Shipbuilding/Repair and Boatbuilding Industry:

Impact of Trade Policy Reforms on Performance, Competitiveness and Structure

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PHILIPPINE INSTITUTE FOR DEVELOPMENT STUDIES

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Abbreviations

AFTA	Asean Free Trade Area
Asean	Association of Southeast Asian Nations
BETP	Bureau of Exports Trade and Promotion
BOI	Board of Investments
BIAP	Boat Industry Association of the Philippines
CCC	canonical correlation coefficient
CIF	cost, insurance, freight
CVA	census value-added
DBP	Development Bank of the Philippines
DRC	domestic resource cost
DRCM	domestic resource cost at market prices
DTI	Department of Trade and Industry
DWT	deadweight tons
EPR	effective protection rate
FRP	fiberglass-reinforced plastic
GRT	gross registered tons
IBRD	International Bank for Reconstruction and Development
ILP	Import Liberalization Program
IPR	import penetration ratio
JICA	Japan International Cooperation Agency
Marina	Maritime Industry Authority
NEDA	National Economic and Development Authority
NSCB	National Statistical Coordination Board
NSO	National Statistics Office
PCM	price-cost margin
PDCP	Private Development Corporation of the Philippines
Philsar	Philippine Shipbuilders and Repairers Association
PSIC	Philippine Standard Industrial Classification

QRs	quantitative restrictions
R&D	research and development
SER	shadow exchange rate
SRA	ship repair afloat
TDP	total domestic production
TEI	technical efficiency index
TRP	Tariff Reform Program
UPSE	University of the Philippines School of Economics

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Introduction

ONE of the primary objectives of the trade reforms implemented in the Philippines during the early 1980s was to adjust the trade protection enjoyed by domestic industries to more uniform levels. These policy revisions were expected to decrease if not eliminate the market distortions caused by the restrictive trade policies of the past decades. Moreover, with the industrial climate becoming conducive to both internal and external competition, improvements in the productivity and international competitiveness of industries will be attained (Kirkpatrick and Maharaj 1992). Successful implementation of such policies, however, are conditioned by market-related and institutional factors which are specific to the industry or which affect all industries.

This paper focuses on the impact of the trade reforms on performance, as measured by efficiency improvements, and competitiveness of the Shipbuilding and Ship Repair (SB/SR) Industry (Philippine Standard Industrial Classification [PSIC] Codes 38412-38419) and its subsector, the Boatbuilding Industry (PSIC Code 38411). Although the boatbuilding industry is a subsector of the SB/SR industry, it is treated separately because of its export potentials and the fact that it received less fiscal incentives than the SB/SR sector. Since the successful implementation of these trade reforms and other industrial policies are affected by market-related and institutional factors, it becomes equally important that these elements be identified in order to come up with the proper policy recommendations needed to neutralize or enhance the impact of these factors. The study will also verify the hypothesis that exposure to foreign competition will lead to improvements in industrial efficiency

via improved access to imported intermediate goods as well as in the level of intra-industry competition. Better access to imported goods will lessen production time, making the firms more productive, which, in turn, enhances competitiveness.

Development of these industries are vital for the country's economic advancement primarily due to their key roles in supporting the shipping industry. The shipping industry accounts for approximately 85 percent of the country's domestic and international trade because of the nation's archipelagic configuration and the underdeveloped aviation industry (Leverage International [Consultants], Inc. 1991). The efficient transport of goods and services across the various islands thus requires a serviceable SB/SR industry. With the present domestic maritime fleet comprised of water vessels, averaging 26 years in age, the sector's development becomes critical. Furthermore, growth of the sector becomes extremely vital if the country desires to become an active member of the Asean Free Trade Area (AFTA). Other economic gains include employment generation, reduction in foreign exchange drainage from the importation of water vessels and freight payments, and support in the advancement of ancillary industries such as iron and steel. Growth of the boatbuilding sector is significant due to its foreign exchange-earning and employment-generating potentials.

The next chapter reviews the body of theoretical and empirical literature relating protection, market structure, and efficiency. Chapter 3 covers the conceptual framework used in the analysis while Chapter 4 details the methodology and defines the terms used in the study. Chapter 5 discusses the current situation of the industry and the government policies which have affected it. Chapter 6 shows and explains the results of the analysis and highlights the factors which may explain the industry's performance. Finally, Chapter 7 summarizes the findings of the study and proffers some policy recommendations.

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Survey of Literature

PAST studies covering the relationship between trade policy reforms and industrial performance focus on how these policy changes lead to reductions in market distortions inherent in restrictive trade regimes. Protectionist policies may result in allocative inefficiencies by causing the promoted sectors to be highly profitable and by shielding domestic producers from competition which may lead to complacency on the part of managers (X-inefficiency) (Tybout, De Melo, and Corbo 1991). Philippine studies focusing on efficiency and industrial policies reveal that the "protection structure induced resource misallocation by favoring the inefficient industries over the efficient ones...,i.e., the export-oriented sectors" (Bautista, Power *et al.* 1979). With trade liberalization, increased import competition and reduced domestic protection will result in a reduction of these inefficiencies.

The diverse literature on the linkages between more open trade regimes and efficiency gains have been the subject of recent surveys in the field (Havrylyshyn 1990, Kirkpatrick and Maharaj 1992, and Tybout 1992). The literature review of Kirkpatrick and Maharaj (1992) partly traces the theoretical evolution from the neoclassical theory of gains from trade liberalization (via the 'import-discipline' hypothesis) to the "new" trade theory which links industrial organization to international economics. What is currently known as the 'new' trade theory was developed by Helpman and Krugman (1985), Dixit and Norman (1980), among others. They incorporated in the analysis the assumptions of imperfect competition, increasing returns to scale and product differentiation. Among their arguments are that the economies of scale will lead to reductions in average costs as the market expands through trade and that incumbent oligopolistic

firms will be forced to adopt competitive prices due to the threat of entry (contestable markets' theory). However, these gains depend on demand shifts accompanying trade liberalization and the nature of the market structure, e.g., ease of entry and exit and the level of intra-industry competition (Kirkpatrick and Maharaj 1992). Power (1986) adds that the existence of barriers to importation and exportation also play a significant role. Other segments of the argument emphasize the role of research and development (R&D) in enhancing productivity and contributing to public knowledge.

