.935	0.873	($10,494,109)	($23,262,805)
3	($12,014,705)	0.07	0.935	0.816	($9,807,578)	($33,070,383)
4	($12,014,705)	0.07	0.935	0.763	($9,165,961)	($42,236,344)
5	($13,014,705)	0.07	0.935	0.713	($9,279,305)	($51,515,649)
6	($12,014,705)	0.07	0.935	0.666	($8,005,905)	($59,521,554)
7	($12,014,705)	0.07	0.935	0.623	($7,482,154)	($67,003,708)
8	($12,014,705)	0.07	0.935	0.582	($6,992,668)	($73,996,376)
9	($12,014,705)	0.07	0.935	0.544	($6,535,203)	($80,531,580)
10	($13,014,705)	0.07	0.935	0.508	($6,616,016)	($87,147,596)
11	($12,014,705)	0.07	0.935	0.475	($5,708,100)	($92,855,696)
12	($12,014,705)	0.07	0.935	0.444	($5,334,673)	($98,190,368)
13	($12,014,705)	0.07	0.935	0.415	($4,985,675)	($103,176,044)
14	($12,014,705)	0.07	0.935	0.388	($4,659,510)	($107,835,553)
15	($13,014,705)	0.07	0.935	0.362	($4,717,128)	($112,552,681)
16	($12,014,705)	0.07	0.935	0.339	($4,069,796)	($116,622,478)
17	($12,014,705)	0.07	0.935	0.317	($3,803,548)	($120,426,026)
18	($12,014,705)	0.07	0.935	0.296	($3,554,718)	($123,980,743)
19	($12,014,705)	0.07	0.935	0.277	($3,322,166)	($127,302,909)
20	($13,014,705)	0.07	0.935	0.258	($3,363,247)	($130,666,156)

Fixed 8%

New

Capacity (TEU)	1970
Average Speed (knots)	23
Crew Size	14
Construction/Acquisition Costs	$129,000,000
Daily Operating Costs ($/day)	$19,265
annual loan payments	$10,573,992

Year n	Cash Flow CF	Discount Rate i	K 1/(1+i)	PV factor PVFn=(PVFn-1)*Kn	PV PV=CFn*PVFn	NPV Sum of PVn's
0	($16,125,000)	0.08	0.926	0.000	($16,125,000)	($16,125,000)
1	($17,605,717)	0.08	0.926	0.926	($16,301,590)	($32,426,590)
2	($17,605,717)	0.08	0.926	0.857	($15,094,065)	($47,520,654)
3	($17,605,717)	0.08	0.926	0.794	($13,975,986)	($61,496,640)
4	($17,605,717)	0.08	0.926	0.735	($12,940,728)	($74,437,368)
5	($17,605,717)	0.08	0.926	0.681	($11,982,155)	($86,419,523)
6	($17,605,717)	0.08	0.926	0.630	($11,094,588)	($97,514,111)
7	($17,605,717)	0.08	0.926	0.583	($10,272,767)	($107,786,878)
8	($17,605,717)	0.08	0.926	0.540	($9,511,821)	($117,298,699)
9	($17,605,717)	0.08	0.926	0.500	($8,807,242)	($126,105,941)
10	($17,605,717)	0.08	0.926	0.463	($8,154,853)	($134,260,794)
11	($17,605,717)	0.08	0.926	0.429	($7,550,790)	($141,811,584)
12	($17,605,717)	0.08	0.926	0.397	($6,991,472)	($148,803,057)
13	($17,605,717)	0.08	0.926	0.368	($6,473,586)	($155,276,642)
14	($17,605,717)	0.08	0.926	0.340	($5,994,061)	($161,270,703)
15	($17,605,717)	0.08	0.926	0.315	($5,550,056)	($166,820,759)
16	($17,605,717)	0.08	0.926	0.292	($5,138,941)	($171,959,700)
17	($17,605,717)	0.08	0.926	0.270	($4,758,279)	($176,717,979)
18	($17,605,717)	0.08	0.926	0.250	($4,405,814)	($181,123,793)
19	($17,605,717)	0.08	0.926	0.232	($4,079,457)	($185,203,250)
20	($17,605,717)	0.08	0.926	0.215	($3,777,275)	($188,980,525)

OLD

Capacity (TEU)	1505
Average Speed (knots)	23.5
Crew Size	30
Construction/Acquisition Costs	$1,540,000
Daily Operating Costs ($/day)	$32,917
Overhaul every 5 years	$1,000,000

Year n	Cash Flow CF	Discount Rate i	K 1/(1+i)	PV factor PVFn=(PVFn-1)*Kn	PV PV=CFn*PVFn	NPV Sum of PVn's
0	($1,540,000)	0.08	0.926	0.000	($1,540,000)	($1,540,000)
1	($12,014,705)	0.08	0.926	0.926	($11,124,727)	($12,664,727)
2	($12,014,705)	0.08	0.926	0.857	($10,300,673)	($22,965,400)
3	($12,014,705)	0.08	0.926	0.794	($9,537,660)	($32,503,060)
4	($12,014,705)	0.08	0.926	0.735	($8,831,167)	($41,334,227)
5	($13,014,705)	0.08	0.926	0.681	($8,857,590)	($50,191,816)
6	($12,014,705)	0.08	0.926	0.630	($7,571,302)	($57,763,119)
7	($12,014,705)	0.08	0.926	0.583	($7,010,465)	($64,773,584)
8	($12,014,705)	0.08	0.926	0.540	($6,491,171)	($71,264,755)
9	($12,014,705)	0.08	0.926	0.500	($6,010,344)	($77,275,099)
10	($13,014,705)	0.08	0.926	0.463	($6,028,327)	($83,303,425)
11	($12,014,705)	0.08	0.926	0.429	($5,152,901)	($88,456,326)
12	($12,014,705)	0.08	0.926	0.397	($4,771,205)	($93,227,531)
13	($12,014,705)	0.08	0.926	0.368	($4,417,782)	($97,645,313)
14	($12,014,705)	0.08	0.926	0.340	($4,090,539)	($101,735,852)
15	($13,014,705)	0.08	0.926	0.315	($4,102,778)	($105,838,630)
16	($12,014,705)	0.08	0.926	0.292	($3,506,978)	($109,345,608)
17	($12,014,705)	0.08	0.926	0.270	($3,247,202)	($112,592,809)
18	($12,014,705)	0.08	0.926	0.250	($3,006,668)	($115,599,478)
19	($12,014,705)	0.08	0.926	0.232	($2,783,952)	($118,383,430)
20	($13,014,705)	0.08	0.926	0.215	($2,792,282)	($121,175,711)

Fixed 9%

New

Capacity (TEU)	1970
Average Speed (knots)	23
Crew Size	14
Construction/Acquisition Costs	$129,000,000
Daily Operating Costs ($/day)	$19,265
annual loan payments	$10,573,992

Year n	Cash Flow CF	Discount Rate i	K 1/(1+i)	PV factor PVFn=(PVFn-1)*Kn	PV PV=CFn*PVFn	NPV Sum of PVn's
0	($16,125,000)	0.09	0.917	0.000	($16,125,000)	($16,125,000)
1	($17,605,717)	0.09	0.917	0.917	($16,152,034)	($32,277,034)
2	($17,605,717)	0.09	0.917	0.842	($14,818,380)	($47,095,414)
3	($17,605,717)	0.09	0.917	0.772	($13,594,844)	($60,690,258)
4	($17,605,717)	0.09	0.917	0.708	($12,472,334)	($73,162,591)
5	($17,605,717)	0.09	0.917	0.650	($11,442,508)	($84,605,099)
6	($17,605,717)	0.09	0.917	0.596	($10,497,714)	($95,102,813)
7	($17,605,717)	0.09	0.917	0.547	($9,630,930)	($104,733,743)
8	($17,605,717)	0.09	0.917	0.502	($8,835,716)	($113,569,459)
9	($17,605,717)	0.09	0.917	0.460	($8,106,161)	($121,675,620)
10	($17,605,717)	0.09	0.917	0.422	($7,436,845)	($129,112,465)
11	($17,605,717)	0.09	0.917	0.388	($6,822,794)	($135,935,259)
12	($17,605,717)	0.09	0.917	0.356	($6,259,444)	($142,194,703)
13	($17,605,717)	0.09	0.917	0.326	($5,742,609)	($147,937,312)
14	($17,605,717)	0.09	0.917	0.299	($5,268,449)	($153,205,760)
15	($17,605,717)	0.09	0.917	0.275	($4,833,439)	($158,039,199)
16	($17,605,717)	0.09	0.917	0.252	($4,434,348)	($162,473,547)
17	($17,605,717)	0.09	0.917	0.231	($4,068,209)	($166,541,756)
18	($17,605,717)	0.09	0.917	0.212	($3,732,302)	($170,274,058)
19	($17,605,717)	0.09	0.917	0.194	($3,424,130)	($173,698,188)
20	($17,605,717)	0.09	0.917	0.178	($3,141,404)	($176,839,592)

OLD

Capacity (TEU)	1505
Average Speed (knots)	23.5
Crew Size	30
Construction/Acquisition Costs	$1,540,000
Daily Operating Costs ($/day)	$32,917
Overhaul every 5 years	$1,000,000

Year n	Cash Flow CF	Discount Rate i	K 1/(1+i)	PV factor PVFn=(PVFn-1)*Kn	PV PV=CFn*PVFn	NPV Sum of PVn's
0	($1,540,000)	0.09	0.917	0.000	($1,540,000)	($1,540,000)
1	($12,014,705)	0.09	0.917	0.917	($11,022,665)	($12,562,665)
2	($12,014,705)	0.09	0.917	0.842	($10,112,537)	($22,675,202)
3	($12,014,705)	0.09	0.917	0.772	($9,277,557)	($31,952,759)
4	($12,014,705)	0.09	0.917	0.708	($8,511,520)	($40,464,279)
5	($13,014,705)	0.09	0.917	0.650	($8,458,665)	($48,922,944)
6	($12,014,705)	0.09	0.917	0.596	($7,163,976)	($56,086,920)
7	($12,014,705)	0.09	0.917	0.547	($6,572,455)	($62,659,375)
8	($12,014,705)	0.09	0.917	0.502	($6,029,775)	($68,689,150)
9	($12,014,705)	0.09	0.917	0.460	($5,531,904)	($74,221,054)
10	($13,014,705)	0.09	0.917	0.422	($5,497,552)	($79,718,606)
11	($12,014,705)	0.09	0.917	0.388	($4,656,093)	($84,374,699)
12	($12,014,705)	0.09	0.917	0.356	($4,271,645)	($88,646,344)
13	($12,014,705)	0.09	0.917	0.326	($3,918,940)	($92,565,284)
14	($12,014,705)	0.09	0.917	0.299	($3,595,358)	($96,160,642)
15	($13,014,705)	0.09	0.917	0.275	($3,573,032)	($99,733,674)
16	($12,014,705)	0.09	0.917	0.252	($3,026,141)	($102,759,815)
17	($12,014,705)	0.09	0.917	0.231	($2,776,276)	($105,536,091)
18	($12,014,705)	0.09	0.917	0.212	($2,547,042)	($108,083,133)
19	($12,014,705)	0.09	0.917	0.194	($2,336,736)	($110,419,869)
20	($13,014,705)	0.09	0.917	0.178	($2,322,225)	($112,742,094)

Fixed 10%

New

Capacity (TEU)	1970
Average Speed (knots)	23
Crew Size	14
Construction/Acquisition Costs	$129,000,000
Daily Operating Costs ($/day)	$19,625
annual loan payments	$10,573,992

Year n	Cash Flow CF	Discount Rate i	K 1/(1+i)	PV factor PVFn=(PVFn-1)*Kn	PV PV=CFn*PVFn	NPV Sum of PVn's
0	($16,125,000)	0.10	0.909	0.000	($16,125,000)	($16,125,000)
1	($17,737,117)	0.10	0.909	0.909	($16,124,652)	($32,249,652)
2	($17,737,117)	0.10	0.909	0.826	($14,658,774)	($46,908,426)
3	($17,737,117)	0.10	0.909	0.751	($13,326,159)	($60,234,585)
4	($17,737,117)	0.10	0.909	0.683	($12,114,690)	($72,349,274)
5	($17,737,117)	0.10	0.909	0.621	($11,013,354)	($83,362,628)
6	($17,737,117)	0.10	0.909	0.564	($10,012,140)	($93,374,769)
7	($17,737,117)	0.10	0.909	0.513	($9,101,946)	($102,476,714)
8	($17,737,117)	0.10	0.909	0.467	($8,274,496)	($110,751,210)
9	($17,737,117)	0.10	0.909	0.424	($7,522,269)	($118,273,479)
10	($17,737,117)	0.10	0.909	0.386	($6,838,426)	($125,111,906)
11	($17,737,117)	0.10	0.909	0.350	($6,216,751)	($131,328,657)
12	($17,737,117)	0.10	0.909	0.319	($5,651,592)	($136,980,249)
13	($17,737,117)	0.10	0.909	0.290	($5,137,811)	($142,118,060)
14	($17,737,117)	0.10	0.909	0.263	($4,670,737)	($146,788,797)
15	($17,737,117)	0.10	0.909	0.239	($4,246,125)	($151,034,922)
16	($17,737,117)	0.10	0.909	0.218	($3,860,113)	($154,895,036)
17	($17,737,117)	0.10	0.909	0.198	($3,509,194)	($158,404,230)
18	($17,737,117)	0.10	0.909	0.180	($3,190,176)	($161,594,406)
19	($17,737,117)	0.10	0.909	0.164	($2,900,160)	($164,494,566)
20	($17,737,117)	0.10	0.909	0.149	($2,636,509)	($167,131,076)

OLD

Capacity (TEU)	1505
Average Speed (knots)	23.5
Crew Size	30
Construction/Acquisition Costs	$1,540,000
Daily Operating Costs ($/day)	$32,917
Overhaul every 5 years	$1,000,000

Year n	Cash Flow CF	Discount Rate i	K 1/(1+i)	PV factor PVFn=(PVFn-1)*Kn	PV PV=CFn*PVFn	NPV Sum of PVn's
0	($1,540,000)	0.10	0.909	0.000	($1,540,000)	($1,540,000)
1	($12,014,705)	0.10	0.909	0.909	($10,922,459)	($12,462,459)
2	($12,014,705)	0.10	0.909	0.826	($9,929,508)	($22,391,967)
3	($12,014,705)	0.10	0.909	0.751	($9,026,826)	($31,418,793)
4	($12,014,705)	0.10	0.909	0.683	($8,206,205)	($39,624,998)
5	($13,014,705)	0.10	0.909	0.621	($8,081,108)	($47,706,106)
6	($12,014,705)	0.10	0.909	0.564	($6,781,988)	($54,488,094)
7	($12,014,705)	0.10	0.909	0.513	($6,165,443)	($60,653,537)
8	($12,014,705)	0.10	0.909	0.467	($5,604,949)	($66,258,486)
9	($12,014,705)	0.10	0.909	0.424	($5,095,408)	($71,353,894)
10	($13,014,705)	0.10	0.909	0.386	($5,017,732)	($76,371,626)
11	($12,014,705)	0.10	0.909	0.350	($4,211,081)	($80,582,707)
12	($12,014,705)	0.10	0.909	0.319	($3,828,255)	($84,410,962)
13	($12,014,705)	0.10	0.909	0.290	($3,480,232)	($87,891,194)
14	($12,014,705)	0.10	0.909	0.263	($3,163,847)	($91,055,041)
15	($13,014,705)	0.10	0.909	0.239	($3,115,617)	($94,170,658)
16	($12,014,705)	0.10	0.909	0.218	($2,614,750)	($96,785,408)
17	($12,014,705)	0.10	0.909	0.198	($2,377,045)	($99,162,453)
18	($12,014,705)	0.10	0.909	0.180	($2,160,950)	($101,323,404)
19	($12,014,705)	0.10	0.909	0.164	($1,964,500)	($103,287,904)
20	($13,014,705)	0.10	0.909	0.149	($1,934,553)	($105,222,457)