Havrylyshyn's survey discloses that empirical studies on developed countries verify the hypothesis that import competition reduces market power, but "weak and ambiguous" findings result from studies on developing countries. He also finds that positive gains result from studies which directly correlate measures of efficiency with trade reforms (Nishimizu and Page 1982) and that time series country-specific studies yield clearer results than cross-country comparisons. Using the efficiency-frontier and domestic resource costs (DRC) methods, Page (1984) finds a significant relationship between technical efficiency and economic performance. Hill and Kalirajan (1991), using a modified version of Farrell's efficiency-frontier methodology, identify export orientation and sources of finance, among others, as closely associated with high levels of technical efficiency, saying that "a policy of export promotion ... will have a significant positive effect on efficiency as firms subject themselves to the discipline of the international market place" (Hill and Kalirajan 1991).

But there are also studies which show skepticism over the empirical proofs presented. Kirkpatrick and Maharaj (1992) assert that the existing theories and empirical evidence supporting trade liberalization are ambiguous and inconsistent. They claim that this indeterminacy stems from the uncertainty of the behavior of firms toward the more open trade policies so that more research must be made at the micro-level to determine how the firms actually respond to the policy changes. They add that the reaction of firms will be "conditioned" by the existing structure of the industry (Kirkpatrick and Maharaj 1992). Page (1984), using data on small and large scale

enterprises of four Indian manufacturing industries, asserts that there is "little evidence of a systematic relationship between firm size and technical efficiency." Rodrik (1992) further adds that current empirical evidences are not as solid as some sectors claim since the effects of other macroeconomic policies are not "disentangled" from that of trade policies proper.

The empirical verifications of the trade liberalization-productivity nexus in the Philippines include the firm-level studies of the Philippine Institute for Development Studies-Tariff Commission (PIDS-TC) on selected manufacturing industries. These studies reveal that there are indeed efficiency gains from the relaxation of trade policies and that further tariff reforms and removal of quantitative restrictions are required for the industries to gain comparative advantage (Tecson 1992). They also recommend that government should consider sector-specific factors like monopolies and the existence of economies of scale in certain industries. Not much emphasis, however, is placed on the industry-specific factors, especially market structure-related variables, which may explain how firms differ in their responses toward the change in policies.

The study on *Barriers to Entry* (1992) by the Sycip, Gorres, Velayo Inc. (SGV) identifies trade and industrial policies as having effectively limited intra-industry competition in some manufacturing industries. The study further asserts that these policy-induced entry barriers have also caused structural barriers, such as excess capacity and limit pricing through rate and price regulation (as in the case of the shipping industry), which had negative effects on the efficiency of some sectors. The report then recommends that 'reforms in the incentive policy scheme, establishment of a central anti-trust authority, and overhaul of the bureaucracy' must be the main components of a competitive policy leading to productivity improvements (SGV 1992).

Numerous studies on the domestic SB/SR industry focus particularly on the technical aspects of ship manufacturing and drydocking (see Marina Technical Notes Series). Other reports delve into the financial viability and future directions of these manufacturing activities (International Bank for Reconstruction and Development or IBRD 1980, Private Development Corporation of

the Philippines or PDCP 1972). A 1972 PDCP study on the shipbuilding sector details the various problems facing the subsector and the government policies affecting it. The 1990 "DBP Industrial Restructuring Studies on the Shipping and Ship Repair Sector" compiles firm-level data on the existing financial, material, and human resources of the two sectors with the view of formulating policies which will help improve efficiency and growth. Another report on the shipbuilding and ship repair sector is presented in the Board of Investments (BOI) *Ten-Year Development Plan for Shipbuilding, Repairing and Breaking Industry* (Leverage International [Consultants] Inc. 1990). The study gives an overview of the structure and performance of the sector in the recent past. It explains that the most important entry and exit barriers for the sector are in the capital, technology, and marketing. As to macroeconomic issues, the report clarifies that the exchange rate fluctuations have the most pronounced impact on the industry since 70 percent of its inputs are imported. Finally, the report gives suggestions on the key issues which the government should address if it decides to assist the sector. The study, however, fails to provide an assessment of the sector's intra-industry level of competition. It is also interesting to note that the problems described in the report are still the same difficulties which the industry faced in the 1970s as described in the 1972 PDCP report.

In a similar vein, studies on the boatbuilding subsector have often centered on the sector's financial viability and future.[1] A case study published by the BOI shows that the problems faced by the industry are also related to the problems of the SB/SR sector. In the product guide on pleasure boats, the Bureau of Exports Trade and Promotion (BETP) of the Department of Trade and Industry (DTI) indicates that the country has been able to penetrate the export market of the United States for sail-propelled boats. Potential export markets are also described in the guide report.

1. Among these include the unpublished thesis of C. Custodio (1992) and the PDCP Study on Boatbuilding (1980).

3

Conceptual Framework

A rationale for trade liberalization, most especially in developing countries, stems from the fact that there are inefficiencies in protected economies. The literature on international trade describes explicitly the numerous 'biases' in resource allocation resulting from tariffs, exchange rate controls, and non-tariff barriers (e.g., quotas) which are inherent in protectionist trade regimes (Krueger 1972). Basically, inefficiencies result as competition from foreign firms is restricted and as monopolistic power results when incumbent firms maintain excess capacity. Although there have been gains in pursuing inward-oriented trade policies, many studies have shown that the costs far outweigh the benefits. A logical consequence of the removal of these trade barriers would then be improvements in welfare and productivity performance.

Industrial Performance

Industrial performance in this study considers efficiency performance or productivity growth at both the firm/plant and industry levels. Specifically, the analysis concentrates on improvements in productivity performance due to *static efficiency* and not technological progress (dynamic).[2] Static efficiency at the plant level can also be further subdivided into (a) *technical efficiency* gains or

2. Microeconomic theory elucidates that efficiency can be analyzed using isoquants and isocost lines. While static efficiency exemplifies the efficient use of resources and managerial expertise which allows plants or firms to reach the least-cost isoquant, technological progress refers to movements in the least-cost isoquant.

maximizing the plant's output, given a particular mix of inputs and technology; and (b) efficiency gains due to the use of the most appropriate technique, given the production environment.

Another type is *allocative efficiency*, referring to the distribution of factors of production into economic activities which will yield the highest returns at undistorted relative prices. At the industry level, allocative efficiency can be illustrated by the gains in efficiency when trade barriers are relaxed, leading to the movement of resources toward the production of goods which are in line with the country's comparative advantage.