Fixed 11%

New

Capacity (TEU)	1970
Average Speed (knots)	23
Crew Size	14
Construction/Acquisition Costs	$129,000,000
Daily Operating Costs ($/day)	$19,265
annual loan payments	$10,573,992

Year n	Cash Flow CF	Discount Rate i	K 1/(1+i)	PV factor PVFn=(PVFn-1)*Kn	PV PV=CFn*PVFn	NPV Sum of PVn's
0	($16,125,000)	0.11	0.901	0.000	($16,125,000)	($16,125,000)
1	($17,605,717)	0.11	0.901	0.901	($15,861,006)	($31,986,006)
2	($17,605,717)	0.11	0.901	0.812	($14,289,195)	($46,275,201)
3	($17,605,717)	0.11	0.901	0.731	($12,873,149)	($59,148,350)
4	($17,605,717)	0.11	0.901	0.659	($11,597,431)	($70,745,781)
5	($17,605,717)	0.11	0.901	0.593	($10,448,136)	($81,193,917)
6	($17,605,717)	0.11	0.901	0.535	($9,412,735)	($90,606,652)
7	($17,605,717)	0.11	0.901	0.482	($8,479,942)	($99,086,594)
8	($17,605,717)	0.11	0.901	0.434	($7,639,587)	($106,726,181)
9	($17,605,717)	0.11	0.901	0.391	($6,882,511)	($113,608,692)
10	($17,605,717)	0.11	0.901	0.352	($6,200,460)	($119,809,152)
11	($17,605,717)	0.11	0.901	0.317	($5,586,000)	($125,395,152)
12	($17,605,717)	0.11	0.901	0.286	($5,032,433)	($130,427,585)
13	($17,605,717)	0.11	0.901	0.258	($4,533,723)	($134,961,308)
14	($17,605,717)	0.11	0.901	0.232	($4,084,435)	($139,045,743)
15	($17,605,717)	0.11	0.901	0.209	($3,679,671)	($142,725,415)
16	($17,605,717)	0.11	0.901	0.188	($3,315,019)	($146,040,434)
17	($17,605,717)	0.11	0.901	0.170	($2,986,504)	($149,026,938)
18	($17,605,717)	0.11	0.901	0.153	($2,690,544)	($151,717,482)
19	($17,605,717)	0.11	0.901	0.138	($2,423,914)	($154,141,395)
20	($17,605,717)	0.11	0.901	0.124	($2,183,706)	($156,325,101)

OLD

Capacity (TEU)	1505
Average Speed (knots)	23.5
Crew Size	30
Construction/Acquisition Costs	$1,540,000
Daily Operating Costs ($/day)	$32,917
Overhaul every 5 years	$1,000,000

Year n	Cash Flow CF	Discount Rate i	K 1/(1+i)	PV factor PVFn=(PVFn-1)*Kn	PV PV=CFn*PVFn	NPV Sum of PVn's
0	($1,540,000)	0.11	0.901	0.000	($1,540,000)	($1,540,000)
1	($12,014,705)	0.11	0.901	0.901	($10,824,059)	($12,364,059)
2	($12,014,705)	0.11	0.901	0.812	($9,751,404)	($22,115,463)
3	($12,014,705)	0.11	0.901	0.731	($8,785,049)	($30,900,511)
4	($12,014,705)	0.11	0.901	0.659	($7,914,458)	($38,814,970)
5	($13,014,705)	0.11	0.901	0.593	($7,723,594)	($46,538,564)
6	($12,014,705)	0.11	0.901	0.535	($6,423,552)	($52,962,116)
7	($12,014,705)	0.11	0.901	0.482	($5,786,984)	($58,749,099)
8	($12,014,705)	0.11	0.901	0.434	($5,213,499)	($63,962,598)
9	($12,014,705)	0.11	0.901	0.391	($4,696,846)	($68,659,444)
10	($13,014,705)	0.11	0.901	0.352	($4,583,577)	($73,243,021)
11	($12,014,705)	0.11	0.901	0.317	($3,812,065)	($77,055,087)
12	($12,014,705)	0.11	0.901	0.286	($3,434,293)	($80,489,380)
13	($12,014,705)	0.11	0.901	0.258	($3,093,958)	($83,583,338)
14	($12,014,705)	0.11	0.901	0.232	($2,787,349)	($86,370,687)
15	($13,014,705)	0.11	0.901	0.209	($2,720,130)	($89,090,817)
16	($12,014,705)	0.11	0.901	0.188	($2,262,275)	($91,353,092)
17	($12,014,705)	0.11	0.901	0.170	($2,038,086)	($93,391,178)
18	($12,014,705)	0.11	0.901	0.153	($1,836,113)	($95,227,291)
19	($12,014,705)	0.11	0.901	0.138	($1,654,156)	($96,881,447)
20	($13,014,705)	0.11	0.901	0.124	($1,614,265)	($98,495,712)

Fixed 12%

New

Capacity (TEU)	1970
Average Speed (knots)	23
Crew Size	14
Construction/Acquisition Costs	$129,000,000
Daily Operating Costs ($/day)	$19,265
annual loan payments	$10,573,992

Year n	Cash Flow CF	Discount Rate i	K 1/(1+i)	PV factor PVFn=(PVFn-1)*Kn	PV PV=CFn*PVFn	NPV Sum of PVn's
0	($16,125,000)	0.12	0.893	0.000	($16,125,000)	($16,125,000)
1	($17,605,717)	0.12	0.893	0.893	($15,719,390)	($31,844,390)
2	($17,605,717)	0.12	0.893	0.797	($14,035,170)	($45,879,560)
3	($17,605,717)	0.12	0.893	0.712	($12,531,402)	($58,410,962)
4	($17,605,717)	0.12	0.893	0.636	($11,188,751)	($69,599,713)
5	($17,605,717)	0.12	0.893	0.567	($9,989,957)	($79,589,670)
6	($17,605,717)	0.12	0.893	0.507	($8,919,604)	($88,509,274)
7	($17,605,717)	0.12	0.893	0.452	($7,963,932)	($96,473,206)
8	($17,605,717)	0.12	0.893	0.404	($7,110,654)	($103,583,860)
9	($17,605,717)	0.12	0.893	0.361	($6,348,798)	($109,932,658)
10	($17,605,717)	0.12	0.893	0.322	($5,668,570)	($115,601,228)
11	($17,605,717)	0.12	0.893	0.287	($5,061,223)	($120,662,451)
12	($17,605,717)	0.12	0.893	0.257	($4,518,949)	($125,181,400)
13	($17,605,717)	0.12	0.893	0.229	($4,034,776)	($129,216,176)
14	($17,605,717)	0.12	0.893	0.205	($3,602,479)	($132,818,654)
15	($17,605,717)	0.12	0.893	0.183	($3,216,499)	($136,035,153)
16	($17,605,717)	0.12	0.893	0.163	($2,871,874)	($138,907,027)
17	($17,605,717)	0.12	0.893	0.146	($2,564,173)	($141,471,200)
18	($17,605,717)	0.12	0.893	0.130	($2,289,440)	($143,760,640)
19	($17,605,717)	0.12	0.893	0.116	($2,044,143)	($145,804,783)
20	($17,605,717)	0.12	0.893	0.104	($1,825,128)	($147,629,911)

OLD

Capacity (TEU)	1505
Average Speed (knots)	23.5
Crew Size	30
Construction/Acquisition Costs	$1,540,000
Daily Operating Costs ($/day)	$32,917
Overhaul every 5 years	$1,000,000

Year n	Cash Flow CF	Discount Rate i	K 1/(1+i)	PV factor PVFn=(PVFn-1)*Kn	PV PV=CFn*PVFn	NPV Sum of PVn's
0	($1,540,000)	0.12	0.893	0.000	($1,540,000)	($1,540,000)
1	($12,014,705)	0.12	0.893	0.893	($10,727,415)	($12,267,415)
2	($12,014,705)	0.12	0.893	0.797	($9,578,049)	($21,845,464)
3	($12,014,705)	0.12	0.893	0.712	($8,551,830)	($30,397,294)
4	($12,014,705)	0.12	0.893	0.636	($7,635,562)	($38,032,856)
5	($13,014,705)	0.12	0.893	0.567	($7,384,893)	($45,417,750)
6	($12,014,705)	0.12	0.893	0.507	($6,087,023)	($51,504,773)
7	($12,014,705)	0.12	0.893	0.452	($5,434,842)	($56,939,615)
8	($12,014,705)	0.12	0.893	0.404	($4,852,538)	($61,792,153)
9	($12,014,705)	0.12	0.893	0.361	($4,332,623)	($66,124,776)
10	($13,014,705)	0.12	0.893	0.322	($4,190,387)	($70,315,163)
11	($12,014,705)	0.12	0.893	0.287	($3,453,941)	($73,769,104)
12	($12,014,705)	0.12	0.893	0.257	($3,083,876)	($76,852,979)
13	($12,014,705)	0.12	0.893	0.229	($2,753,460)	($79,606,439)
14	($12,014,705)	0.12	0.893	0.205	($2,458,447)	($82,064,886)
15	($13,014,705)	0.12	0.893	0.183	($2,377,738)	($84,442,624)
16	($12,014,705)	0.12	0.893	0.163	($1,959,859)	($86,402,483)
17	($12,014,705)	0.12	0.893	0.146	($1,749,874)	($88,152,356)
18	($12,014,705)	0.12	0.893	0.130	($1,562,387)	($89,714,744)
19	($12,014,705)	0.12	0.893	0.116	($1,394,989)	($91,109,732)
20	($13,014,705)	0.12	0.893	0.104	($1,349,192)	($92,458,925)

Fixed 13%

New

Capacity (TEU)	1970
Average Speed (knots)	23
Crew Size	14
Construction/Acquisition Costs	$129,000,000
Daily Operating Costs ($/day)	$19,265
annual loan payments	$10,573,992

Year n	Cash Flow CF	Discount Rate i	K 1/(1+i)	PV factor PVFn=(PVFn-1)*Kn	PV PV=CFn*PVFn	NPV Sum of PVn's
0	($16,125,000)	0.13	0.885	0.000	($16,125,000)	($16,125,000)
1	($17,605,717)	0.13	0.885	0.885	($15,580,281)	($31,705,281)
2	($17,605,717)	0.13	0.885	0.783	($13,787,859)	($45,493,139)
3	($17,605,717)	0.13	0.885	0.693	($12,201,645)	($57,694,784)
4	($17,605,717)	0.13	0.885	0.613	($10,797,916)	($68,492,700)
5	($17,605,717)	0.13	0.885	0.543	($9,555,678)	($78,048,378)
6	($17,605,717)	0.13	0.885	0.480	($8,456,352)	($86,504,730)
7	($17,605,717)	0.13	0.885	0.425	($7,483,497)	($93,988,228)
8	($17,605,717)	0.13	0.885	0.376	($6,622,564)	($100,610,792)
9	($17,605,717)	0.13	0.885	0.333	($5,860,676)	($106,471,468)
10	($17,605,717)	0.13	0.885	0.295	($5,186,439)	($111,657,907)
11	($17,605,717)	0.13	0.885	0.261	($4,589,769)	($116,247,676)
12	($17,605,717)	0.13	0.885	0.231	($4,061,743)	($120,309,419)
13	($17,605,717)	0.13	0.885	0.204	($3,594,462)	($123,903,881)
14	($17,605,717)	0.13	0.885	0.181	($3,180,940)	($127,084,821)
15	($17,605,717)	0.13	0.885	0.160	($2,814,991)	($129,899,813)
16	($17,605,717)	0.13	0.885	0.141	($2,491,143)	($132,390,955)
17	($17,605,717)	0.13	0.885	0.125	($2,204,551)	($134,595,507)
18	($17,605,717)	0.13	0.885	0.111	($1,950,930)	($136,546,437)
19	($17,605,717)	0.13	0.885	0.098	($1,726,487)	($138,272,924)
20	($17,605,717)	0.13	0.885	0.087	($1,527,865)	($139,800,788)

OLD

Capacity (TEU)	1505
Average Speed (knots)	23.5
Crew Size	30
Construction/Acquisition Costs	$1,540,000
Daily Operating Costs ($/day)	$32,917
Overhaul every 5 years	$1,000,000

Year n	Cash Flow CF	Discount Rate i	K 1/(1+i)	PV factor PVFn=(PVFn-1)*Kn	PV PV=CFn*PVFn	NPV Sum of PVn's
0	($1,540,000)	0.13	0.885	0.000	($1,540,000)	($1,540,000)
1	($12,014,705)	0.13	0.885	0.885	($10,632,482)	($12,172,482)
2	($12,014,705)	0.13	0.885	0.783	($9,409,276)	($21,581,759)
3	($12,014,705)	0.13	0.885	0.693	($8,326,793)	($29,908,552)
4	($12,014,705)	0.13	0.885	0.613	($7,368,844)	($37,277,396)
5	($13,014,705)	0.13	0.885	0.543	($7,063,860)	($44,341,256)
6	($12,014,705)	0.13	0.885	0.480	($5,770,885)	($50,112,141)
7	($12,014,705)	0.13	0.885	0.425	($5,106,978)	($55,219,120)
8	($12,014,705)	0.13	0.885	0.376	($4,519,450)	($59,738,569)
9	($12,014,705)	0.13	0.885	0.333	($3,999,513)	($63,738,082)
10	($13,014,705)	0.13	0.885	0.295	($3,833,980)	($67,572,063)
11	($12,014,705)	0.13	0.885	0.261	($3,132,205)	($70,704,268)
12	($12,014,705)	0.13	0.885	0.231	($2,771,863)	($73,476,131)
13	($12,014,705)	0.13	0.885	0.204	($2,452,976)	($75,929,108)
14	($12,014,705)	0.13	0.885	0.181	($2,170,775)	($78,099,883)
15	($13,014,705)	0.13	0.885	0.160	($2,080,931)	($80,180,814)
16	($12,014,705)	0.13	0.885	0.141	($1,700,036)	($81,880,850)
17	($12,014,705)	0.13	0.885	0.125	($1,504,456)	($83,385,306)
18	($12,014,705)	0.13	0.885	0.111	($1,331,377)	($84,716,683)
19	($12,014,705)	0.13	0.885	0.098	($1,178,210)	($85,894,893)
20	($13,014,705)	0.13	0.885	0.087	($1,129,446)	($87,024,339)

Fixed 14%

New

Capacity (TEU)	1970
Average Speed (knots)	23
Crew Size	14
Construction/Acquisition Costs	$129,000,000
Daily Operating Costs ($/day)	$19,265
annual loan payments	$10,573,992