To account for how the entire tariff system gives protection to an industry, the effective protection rate (EPR) framework is used. The study employs two measures of efficiency: (a) domestic resource costs (DRC) of foreign exchange; and b) the technical efficiency index (TEI). The DRC is evaluated at shadow prices in order to account for the distortions in product and factor markets inherent in developing economies. Shadow prices are prices reflective of society's valuation of goods. The TEI is based on the works of Farrel (1957) and Aigner, Lovell and Schmidt (1977), and gives a measure of how far plants are from the efficiency frontier. Since higher protection results in inefficiencies, it is presumed that the sector with a low DRC (i.e., more efficient) will also have a low EPR.

Market Structure

Developments in economic theory reveal that the impact of trade liberalization on industrial performance is also influenced by the existing industrial structure. This theory is based on the structure-conduct-performance paradigm which asserts that certain characteristics of the industry condition the behavior of the firms, which then determines their performance within their respective markets.[3] Structural elements and conditions, like the degree of

3. This relationship should not be treated as flowing only in one but rather in many directions. As certain models suggest, the behavior of firms help shape the structure of the industry (Lee 1984).

domestic seller concentration, conditions of entry and exit, existence of economies of scale, and the existence of multinational corporations in the industry, will affect the productivity and efficiency of the firms directly or affect them by way of altering the degree of competition within the industry. Hence, any policy changes (e.g., trade policy reforms) which affect these elements will lead to changes in the performance of the firms.

In particular, entry and exit conditions can determine whether trade policy changes will be successful in promoting efficiency improvements. In industries where barriers to entry and exit are very high or very restrictive, it is theorized that incumbent firms will not have any incentives to innovate or improve efficiency even if faced by greater foreign competition. Policies such as capacity-licensing, prior operator and protection of investment rules (applied to the shipping industry) have successfully limited the number of participants in the industry.[4] Protectionist trade policies have been effective deterrents to entry by way of limiting foreign competition. The existence of structural barriers to entry (i.e., arising from the inherent nature of the industry and actions of incumbents) such as absolute cost advantages, capital requirements, access to distribution channels have also limited entry into the industry.[5]

It is also theorized that industrial concentration will have detrimental effects on the performance of the firms since a market characterized by few sellers will not perform competitively so that output will be limited and prices will not equal their opportunity costs. Moreover, firms in concentrated industries respond differently from their competitive counterparts in making price and output adjustments in response to disturbances (Caves 1980). Albeit such arguments have merits, the real issue is the cause of concentration.[6]

4. See SGV study on *Barriers to Entry* for a listing of these rules.

5. A comprehensive discussion of these elements are presented in the SGV study on *Barriers to Entry.*

6. Rodrik (1990) provides reasons for the high concentration in less developed countries (LDCs).

Let us suppose that the concentration of the industry results from the relative size of the domestic market in comparison with the minimum efficient scale of the technology used in the industry. Then economies of scale imply that an efficient industry will necessarily be a concentrated one (SGV 1992). It can be qualified, however, that since price is greater than marginal costs as output is restricted, firms in the industry exhibit inefficiencies in resource allocation even if they are technically efficient. But if concentration results from direct interventions by the government to promote and protect particular industries, then the inefficiencies cited above may very well result, and the concern becomes real. What is important then is to examine the causes of concentration in the industry and whether the performance of the firms reveal improvements or not.

Industrial Competitiveness

The concern for improvements in efficiency is actually related to the need to become competitive in the marketplace. Competitiveness is rooted on the theory of comparative advantage, which implies that an economy should produce the goods and services which it can produce efficiently relative to other goods and services. Exploitation of this comparative advantage will then lead to the attainment of 'international competitiveness', the ability of firms to compete without government interventions, in both domestic and foreign markets.

Private profitability is implied by competitive advantage while comparative advantage refers to social profitability. Because of market distortions, comparative advantage differs from competitive advantage. A firm or industry may be socially profitable but may not exhibit competitive advantage because of such distortions. One such distortion arises from an overvalued exchange rate which may penalize exporters by lowering their "private" profits.

The most important factors leading to the achievement of international competitiveness include productivity improvements and government policies. Pack and Westphal (1986) argue that

technological effort will lead to substantial productivity gains, allowing firms to become internationally competitive in production. Hence, efforts must be made to enhance the acquisition of technology by industries.

Trade Reforms, Market Structure, and Performance

Trade protection, by increasing the prices of foreign products, will increase profitability of domestic firms, thereby attracting many entrants into the industry. This eventually leads to the proliferation of too many firms producing output at levels below the minimum efficient scale (Kirkpatrick and Maharaj 1992). Hence, the absence of foreign competition allows domestic firms to operate below efficient scale (scale inefficiency) (Rodrik 1988). With more liberal trade policies, market prices will go down, reducing the profitability of the firms, and result in the exit of the inefficient producers. The remaining firms will then produce at higher output levels, which means moving down their average cost curves to coincide with the lower domestic prices and at higher levels of productivity (Kirkpatrick and Maharaj 1992). Rodrik (1988), however, cautions that these will result only under assumptions of free entry and exit and increasing returns to scale.

Where exit and entry is problematic, the case for trade liberalization will depend on the so-called import-discipline hypothesis, which asserts that the challenge brought about by foreign competition will adversely affect the market power of producers, making them change their production and pricing decisions. Increased imports will force these firms to adopt new technologies which will improve efficiency and minimize costs (Nishimizu and Page 1982). Even if demand for domestic goods are restricted, the increased competition due to more liberal trade policies will induce an improvement in production efficiency. An important variation of this theory relevant to the current study is that entry barriers are also prevalent in the input side, which effectively limit entry, especially for small firms which do not have the resources to acquire imported raw

materials efficiently. With trade liberalization, imported raw materials become accessible, leading to productivity improvements.

Another theory focuses on contestable markets where it is argued that, even with high seller concentration (or existence of monopolists or oligopolists), entry and exit barriers (perfect contestability) and quantitative restrictions (QRs) do not block imports, the incumbent sellers will behave as perfect competitors because of the threat of potential competition from imports (Lee 1984).