Year n	Cash Flow CF	Discount Rate i	K 1/(1+i)	PV factor PVFn=(PVFn-1)*Kn	PV PV=CFn*PVFn	NPV Sum of PVn's
0	($16,125,000)	0.14	0.877	0.000	($16,125,000)	($16,125,000)
1	($17,605,717)	0.14	0.877	0.877	($15,443,611)	($31,568,611)
2	($17,605,717)	0.14	0.877	0.769	($13,547,028)	($45,115,639)
3	($17,605,717)	0.14	0.877	0.675	($11,883,357)	($56,998,996)
4	($17,605,717)	0.14	0.877	0.592	($10,423,998)	($67,422,994)
5	($17,605,717)	0.14	0.877	0.519	($9,143,858)	($76,566,852)
6	($17,605,717)	0.14	0.877	0.456	($8,020,928)	($84,587,780)
7	($17,605,717)	0.14	0.877	0.400	($7,035,902)	($91,623,681)
8	($17,605,717)	0.14	0.877	0.351	($6,171,844)	($97,795,525)
9	($17,605,717)	0.14	0.877	0.308	($5,413,898)	($103,209,423)
10	($17,605,717)	0.14	0.877	0.270	($4,749,033)	($107,958,456)
11	($17,605,717)	0.14	0.877	0.237	($4,165,819)	($112,124,274)
12	($17,605,717)	0.14	0.877	0.208	($3,654,227)	($115,778,501)
13	($17,605,717)	0.14	0.877	0.182	($3,205,462)	($118,983,963)
14	($17,605,717)	0.14	0.877	0.160	($2,811,809)	($121,795,772)
15	($17,605,717)	0.14	0.877	0.140	($2,466,499)	($124,262,271)
16	($17,605,717)	0.14	0.877	0.123	($2,163,596)	($126,425,867)
17	($17,605,717)	0.14	0.877	0.108	($1,897,891)	($128,323,758)
18	($17,605,717)	0.14	0.877	0.095	($1,664,817)	($129,988,574)
19	($17,605,717)	0.14	0.877	0.083	($1,460,365)	($131,448,940)
20	($17,605,717)	0.14	0.877	0.073	($1,281,022)	($132,729,962)

OLD

Capacity (TEU)	1505
Average Speed (knots)	23.5
Crew Size	30
Construction/Acquisition Costs	$1,540,000
Daily Operating Costs ($/day)	$32,917
Overhaul every 5 years	$1,000,000

Year n	Cash Flow CF	Discount Rate i	K 1/(1+i)	PV factor PVFn=(PVFn-1)*Kn	PV PV=CFn*PVFn	NPV Sum of PVn's
0	($1,540,000)	0.14	0.877	0.000	($1,540,000)	($1,540,000)
1	($12,014,705)	0.14	0.877	0.877	($10,539,215)	($12,079,215)
2	($12,014,705)	0.14	0.877	0.769	($9,244,925)	($21,324,140)
3	($12,014,705)	0.14	0.877	0.675	($8,109,584)	($29,433,724)
4	($12,014,705)	0.14	0.877	0.592	($7,113,670)	($36,547,394)
5	($13,014,705)	0.14	0.877	0.519	($6,759,430)	($43,306,824)
6	($12,014,705)	0.14	0.877	0.456	($5,473,738)	($48,780,562)
7	($12,014,705)	0.14	0.877	0.400	($4,801,525)	($53,582,086)
8	($12,014,705)	0.14	0.877	0.351	($4,211,864)	($57,793,950)
9	($12,014,705)	0.14	0.877	0.308	($3,694,617)	($61,488,567)
10	($13,014,705)	0.14	0.877	0.270	($3,510,636)	($64,999,203)
11	($12,014,705)	0.14	0.877	0.237	($2,842,888)	($67,842,091)
12	($12,014,705)	0.14	0.877	0.208	($2,493,761)	($70,335,853)
13	($12,014,705)	0.14	0.877	0.182	($2,187,510)	($72,523,363)
14	($12,014,705)	0.14	0.877	0.160	($1,918,868)	($74,442,231)
15	($13,014,705)	0.14	0.877	0.140	($1,823,314)	($76,265,545)
16	($12,014,705)	0.14	0.877	0.123	($1,476,507)	($77,742,052)
17	($12,014,705)	0.14	0.877	0.108	($1,295,182)	($79,037,234)
18	($12,014,705)	0.14	0.877	0.095	($1,136,124)	($80,173,358)
19	($12,014,705)	0.14	0.877	0.083	($996,600)	($81,169,958)
20	($13,014,705)	0.14	0.877	0.073	($946,972)	($82,116,930)

Fixed 15%

New

Capacity (TEU)	1970
Average Speed (knots)	23
Crew Size	14
Construction/Acquisition Costs	$129,000,000
Daily Operating Costs ($/day)	$19,625
annual loan payments	$10,573,992

Year n	Cash Flow CF	Interest i	K 1/(1+i)	PV factor PVFn=(PVFn-1)*Kn	PV PV=CFn*PVFn	NPV Sum of PVn's
0	($16,125,000)	0.15	0.870	0.000	($16,125,000)	($16,125,000)
1	($17,737,117)	0.15	0.870	0.870	($15,423,580)	($31,548,580)
2	($17,737,117)	0.15	0.870	0.756	($13,411,809)	($44,960,389)
3	($17,737,117)	0.15	0.870	0.658	($11,662,442)	($56,622,831)
4	($17,737,117)	0.15	0.870	0.572	($10,141,254)	($66,764,085)
5	($17,737,117)	0.15	0.870	0.497	($8,818,482)	($75,582,567)
6	($17,737,117)	0.15	0.870	0.432	($7,668,245)	($83,250,812)
7	($17,737,117)	0.15	0.870	0.376	($6,668,039)	($89,918,852)
8	($17,737,117)	0.15	0.870	0.327	($5,798,295)	($95,717,147)
9	($17,737,117)	0.15	0.870	0.284	($5,041,996)	($100,759,142)
10	($17,737,117)	0.15	0.870	0.247	($4,384,344)	($105,143,486)
11	($17,737,117)	0.15	0.870	0.215	($3,812,473)	($108,955,959)
12	($17,737,117)	0.15	0.870	0.187	($3,315,194)	($112,271,153)
13	($17,737,117)	0.15	0.870	0.163	($2,882,777)	($115,153,931)
14	($17,737,117)	0.15	0.870	0.141	($2,506,763)	($117,660,694)
15	($17,737,117)	0.15	0.870	0.123	($2,179,794)	($119,840,488)
16	($17,737,117)	0.15	0.870	0.107	($1,895,473)	($121,735,961)
17	($17,737,117)	0.15	0.870	0.093	($1,648,237)	($123,384,198)
18	($17,737,117)	0.15	0.870	0.081	($1,433,250)	($124,817,448)
19	($17,737,117)	0.15	0.870	0.070	($1,246,304)	($126,063,752)
20	($17,737,117)	0.15	0.870	0.061	($1,083,743)	($127,147,495)

OLD

Capacity (TEU)	1505
Average Speed (knots)	23.5
Crew Size	30
Construction/Acquisition Costs	$1,540,000
Daily Operating Costs ($/day)	$32,917
Overhaul every 5 years	$1,000,000

Year n	Cash Flow CF	Discount Rate i	K 1/(1+i)	PV factor PVFn=(PVFn-1)*Kn	PV PV=CFn*PVFn	NPV Sum of PVn's
0	($1,540,000)	0.15	0.870	0.000	($1,540,000)	($1,540,000)
1	($12,014,705)	0.15	0.870	0.870	($10,447,570)	($11,987,570)
2	($12,014,705)	0.15	0.870	0.756	($9,084,843)	($21,072,413)
3	($12,014,705)	0.15	0.870	0.658	($7,899,864)	($28,972,276)
4	($12,014,705)	0.15	0.870	0.572	($6,869,447)	($35,841,723)
5	($13,014,705)	0.15	0.870	0.497	($6,470,609)	($42,312,331)
6	($12,014,705)	0.15	0.870	0.432	($5,194,289)	($47,506,620)
7	($12,014,705)	0.15	0.870	0.376	($4,516,773)	($52,023,393)
8	($12,014,705)	0.15	0.870	0.327	($3,927,628)	($55,951,021)
9	($12,014,705)	0.15	0.870	0.284	($3,415,329)	($59,366,350)
10	($13,014,705)	0.15	0.870	0.247	($3,217,036)	($62,583,386)
11	($12,014,705)	0.15	0.870	0.215	($2,582,479)	($65,165,865)
12	($12,014,705)	0.15	0.870	0.187	($2,245,634)	($67,411,500)
13	($12,014,705)	0.15	0.870	0.163	($1,952,725)	($69,364,225)
14	($12,014,705)	0.15	0.870	0.141	($1,698,022)	($71,062,247)
15	($13,014,705)	0.15	0.870	0.123	($1,599,435)	($72,661,683)
16	($12,014,705)	0.15	0.870	0.107	($1,283,949)	($73,945,631)
17	($12,014,705)	0.15	0.870	0.093	($1,116,477)	($75,062,108)
18	($12,014,705)	0.15	0.870	0.081	($970,850)	($76,032,958)
19	($12,014,705)	0.15	0.870	0.070	($844,217)	($76,877,175)
20	($13,014,705)	0.15	0.870	0.061	($795,202)	($77,672,377)

Variable increasing 10-15%

New

Capacity (TEU)	1970
Average Speed (knots)	23
Crew Size	14
Construction/Acquisition Costs	$129,000,000
Daily Operating Costs ($/day)	$19,625
annual loan payments	$10,573,992

Year n	Cash Flow CF	Discount Rate i	K 1/(1+i)	PV factor PVFn=(PVFn-1)*Kn	PV PV=CFn*PVFn	NPV Sum of PVn's
0	($16,125,000)	0.1	0.909	0.000	($16,125,000)	($16,125,000)
1	($17,737,117)	0.1025	0.907	0.907	($16,088,088)	($32,213,088)
2	($17,737,117)	0.105	0.905	0.821	($14,559,356)	($46,772,444)
3	($17,737,117)	0.1075	0.903	0.741	($13,146,145)	($59,918,589)
4	($17,737,117)	0.11	0.901	0.668	($11,843,374)	($71,761,963)
5	($17,737,117)	0.1125	0.899	0.600	($10,645,729)	($82,407,692)
6	($17,737,117)	0.115	0.897	0.538	($9,547,739)	($91,955,431)
7	($17,737,117)	0.1175	0.895	0.482	($8,543,838)	($100,499,270)
8	($17,737,117)	0.12	0.893	0.430	($7,628,427)	($108,127,697)
9	($17,737,117)	0.1225	0.891	0.383	($6,795,926)	($114,923,623)
10	($17,737,117)	0.125	0.889	0.341	($6,040,823)	($120,964,446)
11	($17,737,117)	0.1275	0.887	0.302	($5,357,715)	($126,322,161)
12	($17,737,117)	0.13	0.885	0.267	($4,741,340)	($131,063,501)
13	($17,737,117)	0.1325	0.883	0.236	($4,186,614)	($135,250,115)
14	($17,737,117)	0.135	0.881	0.208	($3,688,647)	($138,938,762)
15	($17,737,117)	0.1375	0.879	0.183	($3,242,766)	($142,181,528)
16	($17,737,117)	0.14	0.877	0.160	($2,844,532)	($145,026,060)
17	($17,737,117)	0.1425	0.875	0.140	($2,489,743)	($147,515,803)
18	($17,737,117)	0.145	0.873	0.123	($2,174,448)	($149,690,252)
19	($17,737,117)	0.1475	0.871	0.107	($1,894,944)	($151,585,196)
20	($17,737,117)	0.15	0.870	0.093	($1,647,778)	($153,232,974)

OLD

Capacity (TEU)	1505
Average Speed (knots)	23.5
Crew Size	30
Construction/Acquisition Costs	$1,540,000
Daily Operating Costs ($/day)	$32,917
Overhaul every 5 years	$1,000,000

Year n	Cash Flow CF	Discount Rate i	K 1/(1+i)	PV factor PVFn=(PVFn-1)*Kn	PV PV=CFn*PVFn	NPV Sum of PVn's
0	($1,540,000)	0.1	0.909	0.000	($1,540,000)	($1,540,000)
1	($12,014,705)	0.1025	0.907	0.907	($10,897,692)	($12,437,692)
2	($12,014,705)	0.105	0.905	0.821	($9,862,164)	($22,299,856)
3	($12,014,705)	0.1075	0.903	0.741	($8,904,889)	($31,204,745)
4	($12,014,705)	0.11	0.901	0.668	($8,022,422)	($39,227,167)
5	($13,014,705)	0.1125	0.899	0.600	($7,811,361)	($47,038,528)
6	($12,014,705)	0.115	0.897	0.538	($6,467,414)	($53,505,942)
7	($12,014,705)	0.1175	0.895	0.482	($5,787,395)	($59,293,337)
8	($12,014,705)	0.12	0.893	0.430	($5,167,317)	($64,460,653)
9	($12,014,705)	0.1225	0.891	0.383	($4,603,400)	($69,064,053)
10	($13,014,705)	0.125	0.889	0.341	($4,432,487)	($73,496,540)
11	($12,014,705)	0.1275	0.887	0.302	($3,629,190)	($77,125,730)
12	($12,014,705)	0.13	0.885	0.267	($3,211,672)	($80,337,402)
13	($12,014,705)	0.1325	0.883	0.236	($2,835,914)	($83,173,316)
14	($12,014,705)	0.135	0.881	0.208	($2,498,602)	($85,671,918)
15	($13,014,705)	0.1375	0.879	0.183	($2,379,397)	($88,051,315)
16	($12,014,705)	0.14	0.877	0.160	($1,926,819)	($89,978,134)
17	($12,014,705)	0.1425	0.875	0.140	($1,686,494)	($91,664,627)
18	($12,014,705)	0.145	0.873	0.123	($1,472,920)	($93,137,548)
19	($12,014,705)	0.1475	0.871	0.107	($1,283,591)	($94,421,138)
20	($13,014,705)	0.15	0.870	0.093	($1,209,066)	($95,630,204)

Variable increasing 5-10%

New

Capacity (TEU)	1970
Average Speed (knots)	23
Crew Size	14
Construction/Acquisition Costs	$129,000,000
Daily Operating Costs ($/day)	$19,265
annual loan payments	$10,573,992

Year n	Cash Flow CF	Discount Rate i	K 1/(1+i)	PV factor PVFn=(PVFn-1)*Kn	PV PV=CFn*PVFn	NPV Sum of PVn's
0	($16,125,000)	0.05	0.952	0.000	($16,125,000)	($16,125,000)
1	($17,605,717)	0.0525	0.950	0.950	($16,727,522)	($32,852,522)
2	($17,605,717)	0.055	0.948	0.901	($15,855,471)	($48,707,993)
3	($17,605,717)	0.0575	0.946	0.852	($14,993,353)	($63,701,347)
4	($17,605,717)	0.06	0.943	0.803	($14,144,673)	($77,846,020)
5	($17,605,717)	0.0625	0.941	0.756	($13,312,633)	($91,158,653)
6	($17,605,717)	0.065	0.939	0.710	($12,500,125)	($103,658,778)
7	($17,605,717)	0.0675	0.937	0.665	($11,709,719)	($115,368,497)
8	($17,605,717)	0.07	0.935	0.622	($10,943,663)	($126,312,160)
9	($17,605,717)	0.0725	0.932	0.580	($10,203,881)	($136,516,042)
10	($17,605,717)	0.075	0.930	0.539	($9,491,983)	($146,008,024)
11	($17,605,717)	0.0775	0.928	0.500	($8,809,265)	($154,817,289)
12	($17,605,717)	0.08	0.926	0.463	($8,156,727)	($162,974,016)
13	($17,605,717)	0.0825	0.924	0.428	($7,535,082)	($170,509,098)
14	($17,605,717)	0.085	0.922	0.394	($6,944,776)	($177,453,874)
15	($17,605,717)	0.0875	0.920	0.363	($6,386,001)	($183,839,875)
16	($17,605,717)	0.09	0.917	0.333	($5,858,717)	($189,698,592)
17	($17,605,717)	0.0925	0.915	0.305	($5,362,670)	($195,061,262)
18	($17,605,717)	0.095	0.913	0.278	($4,897,415)	($199,958,677)
19	($17,605,717)	0.0975	0.911	0.253	($4,462,337)	($204,421,014)
20	($17,605,717)	0.1	0.909	0.230	($4,056,670)	($208,477,685)

OLD

Capacity (TEU)	1505
Average Speed (knots)	23.5
Crew Size	30
Construction/Acquisition Costs	$1,540,000
Daily Operating Costs ($/day)	$32,917
Overhaul every 5 years	$1,000,000

Year n	Cash Flow CF	Discount Rate i	K 1/(1+i)	PV factor PVFn=(PVFn-1)*Kn	PV PV=CFn*PVFn	NPV Sum of PVn's
0	($1,540,000)	0.05	0.952	0.000	($1,540,000)	($1,540,000)
1	($12,014,705)	0.0525	0.950	0.950	($11,415,397)	($12,955,397)
2	($12,014,705)	0.055	0.948	0.901	($10,820,281)	($23,775,678)
3	($12,014,705)	0.0575	0.946	0.852	($10,231,944)	($34,007,622)
4	($12,014,705)	0.06	0.943	0.803	($9,652,778)	($43,660,400)
5	($13,014,705)	0.0625	0.941	0.756	($9,841,121)	($53,501,521)
6	($12,014,705)	0.065	0.939	0.710	($8,530,486)	($62,032,007)
7	($12,014,705)	0.0675	0.937	0.665	($7,991,087)	($70,023,094)
8	($12,014,705)	0.07	0.935	0.622	($7,468,306)	($77,491,400)
9	($12,014,705)	0.0725	0.932	0.580	($6,963,455)	($84,454,856)
10	($13,014,705)	0.075	0.930	0.539	($7,016,775)	($91,471,631)
11	($12,014,705)	0.0775	0.928	0.500	($6,011,724)	($97,483,355)
12	($12,014,705)	0.08	0.926	0.463	($5,566,411)	($103,049,766)
13	($12,014,705)	0.0825	0.924	0.428	($5,142,181)	($108,191,948)
14	($12,014,705)	0.085	0.922	0.394	($4,739,338)	($112,931,285)
15	($13,014,705)	0.0875	0.920	0.363	($4,720,735)	($117,652,020)
16	($12,014,705)	0.09	0.917	0.333	($3,998,176)	($121,650,196)
17	($12,014,705)	0.0925	0.915	0.305	($3,659,658)	($125,309,854)
18	($12,014,705)	0.095	0.913	0.278	($3,342,153)	($128,652,007)
19	($12,014,705)	0.0975	0.911	0.253	($3,045,242)	($131,697,249)
20	($13,014,705)	0.1	0.909	0.230	($2,998,820)	($134,696,068)

Variable decreasing 15-10%

New

Capacity (TEU)	1970
Average Speed (knots)	23
Crew Size	14
Construction/Acquisition Costs	$129,000,000
Daily Operating Costs ($/day)	$19,265
annual loan payments	$10,573,992

Year n	Cash Flow CF	Discount Rate i	K 1/(1+i)	PV factor PVFn=(PVFn-1)*Kn	PV PV=CFn*PVFn	NPV Sum of PVn's
0	($16,125,000)	0.15	0.870	0.000	($16,125,000)	($16,125,000)
1	($17,605,717)	0.1475	0.871	0.871	($15,342,673)	($31,467,673)
2	($17,605,717)	0.145	0.873	0.761	($13,399,714)	($44,867,387)
3	($17,605,717)	0.1425	0.875	0.666	($11,728,415)	($56,595,802)
4	($17,605,717)	0.14	0.877	0.584	($10,288,083)	($66,883,885)
5	($17,605,717)	0.1375	0.879	0.514	($9,044,469)	($75,928,354)
6	($17,605,717)	0.135	0.881	0.453	($7,968,695)	($83,897,049)
7	($17,605,717)	0.1325	0.883	0.400	($7,036,375)	($90,933,425)
8	($17,605,717)	0.13	0.885	0.354	($6,226,881)	($97,160,306)
9	($17,605,717)	0.1275	0.887	0.314	($5,522,732)	($102,683,038)
10	($17,605,717)	0.125	0.889	0.279	($4,909,096)	($107,592,134)
11	($17,605,717)	0.1225	0.891	0.248	($4,373,359)	($111,965,493)
12	($17,605,717)	0.12	0.893	0.222	($3,904,785)	($115,870,277)
13	($17,605,717)	0.1175	0.895	0.198	($3,494,215)	($119,364,492)
14	($17,605,717)	0.115	0.897	0.178	($3,133,825)	($122,498,317)
15	($17,605,717)	0.1125	0.899	0.160	($2,816,921)	($125,315,238)
16	($17,605,717)	0.11	0.901	0.144	($2,537,767)	($127,853,005)
17	($17,605,717)	0.1075	0.903	0.130	($2,291,437)	($130,144,442)
18	($17,605,717)	0.105	0.905	0.118	($2,073,699)	($132,218,141)
19	($17,605,717)	0.1025	0.907	0.107	($1,880,906)	($134,099,047)
20	($17,605,717)	0.1	0.909	0.097	($1,709,915)	($135,808,962)

OLD

Capacity (TEU)	1505
Average Speed (knots)	23.5
Crew Size	30
Construction/Acquisition Costs	$1,540,000
Daily Operating Costs ($/day)	$32,917
Overhaul every 5 years	$1,000,000

Year n	Cash Flow CF	Discount Rate i	K 1/(1+i)	PV factor PVFn=(PVFn-1)*Kn	PV PV=CFn*PVFn	NPV Sum of PVn's
0	($1,540,000)	0.15	0.870	0.000	($1,540,000)	($1,540,000)
1	($12,014,705)	0.1475	0.871	0.871	($10,470,331)	($12,010,331)
2	($12,014,705)	0.145	0.873	0.761	($9,144,394)	($21,154,725)
3	($12,014,705)	0.1425	0.875	0.666	($8,003,846)	($29,158,571)
4	($12,014,705)	0.14	0.877	0.584	($7,020,918)	($36,179,489)
5	($13,014,705)	0.1375	0.879	0.514	($6,685,959)	($42,865,447)
6	($12,014,705)	0.135	0.881	0.453	($5,438,093)	($48,303,540)
7	($12,014,705)	0.1325	0.883	0.400	($4,801,848)	($53,105,388)
8	($12,014,705)	0.13	0.885	0.354	($4,249,423)	($57,354,811)
9	($12,014,705)	0.1275	0.887	0.314	($3,768,889)	($61,123,700)
10	($13,014,705)	0.125	0.889	0.279	($3,628,959)	($64,752,659)
11	($12,014,705)	0.1225	0.891	0.248	($2,984,520)	($67,737,180)
12	($12,014,705)	0.12	0.893	0.222	($2,664,750)	($70,401,930)
13	($12,014,705)	0.1175	0.895	0.198	($2,384,564)	($72,786,494)
14	($12,014,705)	0.115	0.897	0.178	($2,138,622)	($74,925,116)
15	($13,014,705)	0.1125	0.899	0.160	($2,082,358)	($77,007,474)
16	($12,014,705)	0.11	0.901	0.144	($1,731,853)	($78,739,327)
17	($12,014,705)	0.1075	0.903	0.130	($1,563,750)	($80,303,077)
18	($12,014,705)	0.105	0.905	0.118	($1,415,159)	($81,718,236)
19	($12,014,705)	0.1025	0.907	0.107	($1,283,591)	($83,001,826)
20	($13,014,705)	0.1	0.909	0.097	($1,264,023)	($84,265,849)

Variable decreasing 10-5%

New

Capacity (TEU)	1970
Average Speed (knots)	23
Crew Size	14
Construction/Acquisition Costs	$129,000,000
Daily Operating Costs ($/day)	$19,265
annual loan payments	$10,573,992

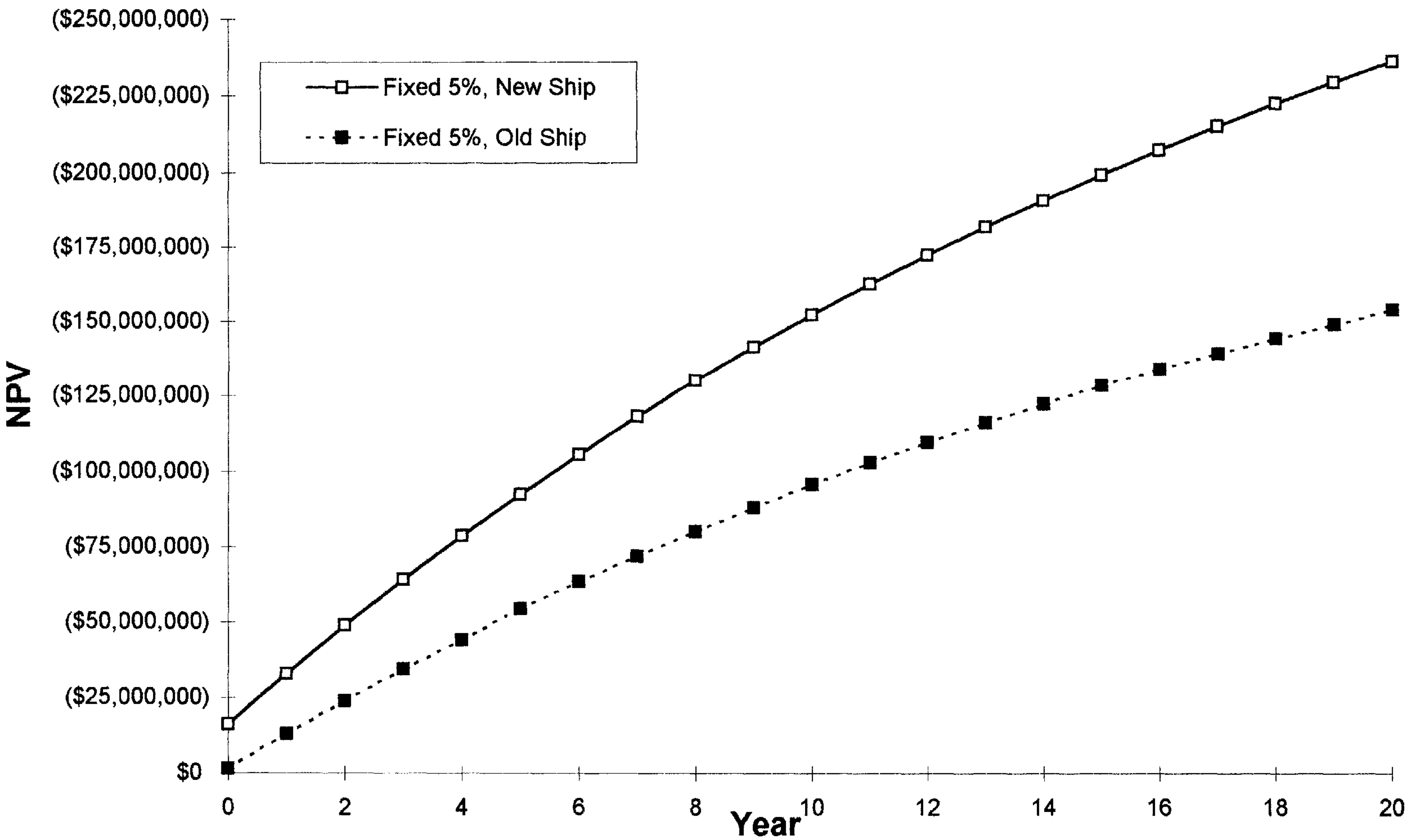
Year n	Cash Flow CF	Discount Rate i	K 1/(1+i)	PV factor PVFn=(PVFn-1)*Kn	PV PV=CFn*PVFn	NPV Sum of PVn's
0	($16,125,000)	0.1	0.909	0.000	($16,125,000)	($16,125,000)
1	($17,605,717)	0.0975	0.911	0.911	($16,041,656)	($32,166,656)
2	($17,605,717)	0.095	0.913	0.832	($14,649,914)	($46,816,569)
3	($17,605,717)	0.0925	0.915	0.762	($13,409,532)	($60,226,101)
4	($17,605,717)	0.09	0.917	0.699	($12,302,323)	($72,528,424)
5	($17,605,717)	0.0875	0.920	0.643	($11,312,481)	($83,840,905)
6	($17,605,717)	0.085	0.922	0.592	($10,426,250)	($94,267,155)
7	($17,605,717)	0.0825	0.924	0.547	($9,631,639)	($103,898,794)
8	($17,605,717)	0.08	0.926	0.507	($8,918,185)	($112,816,979)
9	($17,605,717)	0.0775	0.928	0.470	($8,276,738)	($121,093,717)
10	($17,605,717)	0.075	0.930	0.437	($7,699,291)	($128,793,007)
11	($17,605,717)	0.0725	0.932	0.408	($7,178,826)	($135,971,833)
12	($17,605,717)	0.07	0.935	0.381	($6,709,183)	($142,681,016)
13	($17,605,717)	0.0675	0.937	0.357	($6,284,949)	($148,965,965)
14	($17,605,717)	0.065	0.939	0.335	($5,901,361)	($154,867,326)
15	($17,605,717)	0.0625	0.941	0.315	($5,554,222)	($160,421,547)
16	($17,605,717)	0.06	0.943	0.298	($5,239,832)	($165,661,379)
17	($17,605,717)	0.0575	0.946	0.281	($4,954,924)	($170,616,303)
18	($17,605,717)	0.055	0.948	0.267	($4,696,610)	($175,312,913)
19	($17,605,717)	0.0525	0.950	0.253	($4,462,337)	($179,775,250)
20	($17,605,717)	0.05	0.952	0.241	($4,249,845)	($184,025,095)