These gains in trade liberalization will be affected by the structural impediments to resource allocation. In situations where the importers are also major sellers, an increase in imports only result in higher seller concentration (Kirkpatrick and Maharaj 1992). The hypothesized decline in profitability will not materialize if these sellers are able to maintain the level of domestic prices, given the lower cost of imported supplies. Collusive behavior between producers and importers will not lead to the hypothesized efficiency gains theorized in the preceding discussion. In short, the purported benefits from trade liberalization will depend on how the incumbent firms will behave. Rodrik (1988) points out that because of the indeterminacy of oligopolistic market structures, the results will not be clear-cut.

As stated earlier, there are many determinants of the efficient performance of the firms which may or may not be affected by trade policy reforms. These include the forward and backward linkages of the industry, which have remained underdeveloped due to financial and technological constraints (e.g., the local iron and steel industry). Although lower tariff rates may help the SB/SR industry, this may not be enough since the importation activities would require time and financial considerations which may adversely affect the ability of the firms to deliver their services or products and hence their competitiveness.

Albeit demand for repair jobs is more than adequate, demand conditions facing domestic shipbuilders and boat manufacturers have prevented them from exploiting the potential economies of scale from ship or boat construction. The limited domestic demand for ships generally arise from domestic shipping policies which favor ship importation than domestic production and the existence of alternative

markets of ships. Furthermore, the geographic location of the country also determines the activities of the shipyards with countries situated in areas of growing trade and commerce experiencing greater traffic of water vessels and thus, more shipbuilding or repair activities. As for the boatyards, their products are designed to cater to certain segments of the market which require special marketing activities. Another factor which affects the competitiveness of domestic yards, but somewhat unrelated to trade policy changes, is the nature of the infrastructure services in the country.

All these factors will have a bearing on how trade policy reforms will affect the performance of the industry. Basically, this paper will show that the channels, through which trade policy reforms impact on the industry's performance, are mainly through an improvement in its access to non-substitutable imported material inputs and a movement toward greater intra-industry competition. More efficiency gains also result if more "pro-competition" domestic policies exist.

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4

Data Sources and Estimation Methodology

Data Sources

Most of the observations employed in this study were taken from the National Statistics Office (NSO) 1983 and 1988 Census of Large Establishments (i.e., plants employing more than five persons) (*census data*) and the surveys of manufacturing firms belonging to the shipbuilding, ship repair, and boatbuilding sectors for the years 1986 and 1991 (*survey data*). Since the census data are gathered at the plant level, it is possible that two observations may yield similar characteristics if both plants were owned by the same firm. Furthermore, the confidentiality clause in the NSO survey prevented the study group from identifying which plants were operational during the two years. For the survey data, only SB/SR firms registered with the Marina and boatbuilders belonging to the Boating Industries Association of the Philippines (BIAP) were given questionnaires. Only 22 firms (20 SB/SR and two boatbuilders) responded to the questionnaires with 12 of these completely answered. An advantage of this data set is that a comparison of the same set of firms for the two years can be done.

Other data were retrieved from the Marina Offices, BOI and BETP-DTI, PIDS, University of the Philippines School of Economics (UPSE), National Economic and Development Authority (NEDA), Development Bank of the Philippines (DBP), PDCP, National Statistical Coordination Board (NSCB) and Philippine Shipbuilders and Repairers Association (Philsar).

Protection Measures

As the primary measure of the structure of protection, the study uses the EPR framework (Medalla 1986). EPRs are estimated using taxes, import mark-ups, and tariffs, since EPRs based on prices cannot be computed due to insufficient data. EPR calculations consist of identifying the tariff rates, sales taxes and mark-ups for the sectors' products, and material inputs, and using these to estimate their implicit tariff rates (Appendix 12).

Implicit Tariffs

Implicit tariffs measure the "proportional difference between domestic prices and border prices of homogeneous goods" (Medalla 1986) due to the many instruments of protection. The general formula is

$$T = (1 + t)[1 + f(1 + m] - 1$$

where f = advance sales tax which differed between domestic and imported goods. (After 1986, the sales taxes for both goods were made equal);
m = percentage mark-up applied to compute the advance sales tax, f, which was abolished after 1986;
t = representative tariff rate for the sector; and
T = implicit tariff rate.

To come up with the representative tariff rates, the tariff rates for the products are averaged. Ideally, weights based on the elasticities of demand and supply for the goods in question should have been used, but since these cannot be computed given the available data, simple averaging is used for the tariff rates on outputs. Tariff rates for inputs are weighted by their shares in total production based on data obtained from past technical studies (Leverage International [Consultants], Inc. 1990, Custodio 1992). These average tariff rates are then used to compute for the implicit tariffs for outputs and inputs.

Effective Protection Rate (EPR)

The assumptions used by Medalla (1986) are applied in this paper, namely: (a) fixed input coefficients; (b) infinite elasticity of foreign supply of imports; (c) taxes for intermediate inputs credited against the sales taxes on outputs; (d) exporters granted drawbacks on tariff duties as well as taxes on their intermediate inputs; (e) intermediate inputs generally imposed lower tariffs than outputs; and (f) effects of non-tariff barriers excluded.

Basically, the EPR measures the proportionate increase in domestic value added over free trade value added as a result of trade protection (Bautista *et al.* 1979). This can be represented by the formula:

$$EPR = \frac{\sum_j P_{sj}Q_j + E_j - \sum_i \frac{A'_{ij}}{1+s_i} - \sum_i \frac{A_{ij}}{1+f_i(1+m_i)}}{\sum_j \frac{P_{sj}Q_j}{1+N_j} + E_j - \sum_i \frac{A'_{ij}}{(1+s_i)(1+t_i)} - \sum_i \frac{A_{ij}}{1+T_i}} - 1$$

where $P_{sj}Q_j$ = Value of domestic output computed as $(P_{dj}Q_j / (1+s_j))$. $P_{dj}Q_j$ is the value of domestic sales, inclusive of domestic sales tax, s_j

E_j = value of exports of product j in pesos

A'_{ij} = total domestic material inputs cost per annum

s_i = domestic sales tax on material input i

A_{ij} = total imported material inputs cost per year

f_i = advance sales tax on imported material input i. After 1986, this equalled the domestic sales tax for the commodity.

m_i = percentage mark-up applied to compute the advance sales tax, f_i. This became zero after 1986.