OLD

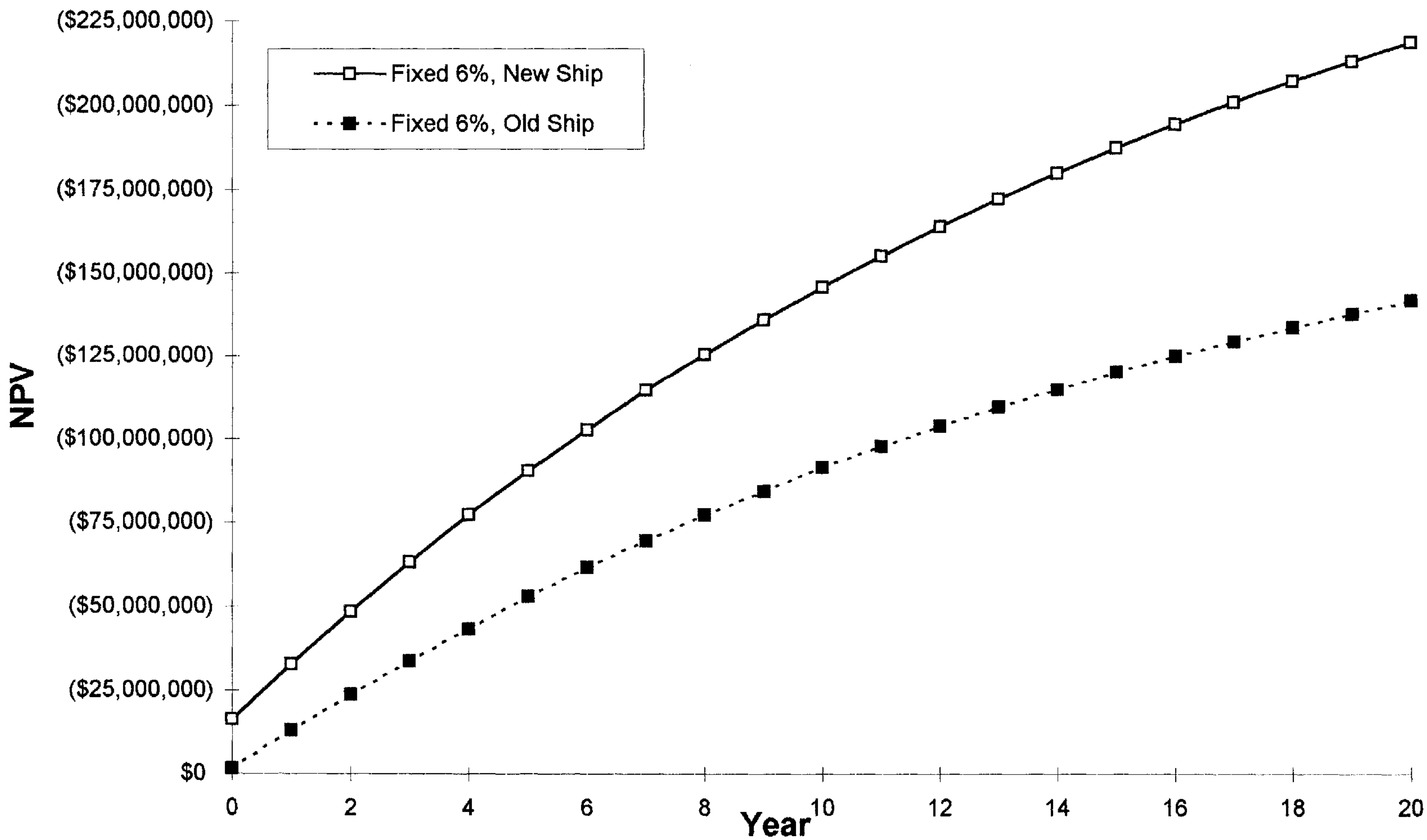
Capacity (TEU)	1505
Average Speed (knots)	23.5
Crew Size	30
Construction/Acquisition Costs	$1,540,000
Daily Operating Costs ($/day)	$32,917
Overhaul every 5 years	$1,000,000

Year n	Cash Flow CF	Discount Rate i	K 1/(1+i)	PV factor PVFn=(PVFn-1)*Kn	PV PV=CFn*PVFn	NPV Sum of PVn's
0	($1,540,000)	0.1	0.909	0.000	($1,540,000)	($1,540,000)
1	($12,014,705)	0.0975	0.911	0.911	($10,947,339)	($12,487,339)
2	($12,014,705)	0.095	0.913	0.832	($9,997,570)	($22,484,910)
3	($12,014,705)	0.0925	0.915	0.762	($9,151,094)	($31,636,004)
4	($12,014,705)	0.09	0.917	0.699	($8,395,499)	($40,031,503)
5	($13,014,705)	0.0875	0.920	0.643	($8,362,545)	($48,394,048)
6	($12,014,705)	0.085	0.922	0.592	($7,115,207)	($55,509,254)
7	($12,014,705)	0.0825	0.924	0.547	($6,572,939)	($62,082,194)
8	($12,014,705)	0.08	0.926	0.507	($6,086,055)	($68,168,248)
9	($12,014,705)	0.0775	0.928	0.470	($5,648,311)	($73,816,559)
10	($13,014,705)	0.075	0.930	0.437	($5,691,560)	($79,508,119)
11	($12,014,705)	0.0725	0.932	0.408	($4,899,061)	($84,407,180)
12	($12,014,705)	0.07	0.935	0.381	($4,578,561)	($88,985,741)
13	($12,014,705)	0.0675	0.937	0.357	($4,289,050)	($93,274,792)
14	($12,014,705)	0.065	0.939	0.335	($4,027,277)	($97,302,069)
15	($13,014,705)	0.0625	0.941	0.315	($4,105,857)	($101,407,926)
16	($12,014,705)	0.06	0.943	0.298	($3,575,829)	($104,983,755)
17	($12,014,705)	0.0575	0.946	0.281	($3,381,399)	($108,365,153)
18	($12,014,705)	0.055	0.948	0.267	($3,205,117)	($111,570,271)
19	($12,014,705)	0.0525	0.950	0.253	($3,045,242)	($114,615,513)
20	($13,014,705)	0.05	0.952	0.241	($3,141,620)	($117,757,133)

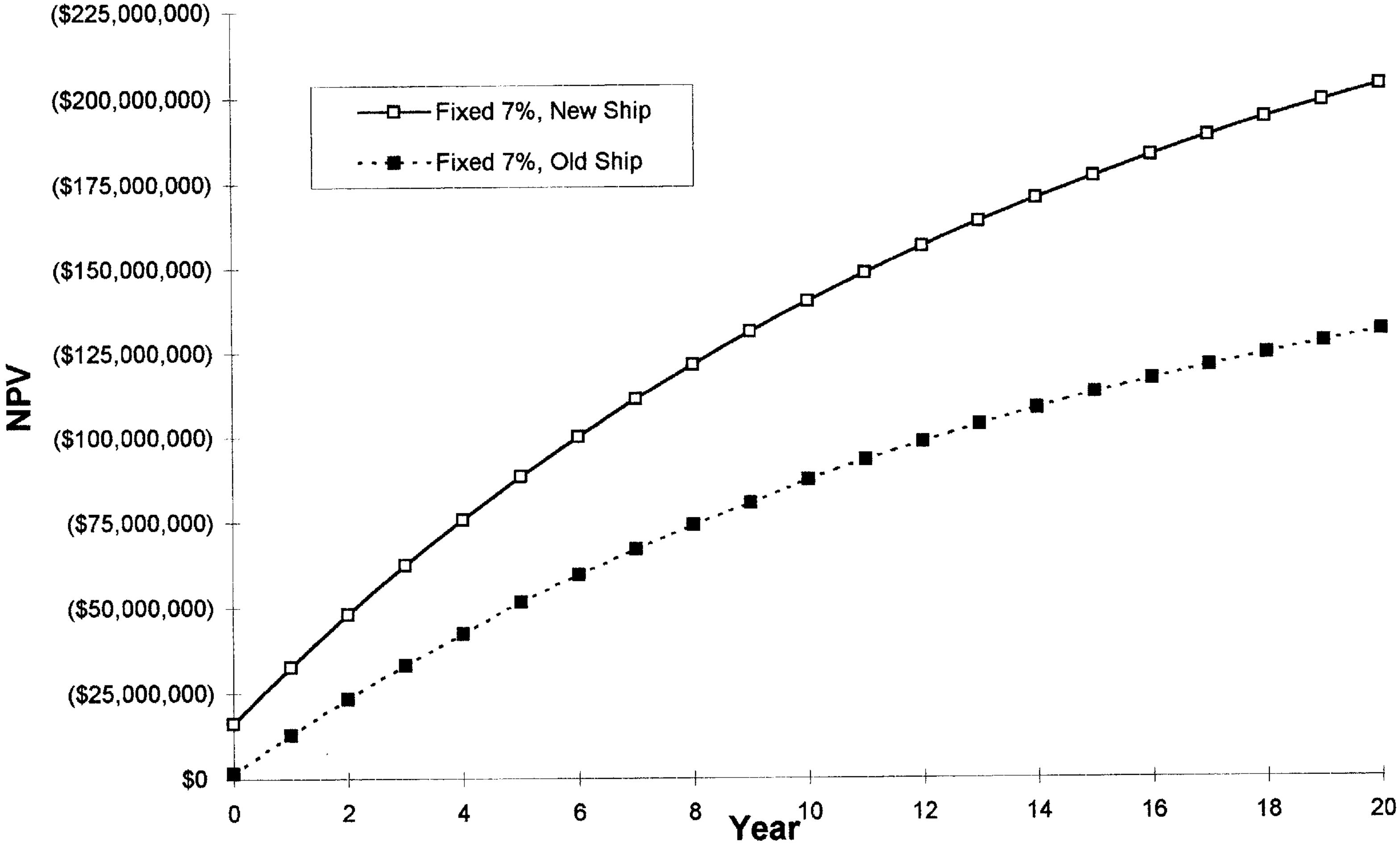
APPENDIX B - Graphs of NPV Results



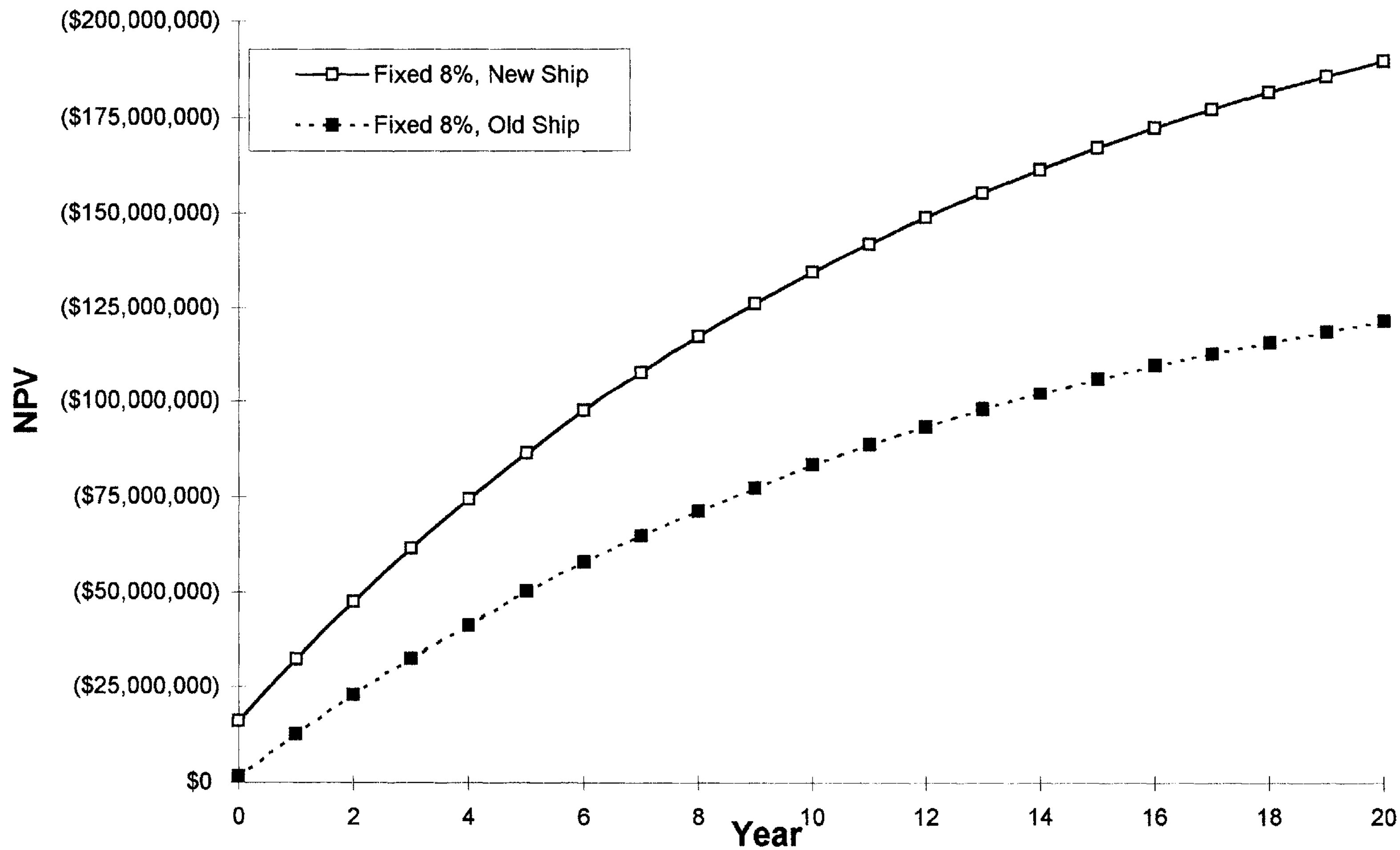
Results of NPV calculations for Fixed 5% Case



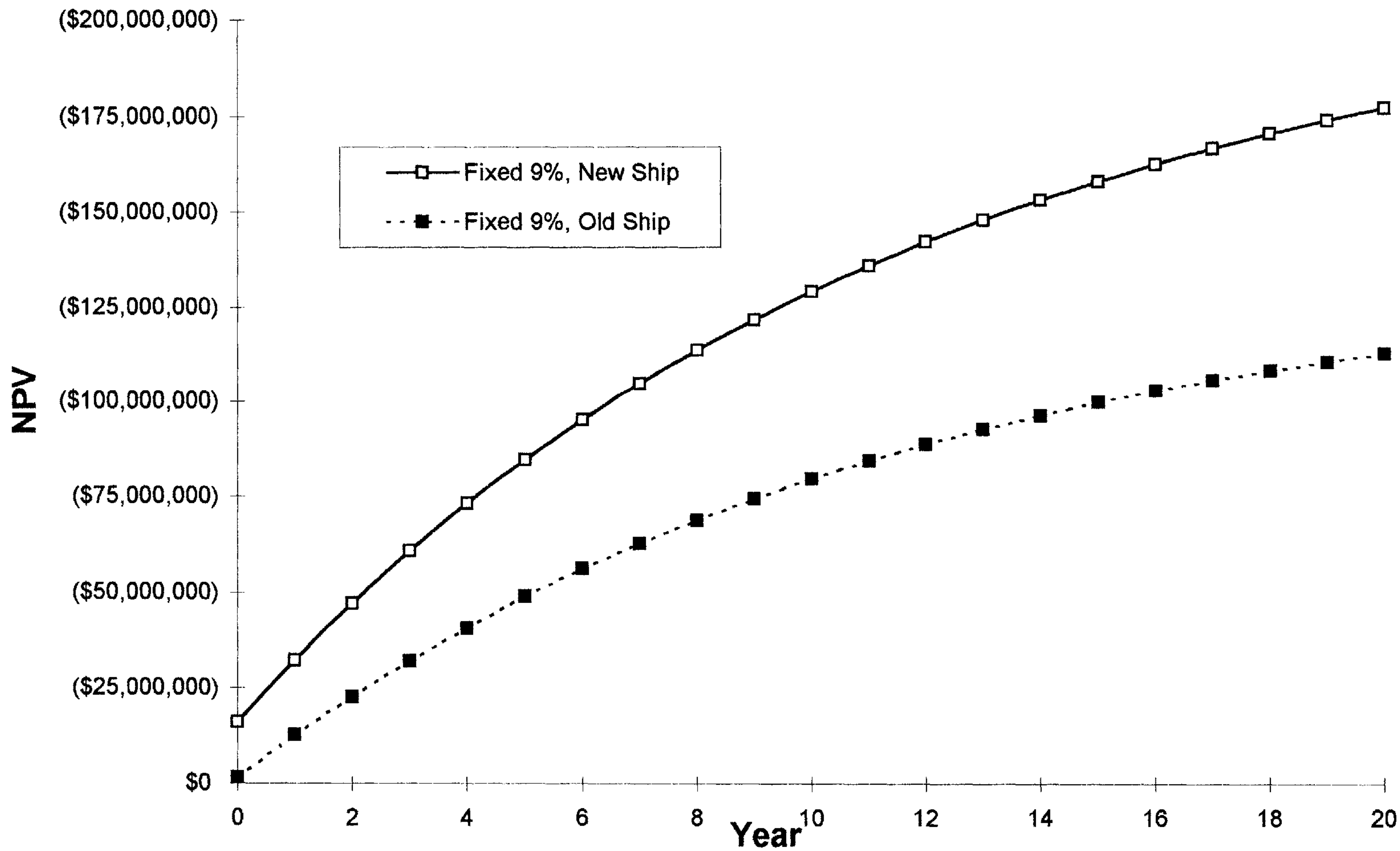
Results of NPV calculations for Fixed 6% Case



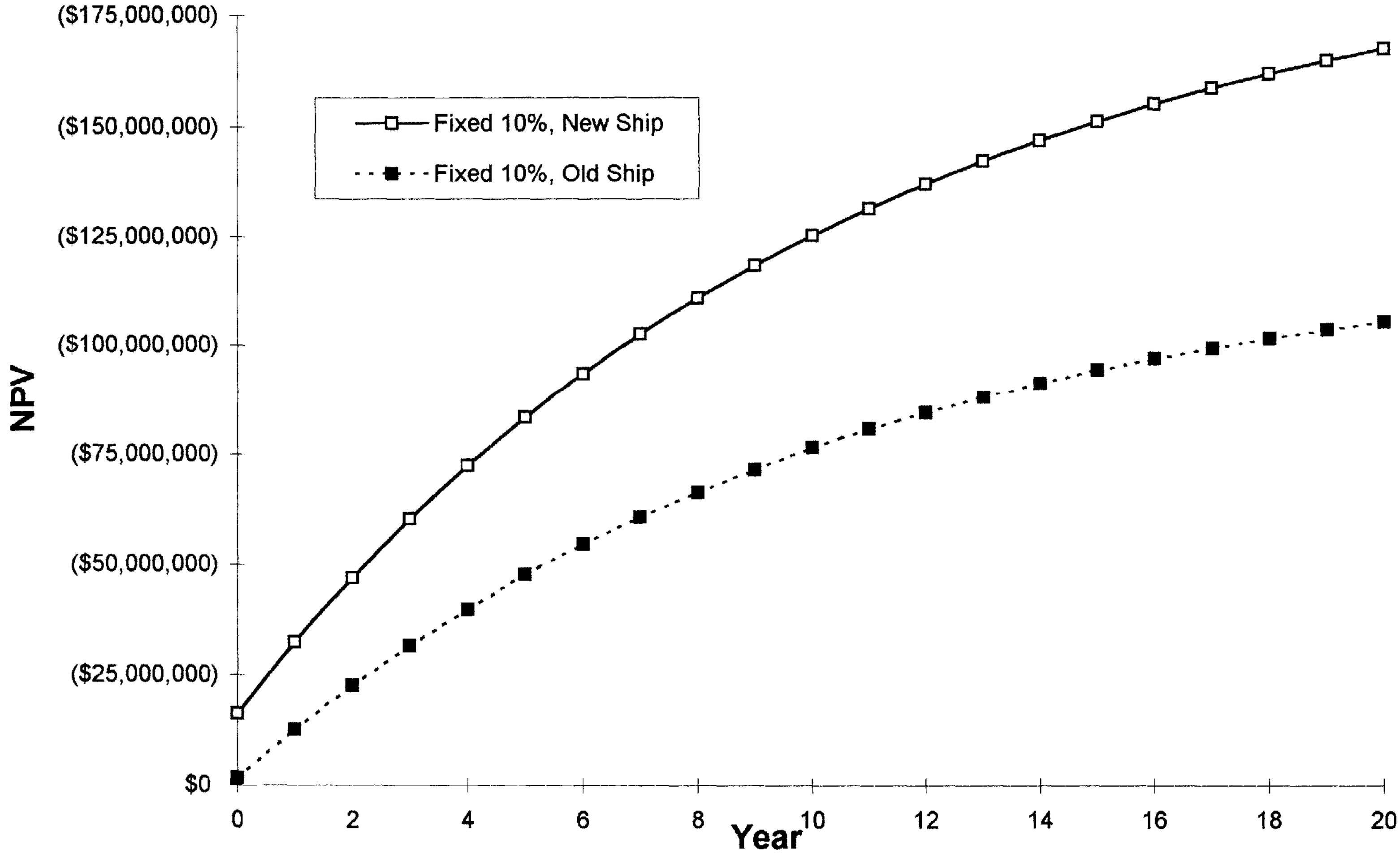
Results of NPV calculations for Fixed 7% Case



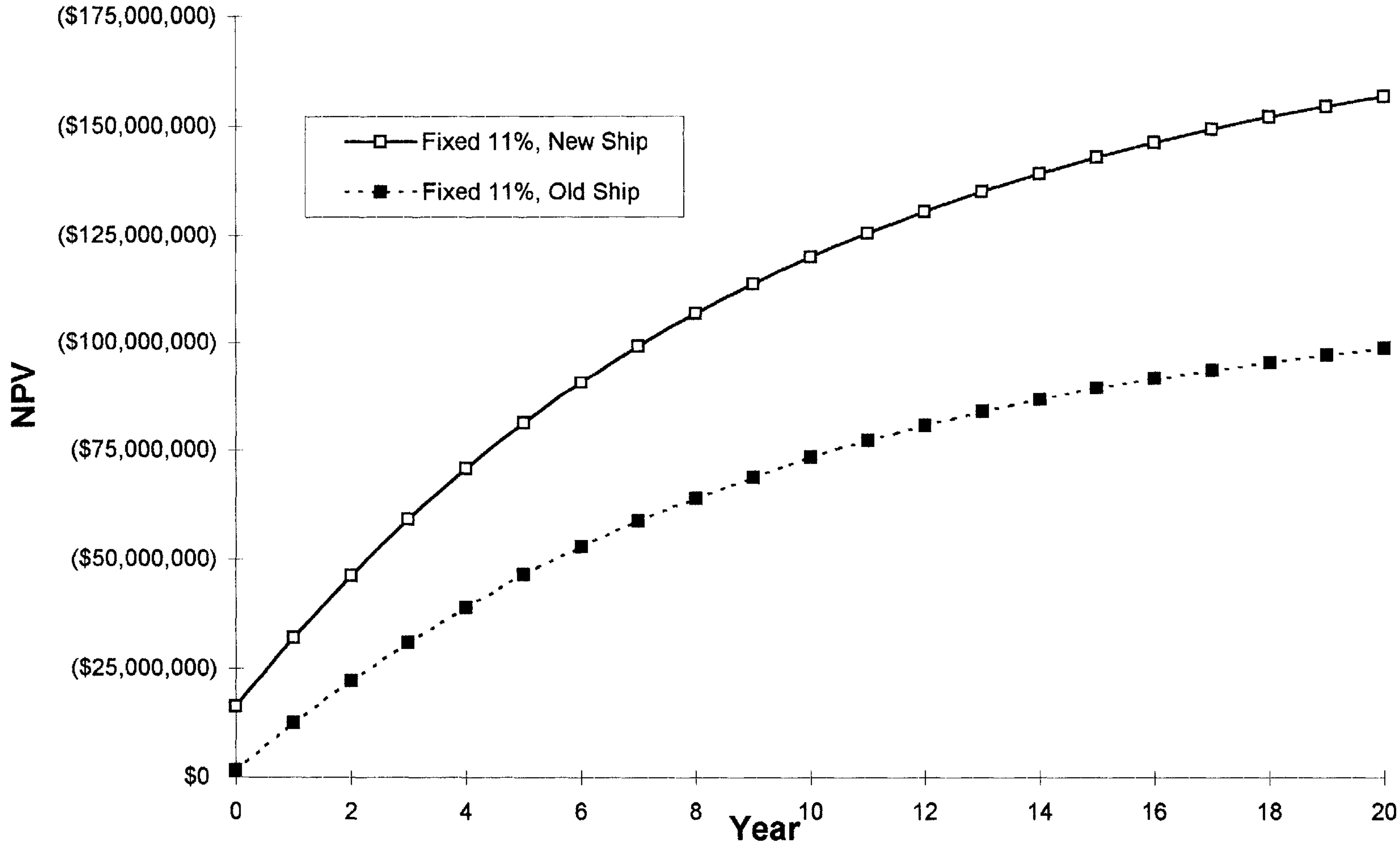
Results of NPV calculations for Fixed 8% Case



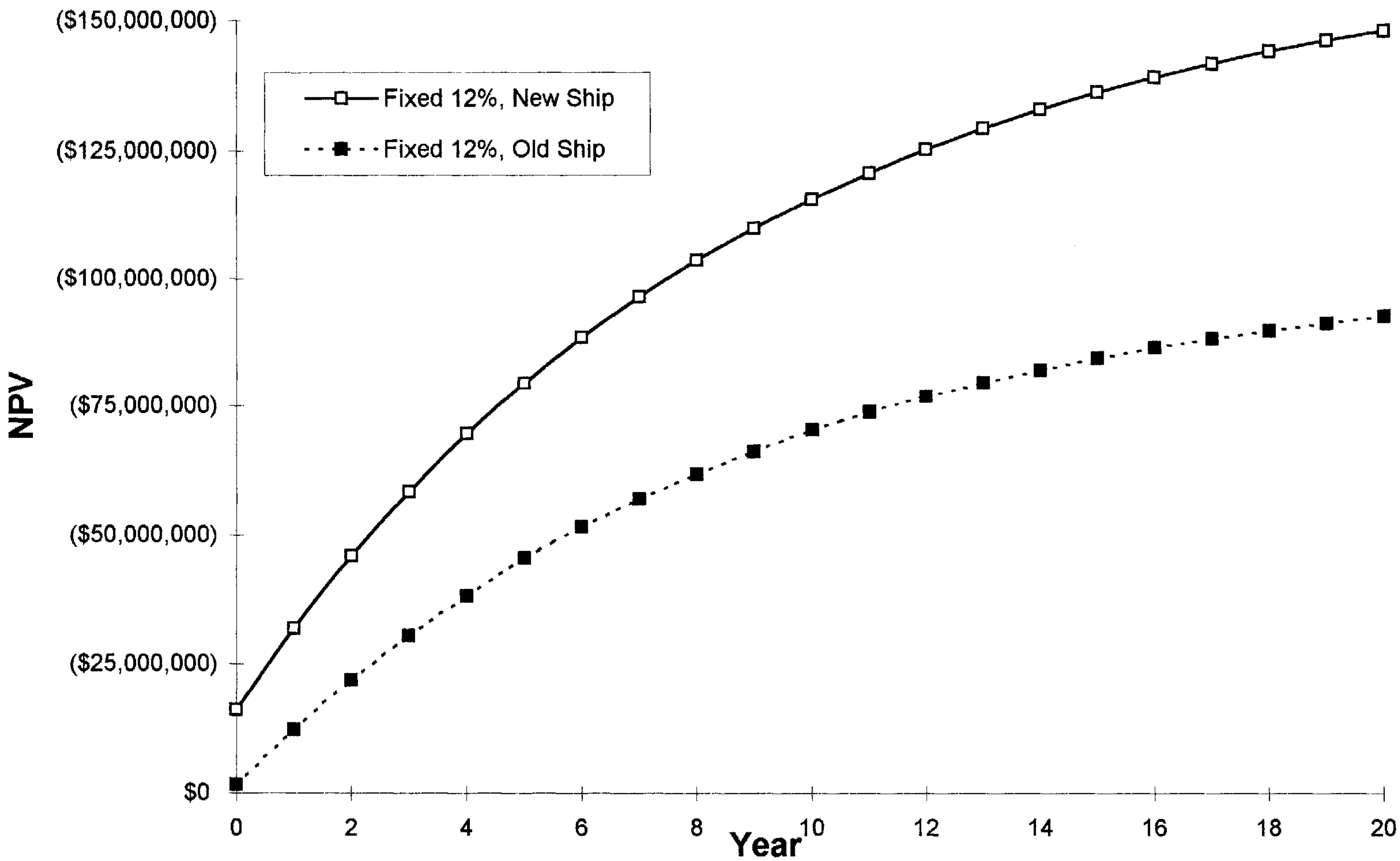
Results of NPV calculations for Fixed 9% Case



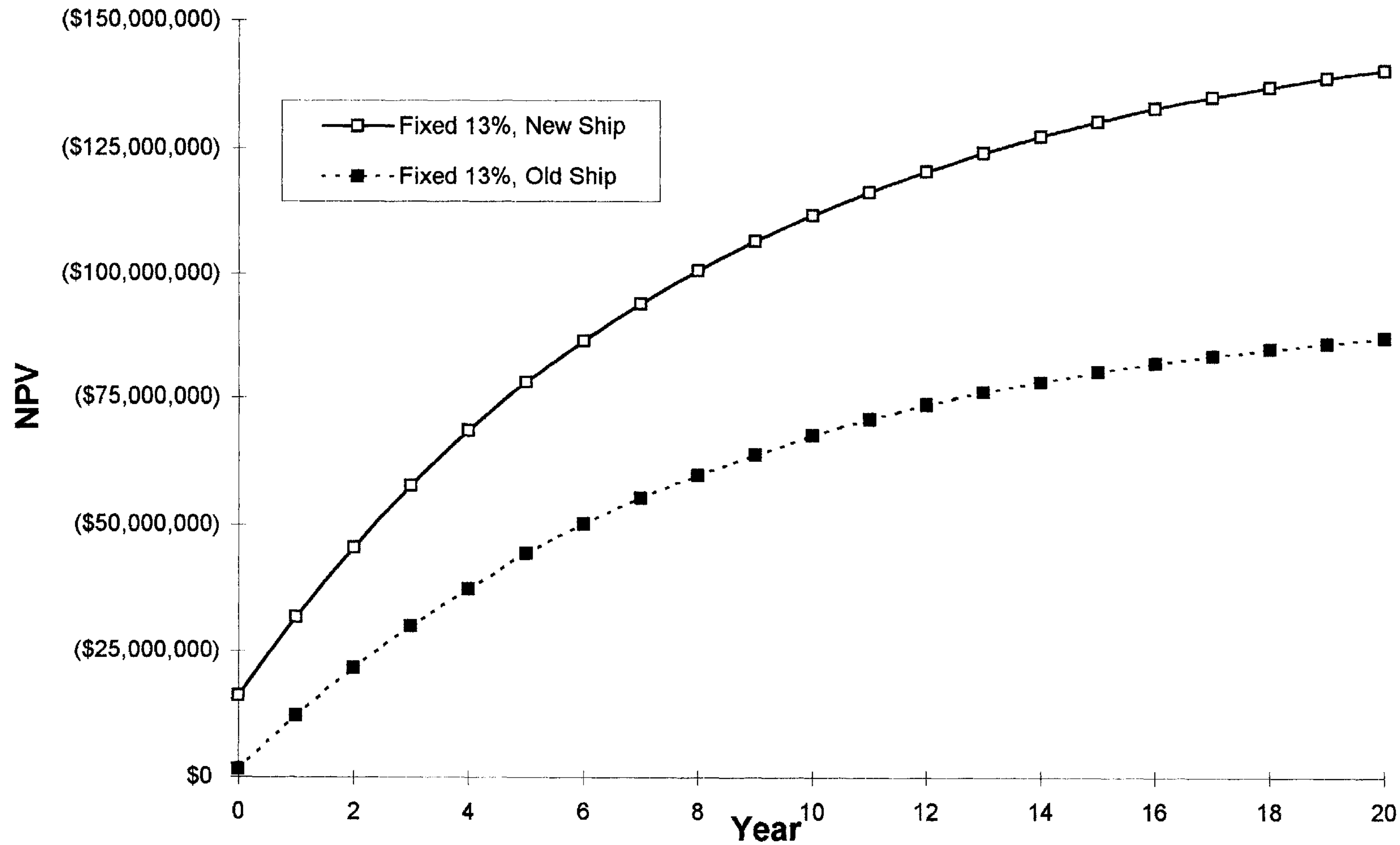
Results of NPV calculations for Fixed 10% Case