N_j = nominal protection rate of product j

t_i = actual tariff rate on input i

T_i = implicit tariff rate on imported input i

Note that the *numerator* of the fraction represents domestic value added with protection while the *denominator* represents free trade value added. Value added is defined as the difference between the value of production and the total cost of material inputs.

Value of domestic sales inclusive of sales taxes ($P_{dj}Q_j$) is calculated by subtracting exports from the total domestic production (TDP) equation:

$$TDP = \sum_j (\Delta FGI + .5\Delta WIPI + TR)$$

so that

$$P_{dj}Q_j = TDP - E_j$$

where ΔFGI = ending inventory of finished goods less beginning inventory of finished goods;
$\Delta WIPI$ = work-in-process ending inventory less work-in-process beginning inventory[7]; and
TR = total revenues from the sales of main products.

Because consumers are not entitled to tax credits, the excess of domestic price over free trade price will include the advance sales tax and the tariffs. Protection on output (N_j) is

$$N_j = \frac{((1 + t_j)[1 + f_j(1 + m_j)])}{(1 + s_j)} - 1$$

where t_j = tariff rate on product j;
f_j = advance sales tax rate, which equalled s_j after 1986;
m_j = mark-up rate; and
s_j = sales tax rate.

7. For 1983, no data were available for the breakdown of inventories so that work-in-process and finished goods inventories were computed by taking the ratios from the 1988 dataset.

Taxes on locally sourced material inputs do not constitute protection because users are given tax credits, implying that these inputs will only be protected by tariffs. The deflator for such inputs then becomes

$$(1 + t_i) * (1+s_i)$$

The advance sales taxes and mark-ups are assumed to be incorporated in the reported values of imported inputs. The relevant deflator for imported inputs is then the implicit tariff rates, given by

$$1 + T_i = (1 + t_i) [1 + f_i (1 + m_i)]$$

where the subscript *i* represents inputs.

Average Implicit Tariff Rates

Since plants also export their products, the *average implicit tariff rates* they face is an average of the tariff rates described above and the tariff rate on exportables which is equivalent to zero. This is computed as:

$$\text{Average Implicit Tariff Rate on Output} = \frac{\text{Domestic Value of Output}}{\text{Border Value of Output}} - 1$$

The same formula can be applied for inputs as well:

$$\text{Average Implicit Tariff Rate on Inputs} = \frac{\text{Domestic Value of Inputs}}{\text{Border Value of Inputs}} - 1$$

Net Effective Protection Rates

The EPR formula can also be modified to account for the overvaluation or undervaluation of the exchange rate. The overvalued currency penalizes tradable goods while an undervalued currency

protects them, so that the EPR needs to be adjusted for such distortions (Bautista et. al 1979). The EPR net of the exchange rate distortions can be computed as:

$$NEPR = \frac{OER\ (1 + EPR)}{SER} - 1$$

where $NEPR$ = net effective protection rate;
OER = official exchange rate; and
SER = shadow exchange rate.

Estimates of EPRs are done from the plant to the industry levels using census data only since there were only a limited number of observations for the survey data. Industry-level EPR estimates for 1986 and 1991, however, were made using the 1983 and 1988 industrial structure on the assumption that there were no big changes in this structure during the 1983-1991 period.

Import Penetration Ratio (IPR)

As an indicator of the degree of penetration into the domestic market by imports, the IPR is calculated. The IPR measures the share of imports in the sales of industry *i* for the current year. Hence,

$$IPR = \frac{Imports}{P_{ij}Q_j + Imports - Exports}$$

EFFICIENCY INDICATORS

Domestic Resource Costs (DRC)

The DRC criterion, a measure of static efficiency, is a single-period social cost-benefit indicator giving the domestic factor costs of generating a unit of value added at international prices (Bautista et al.

1979). When compared with the economy's shadow exchange rate (SER) or the social value of foreign exchange, the DRC provides an indication of the relative efficiency position of the firm or industry. A positive DRC/SER less than or equal to one means the plant or industry has a comparative advantage in its economic activities. A DRC/SER greater than one implies that the price of foreign exchange is lower than the social value of foreign exchange saved (or earned) in producing the import-substitute (exportable good) and thus, the plant or industry exhibits comparative disadvantage. As an 'ex post measure of the opportunity cost' incurred by the economy in sustaining its import substitutes or exports, the DRC can be a good indicator of how the sectors' efficiency performance changed when the existing protection structure was altered (Bruno 1972).

Shadow prices are used because, in economies with distorted trade structures such as in developing countries, market prices do not reflect the true opportunity costs of goods and services. These distortions arise because of market failures (e.g., monopolies and externalities) and government policies (e.g., foreign exchange controls). Specifically, shadow prices of labor, capital, and foreign exchange are required for estimating DRCs. The shadow prices utilized in the study stem from estimates of past studies (specifically Medalla 1986). These are outlined in Appendix 12.

The sectors under study are basically considered as import substituting, although some firms from the survey were found to be exporters, particularly the large SB/SR firms which service foreign ships and the boatbuilders.

The DRC estimation follows the methodology used by Bautista et al. (1979), and the PIDS-TC series of industry studies.[8] DRC estimates are done for four years and the term *current year* will refer to any one of these: 1983, 1986, 1988, or 1991.

The varied production cost components are first expressed in terms of their social opportunity costs, and then allocated into either

8. There were some changes which the study group made, however, with regards to certain assumptions. Details of the methodology used will be presented in a forthcoming Development Incentives Assessment (DIA) project volume.

foreign or domestic (see Appendix 12 for details).[9] It is assumed that the domestic capital costs are reported inclusive of sales taxes, so the taxes are netted out as well. The foreign costs are then converted to their world or border values by multiplying these with

$$\frac{1}{OER * (1 + T_a)}$$

where OER = official exchange rate for the current year; and
T_a = implicit tariff of the asset for the current year.

In cases where data are missing, the required imputations are made as long as the other necessary data are available. Otherwise, the observation is dropped.

Capital costs

Depreciation and interest costs comprise the total costs of capital services contributed by the following: production machinery equipment, transportation, buildings, other fixed assets, and inventories.

Depreciation costs. Estimates of the depreciation costs (D_a) of each asset type (except inventories) are computed based on the depreciation values (d_a) reported by the plants or firms, adjusted to reflect the actual lifespan of the assets, inflation, and productivity change over time. Actual economic lifespans (n_a) of the assets are obtained from the Bulletin "F" tables and the $d_a s$ are deflated by the factor 1.5 since the actual economic life of these assets are longer than what is reported by the firms. To adjust for inflation, the $d_a s$ are multiplied by the price

9. The allocation for domestic or foreign costs basically considers the perceived actual conditions during the period of study, e.g., the source of financing of the firms. For the survey data, the firms were able to provide some data on how the costs were allocated. Whenever given, the allocation ratios for capital costs using survey data were based on the source of financing of the firms.

index ratio (PIR) which is calculated by dividing the price index of that asset type for the current year with the price index during the asset's year of acquisition (see Appendix 13 for the list of price indices for each asset type).[10] The $d_a s$ are also deflated by the factor 1.03^k to reflect the assets' annual productivity change, since the study assumes that capital assets of a newer vintage embody higher productivity. The superscript k represents the age of the assets as reported by the firms, and thus, the factor also accounts for the assets' aging process which affects their productivity.[11]

Interest cost. The interest costs for asset a (IC_a) equals $i * RC_a$ where i is the interest rate for the current year (Appendix 12). RC_a is the replacement cost of the asset a which is the estimated cost of replicating the entire fixed asset of a given quality during the current year. This is computed depending on the available information. In the survey data, the reported replacement costs are used whenever available. Otherwise, these are calculated as follows:

$$RC_a = \frac{(n_a * d_a) * PIR}{1.03^k}$$

where the variables are similarly defined in the preceding discussion.

Inventories

An average level of inventories (i.e., working capital and material input inventories [WC]) for the current year is first computed by averaging the beginning and ending inventories of the outputs and

10. The year when the asset was acquired was determined by subtracting the asset age, k, from the current year.

11. Age of asset, k, is computed as:

where bv = book value of the asset
n = actual economic life of the asset
d = depreciation costs for the current year.

inputs, respectively. Interest costs are then calculated by multiplying the average level of inventory with the shadow interest rate for the year. Thus,

$$WC = i * [.5\sum_{j}(FG_{beg} + FG_{end}) + .5\sum_{j}(WIP_{beg} + WIP_{end}) + .5\sum_{j}(MI_{beg} + MI_{end})]$$

where i = current year's interest rate;
FG = finished goods inventory;
WIP = inventory of work-in-process goods;
MI = inventory of material inputs;
beg = subscript meaning beginning; and
end = subscript meaning ending.

Land costs

These costs are only used for the survey data since the census data do not have the necessary data for calculating this particular asset. Interest costs accruing from land ownership is calculated by multiplying the market value of land with the market interest rate of this asset (10 percent).

Border value of output

The figure used corresponds to the value of output for the current period, computed in a similar manner as in the EPR equation. The domestic sales $(P_{dj}Q_j)$ and export (E_j) components are however expressed at world prices. Border value of domestic sales (BVDS) is given by

$$BVDS = \frac{P_{dj}Q_j}{OER\ (1 + T_j)}$$

Border value of exports *(BVX)* is derived by deflating E_j (also from the EPR equation) by the OER for the current period.

World value of output (W) can then be expressed as

$$W = \sum_j BVX + BVDS$$

Labor costs

The costs of labor services are divided into wages and benefits for unskilled labor, skilled labor, and family members. Since the census data do not indicate the number of unskilled workers, it is assumed to be 5 percent of the total workforce (TW).

The shadow wage rate (SW_{ul}) of unskilled workers is assumed to be 60 percent of the minimum wage rate.[12] The market wage rates of skilled workers (SW_{sl}) are taken to reflect the social productivity of their services so that no adjustments are required. Their wages are computed by subtracting SSS benefits and wages of unskilled workers from the reported total compensation of all workers. The shadow wage of working owners (SW_{wo}) is obtained by applying the average wage rate of skilled workers on the number of work-owners.

Total domestic labor costs is then given by:

$$SW_{tl} = SW_{ul} + SW_{sl} + SW_{wo}$$

Foreign labor costs (SW_{fl}) arise whenever foreign consultants and technical personnel visit local yards. These costs do not require adjustments.

Material inputs and other costs

Material inputs. The required figures for the raw and intermediate materials (hereon referred to as material inputs) are the value of material inputs actually used during the year. The domestic component of the material inputs (MI) is divided into two equal parts.

12. These factors were estimated in past studies (see Medalla 1986). See Appendix 12 for the respective factors applicable for each period under study.

The first is divided by the implicit tariff for that input and multiplied by the ratio of the shadow exchange rate (SER) over the official exchange rate (OER). The second is deflated by the sales tax. Domestic MI is thus computed as:

$$MI = \sum_i \frac{dom\ MI_i * .5}{1+T_i} * \frac{SER}{OER} + \sum_i \frac{dom\ MI_i * .5}{1+s_i}$$

where $dom\ MI_i$ = domestically sourced material input i which is calculated as a percentage of the total value of material inputs (Appendix 12);
T_i = implicit tariff rate on input i;
s_i = sales tax on material input i;

This means that producers are able to avail of tax credits for their material inputs so that value of domestic inputs are deflated by sales taxes.

Imported or foreign material inputs (FMI) is given by:

$$FMI = \sum_i \frac{for\ MI_i}{OER*(1+T_i)}$$

where $for\ MI_i$ = imported material input i; and
T_i = implicit tariff on the material input i.

Other costs. Other domestic costs (ODC) include light, water, and other utilities (see Appendix 12 for a detailed list). Their shadow values are computed by simply deflating the reported values with the appropriate domestic sales taxes.

Other costs include costs of industrial and non-industrial services done by other enterprises and subsidies received by the firms or plants. Since no appropriate tax deflators were included here, these values are included in the domestic component of costs as reported by the firms or plants.