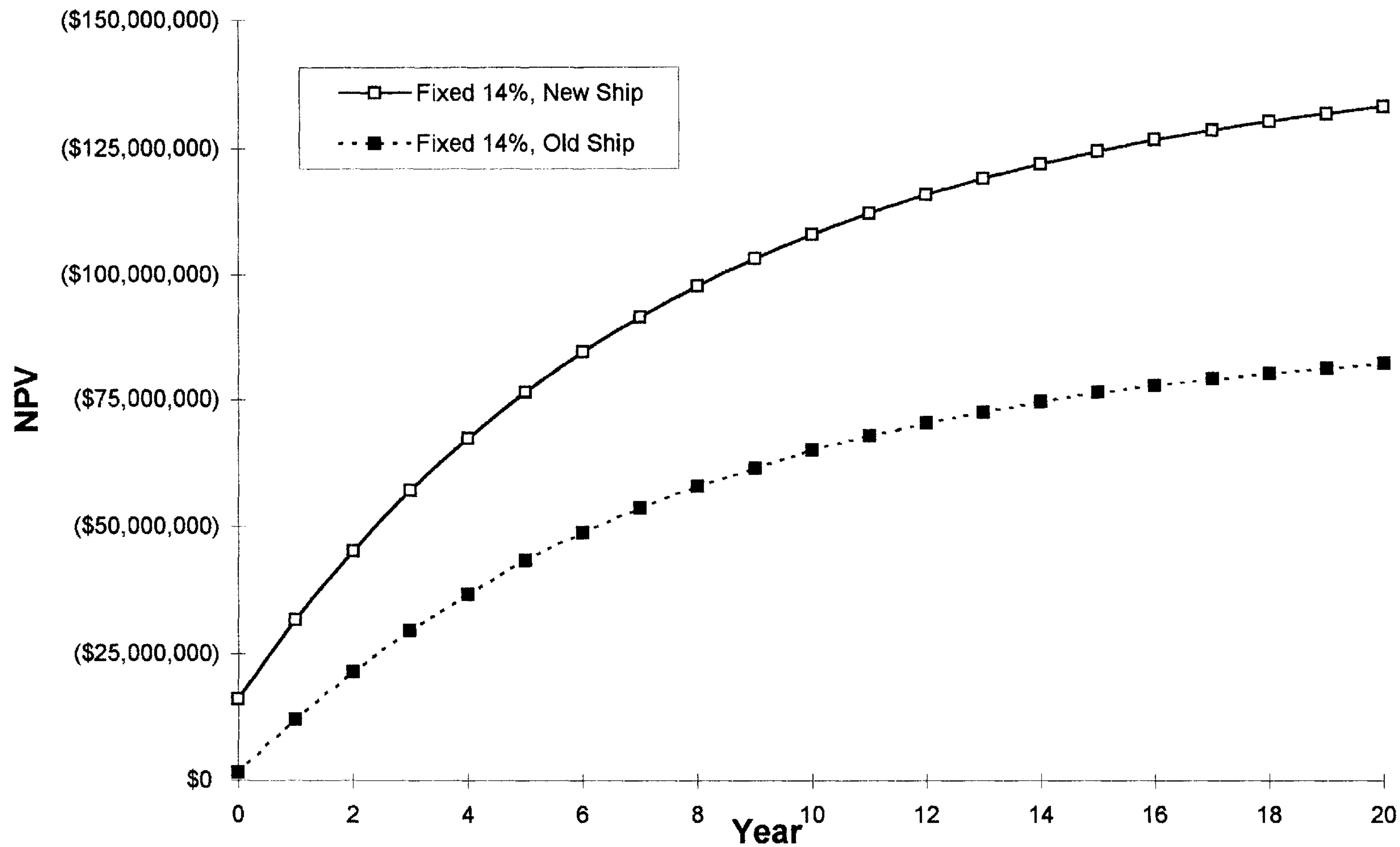
Results of NPV calculations for Fixed 11% Case



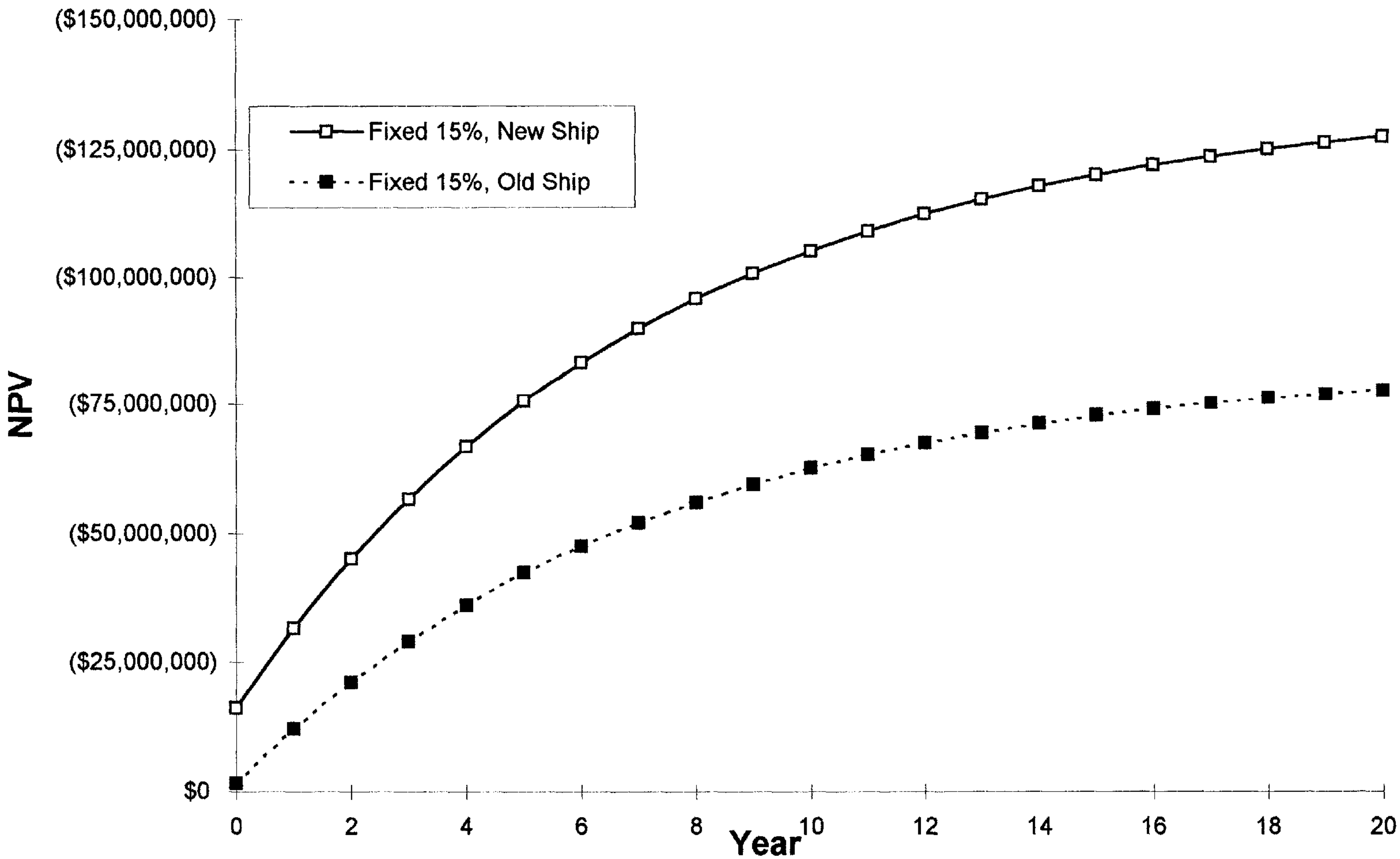
Results of NPV calculations for Fixed 12% Case



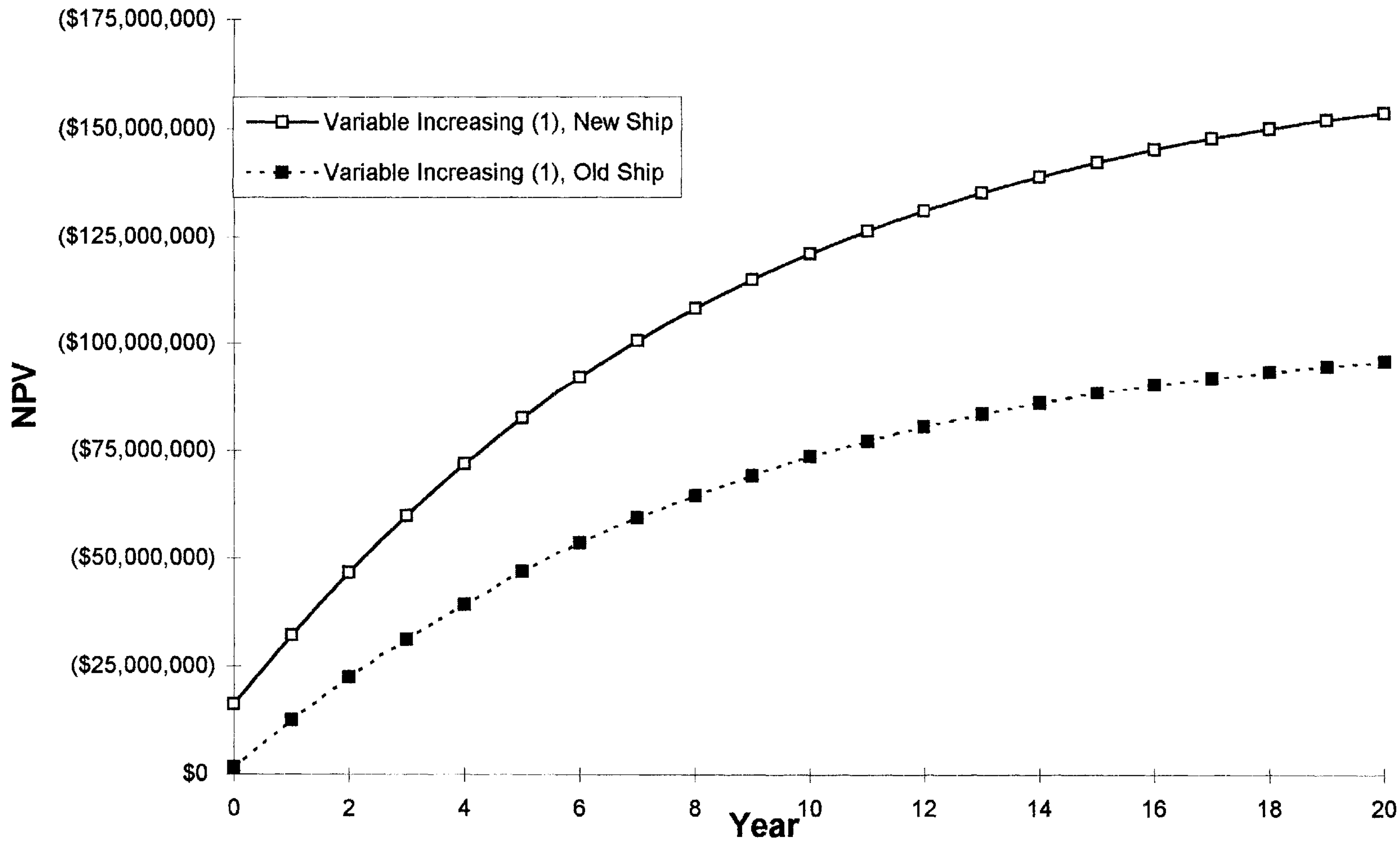
Results of NPV calculations for Fixed 13% Case



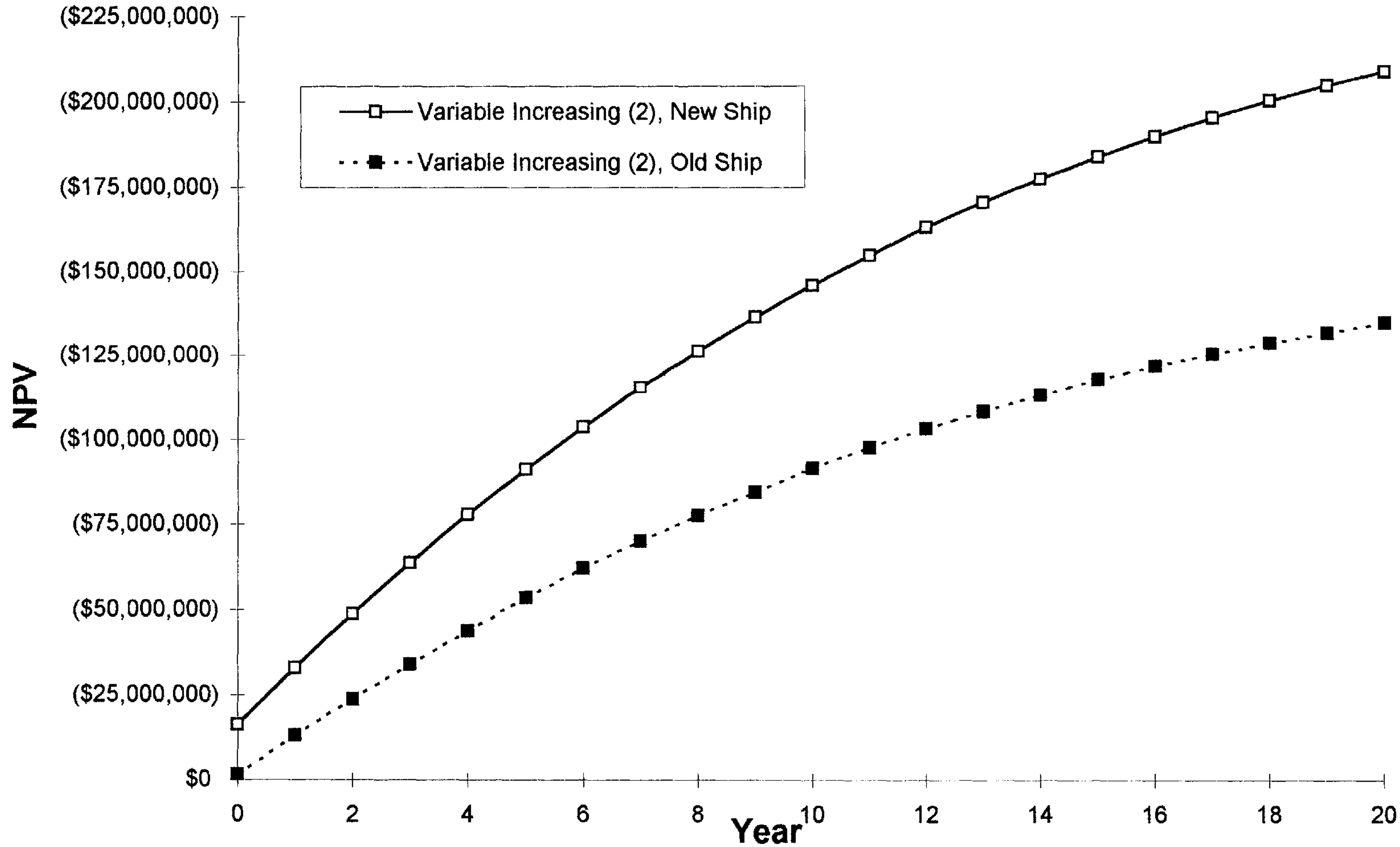
Results of NPV calculations for Fixed 14% Case