Other foreign costs (OFC) include licensing fees, dividends on foreign shares, packaging materials, fuels, and lubricants. These are expressed in border prices by deflating with the OER and their respective implicit tariffs. Hence,

$$OFC = \frac{for\ OC}{OER * (1 + T)}$$

where $for\ OC$ = foreign component of other production costs; and
T = implicit tariffs for other foreign costs.[13]

Domestic resource costs formula (at shadow prices)

Having enumerated the various costs and output components, we now combine these equations to come up with the DRC equation in detail. DRCs are computed at the firm or plant to the sector levels and the expanded form is given by:

$$DRC_j = \frac{\left[\sum_a \frac{D_{da}}{1+s} + \sum_a \frac{IC_{da}}{1+s} + \sum_i \frac{dMI_i}{1+s} + \sum_i \frac{dMI_i}{1+T_i} + \frac{SER}{OER} + \sum \frac{dom\ OC}{1+s} + SW_{dd} + L_{di} + ODC\right]}{\left(W - \left[\frac{1}{OER}\left(\sum_a D_{fa}\frac{1}{1+T_a} + \sum_a IC_{fa}\frac{1}{1+T_a} + SW_{df} + \sum_i for\ MI_i\frac{1}{1+T_i} + \sum for\ OC\frac{1}{1+T_i}\right)\right]\right)}$$

where

Domestic Costs Components

D_{da} = domestic depreciation costs for each asset a
IC_{da} = domestic interest costs for each asset a
L_{di} = interest costs of land
SW_{dd} = domestic labor costs
DMI_i = costs of domestic material input i multiplied by .5

13. Implicit tariffs were also taken from the estimates made in past studies (Medalla 1986).

$dom\ OC$ = other domestic costs, including utilities such as water, electricity, and other utilities subjected to domestic sales taxes

ODC = other domestic costs not subjected to sales taxes

s = sales tax applicable for each cost component for the current year

W = border value of output

Foreign Costs Components

D_{fa} = foreign depreciation costs for each asset a

IC_{fa} = foreign interest costs for each asset a

SW_{tlf} = foreign labor costs

$for\ MI_i$ = costs of foreign material input i

$for\ OC$ = other foreign costs

T = implicit tariff rate for each foreign cost item

While plant and industry DRCs are computed using census data, only firm-level DRCs are computed using survey data. Sensitivity to changes in the interest costs components are analyzed using two interest rates: 10 and 12 percent.

Domestic resource costs at market prices (DRCM)

The DRC formula can also be used to measure the *competitive advantage* of particular firms by converting the shadow values of the numerator in the DRCs equation to their market values. This yields the equation:

$$DRC_j = \frac{\left[\sum_a D_{da} + \sum_a IC_{da} + \sum_i dMI_i + \sum dom\ OC + SW_{tld} + L_{dl} + ODC\right]}{\left(W - \left[\frac{1}{OER}\left(\sum_a D_{fa}\frac{1}{1+T_a} + \sum_a IC_{fa}\frac{1}{1+T_a} + SW_{tlf} + \sum_i for\ MI\frac{1}{1+T_i} + \sum for\ OC\frac{1}{1+T_i}\right)\right]\right)}$$

Competitive advantage can be determined by comparing the computed DRCm with the OER. If the ratio yields a positive value less than or equal to one (greater than one), the firm or industry is said to have competitive advantage (disadvantage).

Owing to computational errors, we include in the definition of firms having competitive advantage those which have positive DRCm/OER less than or equal to 1.2 and firms with comparative advantage those which have positive DRCs/SER less than or equal to 1.2.

Technical Efficiency Index

Another measure of efficiency is the Technical Efficiency Index (TEI) which can be defined as *actual output over potential output.* Estimation of the (best practice) production frontier is thus required to measure the relative productive efficiency of the firms. Following the methodologies of Farrell (1957) and Aigner, Lovell, and Schmidt (1977), we first define a production function as

$$Y_i^* = f_i(X_1, X_2, \ldots X_m)^{z_i}$$

where Y_i^* = maximum potential output of firm i;
X_i = material inputs used by firm i; and
z_i = error or disturbance term.

This function describes the maximum feasible output a firm can produce, and thus defines the efficiency frontier. If firm i fails to produce the maximum output, then it is considered technically inefficient and this inefficiency is reflected in the error term z. As explained in Chapter 3, technical inefficiency can be caused by several variables, some of them not quantifiable, and it is assumed that these are captured by the error term.

To derive the TEI, we specify a translog production function and use linear programming to minimize the sum of the deviations from the frontier subject to the qualifications that all observations are situated on or below it. Page (1984) calls this a 'deterministic' frontier,

since it attributes the variation of actual output from potential output as due to technical inefficiency.[14]

Plant and sector TEI's are computed for the SB/SR sector census data only since the lack of observations from both the boatbuilding industry and survey data may influence the estimates.

The linear programming model is specified by :

Minimize $Y_e - Y$,

$$Y_e = a_o + \alpha_L \ln L + \alpha_K \ln K + \alpha_M \ln M + \alpha_{LK} \ln L \ln K + \alpha_{LM} \ln L \ln M + \alpha_{KM} \ln K \ln M + 1/2\ \alpha_{LL} (\ln L)^2 + 1/2\ \alpha_{KK} (\ln K)^2 + 1/2\ \alpha_{MM} (\ln M)^2$$

subject to :

(1) $\alpha_L + \alpha_K + \alpha_M = 1$
(2) $\alpha_{LK} + \alpha_{LM} + \alpha_{LL} = 0$
(3) $\alpha_{KL} + \alpha_{KM} + \alpha_{KK} = 0$
(4) $\alpha_{ML} + \alpha_{MK} + \alpha_{MM} = 0$
(5) $\alpha_{LL} \leq 0$
(6) $\alpha_{KK} \leq 0$
(7) $\alpha_{MM} \leq 0$

where

Y_e = estimated potential output;
Y = value of actual output;
L = total man-hours;
K = capital costs valued at market prices; and
M = cost of material inputs.

The difference between potential output Y_e and actual output Y is the error term. This is specified to have a negative expectation to reflect the existence of inefficiency. The closer the derived TEI is to

14. This is a major weakness of this particular specification, requiring wariness in the interpretation of the results.

one, the nearer the plant is to the frontier, and hence the more efficient it is. The criterion that plant TEI's in the 75 to 100 range constitutes technical efficiency is followed here.

Partial Productivity and Factor-Intensity Indicators

Factor intensity

The capital-labor (K/L) ratio measures the capital intensity of domestic production in a given year. It is constructed by adding the replacement costs of production machinery and equipment, buildings, and transport equipment, then deflating it by the appropriate price index for the current year. The denominator *L* refers to the actual number of workers for the current year.

The data for total employment for 1983 is obtained by subtracting homeworkers from the total employees. The figure for 1988 is already adjusted for homeworkers.