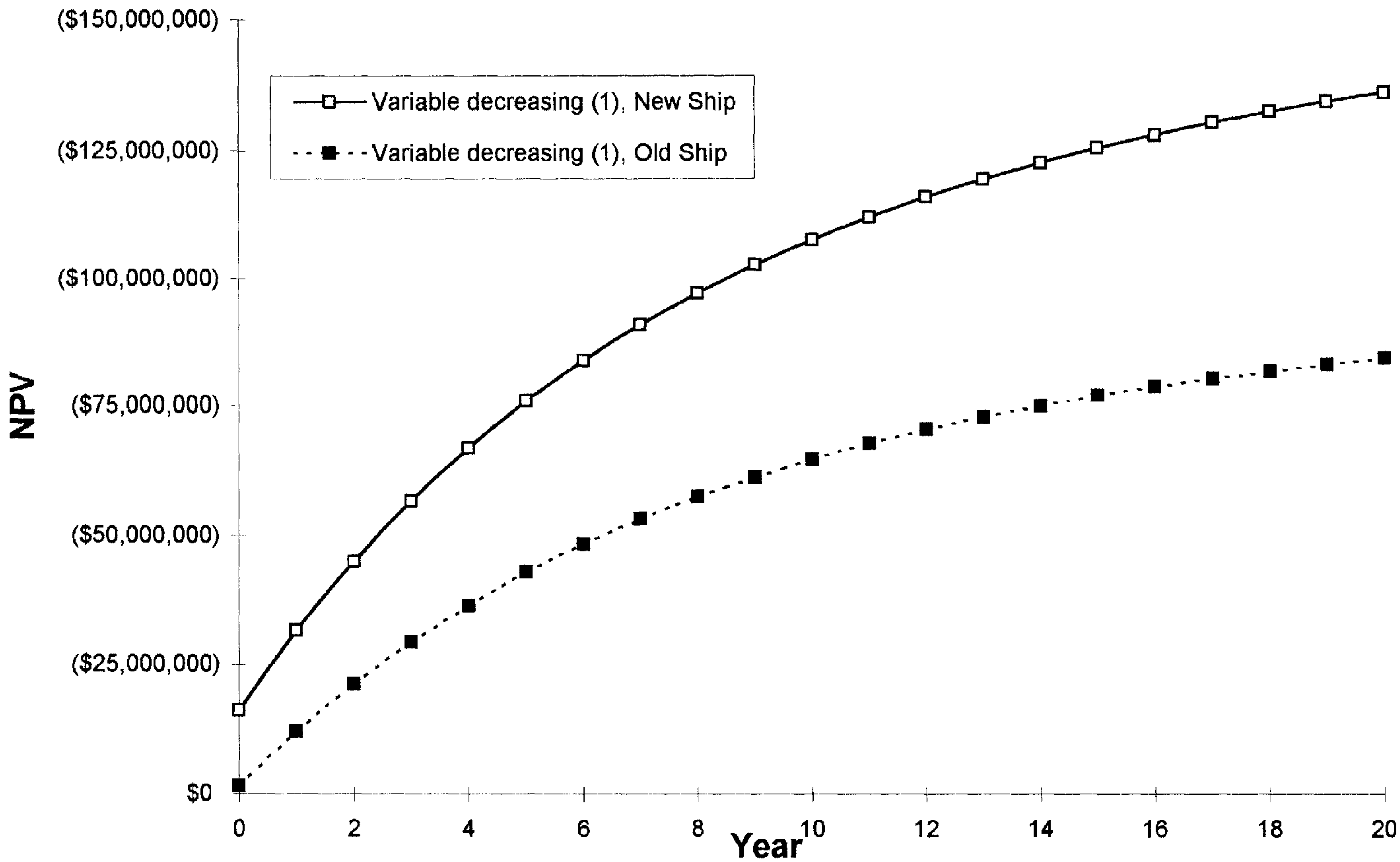
Results of NPV calculations for Fixed 15% Case



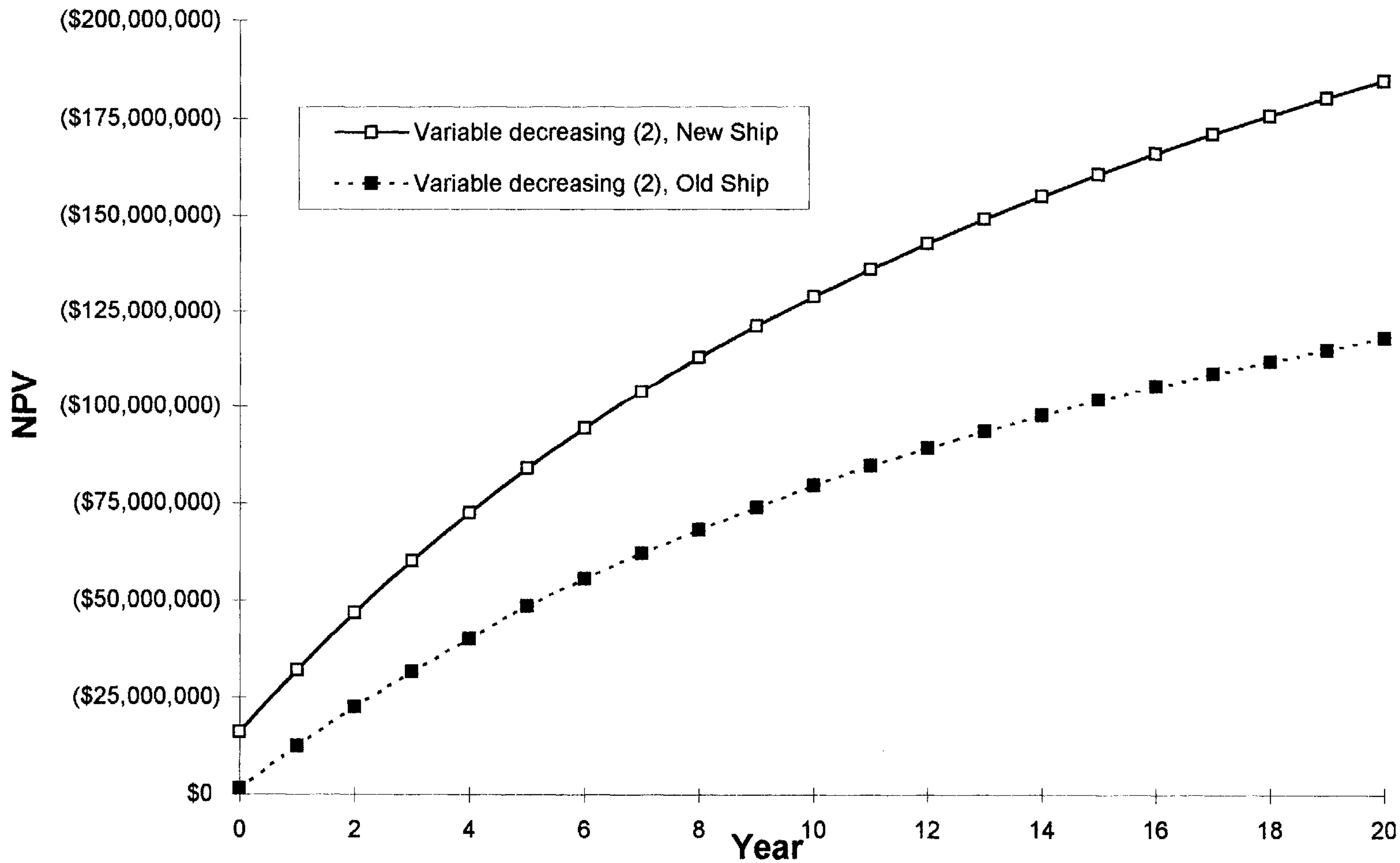
Results of NPV calculations for Variable Increasing (1) Case



Results of NPV calculations for Variable Increasing (2) Case



Results of NPV calculations for Variable decreasing (1) Case



Results of NPV calculations for Variable decreasing (2) Case

APPENDIX C- Calculations for Five Year Life of Old Ship

Original Acquisition

OLD

Capacity (TEU)	1505
Average Speed (knots)	23.5
Crew Size	30
Construction/Acquisition Costs	$1,540,000
Daily Operating Costs ($/day)	$32,917
Discount Rate	0.10

Year n	Cash Flow CF	Discount Rate i	K 1/(1+i)	PV factor PVFn=(PVFn-1)*Kn	PV PV=CFn*PVFn	NPV Sum of PVn's
0	($1,540,000)	0.10	0.909	0.000	($1,540,000)	($1,540,000)
1	($12,014,705)	0.10	0.909	0.909	($10,922,459)	($12,462,459)
2	($12,014,705)	0.10	0.909	0.826	($9,929,508)	($22,391,967)
3	($12,014,705)	0.10	0.909	0.751	($9,026,826)	($31,418,793)
4	($12,014,705)	0.10	0.909	0.683	($8,206,205)	($39,624,998)
5	($12,014,705)	0.10	0.909	0.621	($7,460,187)	($47,085,185)

Equivalent Annuity Payment $ (12,420,953)

$5 million Acquisition

OLD

Capacity (TEU)	1505
Average Speed (knots)	23.5
Crew Size	30
Construction/Acquisition Costs	$5,000,000
Daily Operating Costs ($/day)	$32,917
Discount Rate	0.10

Year n	Cash Flow CF	Discount Rate i	K 1/(1+i)	PV factor PVFn=(PVFn-1)*Kn	PV PV=CFn*PVFn	NPV Sum of PVn's
0	($5,000,000)	0.10	0.909	0.000	($5,000,000)	($5,000,000)
1	($12,014,705)	0.10	0.909	0.909	($10,922,459)	($15,922,459)
2	($12,014,705)	0.10	0.909	0.826	($9,929,508)	($25,851,967)
3	($12,014,705)	0.10	0.909	0.751	($9,026,826)	($34,878,793)
4	($12,014,705)	0.10	0.909	0.683	($8,206,205)	($43,084,998)
5	($12,014,705)	0.10	0.909	0.621	($7,460,187)	($50,545,185)

Equivalent Annuity Payment $ (13,333,692)

$10 million Acquisition

OLD

Capacity (TEU)	1505
Average Speed (knots)	23.5
Crew Size	30
Construction/Acquisition Costs	$10,000,000
Daily Operating Costs ($/day)	$32,917
Discount Rate	0.10

Year n	Cash Flow CF	Discount Rate i	K 1/(1+i)	PV factor PVFn=(PVFn-1)*Kn	PV PV=CFn*PVFn	NPV Sum of PVn's
0	($10,000,000)	0.10	0.909	0.000	($10,000,000)	($10,000,000)
1	($12,014,705)	0.10	0.909	0.909	($10,922,459)	($20,922,459)
2	($12,014,705)	0.10	0.909	0.826	($9,929,508)	($30,851,967)
3	($12,014,705)	0.10	0.909	0.751	($9,026,826)	($39,878,793)
4	($12,014,705)	0.10	0.909	0.683	($8,206,205)	($48,084,998)
5	($12,014,705)	0.10	0.909	0.621	($7,460,187)	($55,545,185)

Equivalent Annuity Payment $ (14,652,680)

$15 million Acquisition

OLD

Capacity (TEU)	1505
Average Speed (knots)	23.5
Crew Size	30
Construction/Acquisition Costs	$15,000,000
Daily Operating Costs ($/day)	$32,917
Discount Rate	0.10

Year n	Cash Flow CF	Discount Rate i	K 1/(1+i)	PV factor PVFn=(PVFn-1)*Kn	PV PV=CFn*PVFn	NPV Sum of PVn's
0	($15,000,000)	0.10	0.909	0.000	($15,000,000)	($15,000,000)
1	($12,014,705)	0.10	0.909	0.909	($10,922,459)	($25,922,459)
2	($12,014,705)	0.10	0.909	0.826	($9,929,508)	($35,851,967)
3	($12,014,705)	0.10	0.909	0.751	($9,026,826)	($44,878,793)
4	($12,014,705)	0.10	0.909	0.683	($8,206,205)	($53,084,998)
5	($12,014,705)	0.10	0.909	0.621	($7,460,187)	($60,545,185)

Equivalent Annuity Payment $ (15,971,667)

$20 million Acquisition

OLD

Capacity (TEU)	1505
Average Speed (knots)	23.5
Crew Size	30
Construction/Acquisition Costs	$20,000,000
Daily Operating Costs ($/day)	$32,917
Discount Rate	0.10

Year n	Cash Flow CF	Discount Rate i	K 1/(1+i)	PV factor PVFn=(PVFn-1)*Kn	PV PV=CFn*PVFn	NPV Sum of PVn's
0	($20,000,000)	0.10	0.909	0.000	($20,000,000)	($20,000,000)
1	($12,014,705)	0.10	0.909	0.909	($10,922,459)	($30,922,459)
2	($12,014,705)	0.10	0.909	0.826	($9,929,508)	($40,851,967)
3	($12,014,705)	0.10	0.909	0.751	($9,026,826)	($49,878,793)
4	($12,014,705)	0.10	0.909	0.683	($8,206,205)	($58,084,998)
5	($12,014,705)	0.10	0.909	0.621	($7,460,187)	($65,545,185)

Equivalent Annuity Payment $ (17,290,655)

$25 million Acquisition

OLD

Capacity (TEU)	1505
Average Speed (knots)	23.5
Crew Size	30
Construction/Acquisition Costs	$25,000,000
Daily Operating Costs ($/day)	$32,917
Discount Rate	0.10

Year n	Cash Flow CF	Discount Rate i	K 1/(1+i)	PV factor PVFn=(PVFn-1)*Kn	PV PV=CFn*PVFn	NPV Sum of PVn's
0	($25,000,000)	0.10	0.909	0.000	($25,000,000)	($25,000,000)
1	($12,014,705)	0.10	0.909	0.909	($10,922,459)	($35,922,459)
2	($12,014,705)	0.10	0.909	0.826	($9,929,508)	($45,851,967)
3	($12,014,705)	0.10	0.909	0.751	($9,026,826)	($54,878,793)
4	($12,014,705)	0.10	0.909	0.683	($8,206,205)	($63,084,998)
5	($12,014,705)	0.10	0.909	0.621	($7,460,187)	($70,545,185)

Equivalent Annuity Payment $ (18,609,642)

$30 million Acquisition

OLD

Capacity (TEU)	1505
Average Speed (knots)	23.5
Crew Size	30
Construction/Acquisition Costs	$30,000,000
Daily Operating Costs ($/day)	$32,917
Discount Rate	0.10

Year n	Cash Flow CF	Discount Rate i	K 1/(1+i)	PV factor PVFn=(PVFn-1)*Kn	PV PV=CFn*PVFn	NPV Sum of PVn's
0	($30,000,000)	0.10	0.909	0.000	($30,000,000)	($30,000,000)
1	($12,014,705)	0.10	0.909	0.909	($10,922,459)	($40,922,459)
2	($12,014,705)	0.10	0.909	0.826	($9,929,508)	($50,851,967)
3	($12,014,705)	0.10	0.909	0.751	($9,026,826)	($59,878,793)
4	($12,014,705)	0.10	0.909	0.683	($8,206,205)	($68,084,998)
5	($12,014,705)	0.10	0.909	0.621	($7,460,187)	($75,545,185)

Equivalent Annuity Payment $ (19,928,629)