Factor productivity

Partial factor productivities are given by the ratio of census value-added (CVA) to the number of workers (CVA/L) to indicate labor productivity; and census value-added over the replacement costs of capital (CVA/K) to indicate capital productivity. *K* and *L* are defined similarly above while CVA is computed as value of output, minus the total of cost of raw material inputs, supplies, fuels, electricity, contract work, industrial services done by others, and goods for resale. It is then deflated by the gross national product (GNP) deflator for the current year to adjust for inflation.

Other partial productivity measures included in the study are value of output per capital (VO/K) and value of output per worker (VO/L). Output values (VO) are deflated by the GNP deflator for the current years.

Market Structure Indicators and Profitability Measures

All measures described here are computed at the plant and industry levels.

Concentration Ratios

Two measures of concentration are computed, 4-Plant Concentration Ratio (CR-4) and the Herfindahl Index (HI). The CR-4 measures the total shares of the four largest plants in the sector in terms of value-added and product sales. On the other hand, the HI gives an indication of how dispersed the plants are within an industry. It is defined as the sum of the squares of the market shares of all plants in industry *i* in terms of value-added and sales. Thus,

$$H_i = \Sigma S_{ij}$$

over j = 1 ... n plants in industry *i*.

A CR-4 ratio higher than 60 percent and an HI value far from the 1/N ratio imply that the industry is highly concentrated, which may or may not indicate oligopolistic power, depending on the perceived reasons for such indices. HI is preferred over the CR-4 index because the former takes into account the variations in size structure between plants and the total number of plants in the industry (Lee 1984).

Concentration ratios are measured for small and medium plants as one group, and large plants as another group, since industry sources explain that both groups cater to different markets. Large shipping lines and foreign vessels are serviced by the large shipyards, while small domestic ships are serviced by the small and medium repair yards.

Profitability

The price-cost margin (PCM) is used here to indicate the relative profitability of the different plants. PCM is derived by subtracting

compensation from census value-added over the value of output. Hence,

$$\textit{Price-Cost Margin} = \frac{\textit{Census Value-Added - Compensation}}{\textit{Value of Output}}$$

Discriminant Analysis

One way of identifying which industry characteristics and variables are closely related to efficiency indicators is through the use of discriminant function analysis. The analysis basically tries to statistically differentiate between two groups, i.e., plants with positive DRC/SER less than or equal to 1.2, and the rest, with respect to particular variables. The Canonical discriminant function thus identifies the most important variables which can discriminate between the efficient and the inefficient plants.[15]

Among the industry characteristics which might effectively discriminate between efficient and inefficient plants are the following:

- *Partial Factor Productivities.* CVA/L and CVA/K are theorized to have positive impacts on efficiency, as plants are able to produce more based on the intensive use of their resource endowments.

- *Capital Intensity.* The relationship is hypothesized to be positive since the use of more capital-intensive techniques will speed up the production processes as well as provide quality results.

- *Plant Size.* The link is not clear since small and large SB/SR plants cater to different customers (i.e., in terms of ship size). However, the nature of competition faced by small and large plants differ for the SB/SR sector so that small plants are expected to be more efficient.

15. See Hill and Kalirajan (1991) for a clear explanation and example of an application of this technique.

- *Price-Cost Margin.* The relation is presumed negative since plants with high PCMs tend to have oligopolistic powers and have no incentive to perform efficiently.

- *Dummy Variables.*

  a) *Legal organization*
  "1" means plant is a single proprietorship; "0" means otherwise.

  A firm or plant which is managed by yard owners tends to perform inefficiently as no room for advancement exists for other personnel.

  b) *Period of Operation*
  "1" means plant has been operating since 1983; "0" means otherwise.

  This dummy variable serves to ascertain whether entrants after the trade reform program are more efficient or not.

Discriminant analysis therefore aims to weigh and linearly combine these discriminating factors in such a way that the two groups are forced to become as distinct as possible. The analysis therefore comes up with one or more linear combinations of these variables of the form

$$D_l = d_{l1}Z_1 + d_{l2}Z_2 + \ldots + d_{lp}Z_p$$

where
D_l = score on discriminant function l;
d = weighing coefficients; and
Z = standardized values of the p discriminating variables used in the analysis.

For this study, the statistical gauges, which are used to determine whether the discriminant function can distinguish the two subgroups,

are: low Wilk's lambda and the canonical correlation coefficient (CCC). The CCC is interpreted in a similar manner as the R^2 in standard ordinary least squares (OLS) regression analysis, while a low Wilk's lambda indicates that the functions are reliable for discriminating between the two subgroups.

To determine the relationship between the variables and the two subgroups, efficient and inefficient, the mean of the two subgroups is compared to the values of the coefficients of the variables. The closer the value of the variable is to the value of the subgroup mean, the more related that particular variable is to the subgroup. This implies that variables with values closer to the mean of the efficient subgroup is directly related to efficiency and vice-versa.

The discriminant function was applied to a single set of plant-level observations for both SB/SR and boatbuilding sectors. Since CVA/K and CVA/L are correlated, two equations are made, one for each of these variables.

5

Industry Background

AN overview of the prevailing economic situation of the shipbuilding and ship repair sector is presented first, followed by that of the boatbuilding sector. The final part describes the industrial and trade policy environment encompassing the two sectors.

A. Shipbuilding and Ship Repair Industry

The shipbuilding industry refers to the sector involved in the construction, launching, and outfitting of watercrafts, while the ship repair industry deals with the overhaul, improvement, alteration, and reconditioning of water vessels (PDCP 1972).

Structure

Table 1 summarizes the composition of the Philippine SB/SR industry which was comprised of 152 firms in 1992 (Marina Annual Report 1992). A significant component of the subsector is the Ship Repair Afloat (SRA), composed of 57 small enterprises, which provides mainly manpower services to shipping lines and to shipbuilders and repairers. During the 1985 to 1992 period, there was a general increase in the number of Marina-licensed firms involved in ship repair, combined shipbuilding and ship repair and shipbuilding operations. Tables 1 and 2 show markedly different figures because Table 1 (from Marina) includes small and large firms while Table 2 (from NSO) includes plants or firms employing more than five persons.

Table 1

Licensed Shipbuilding and Ship Repair Companies: 1985-1992

Type of Operation or License	Number of Companies		
	1985	1989	1992
Ship repair	22	84	92*
Shipbuilding	1	3	3
Ship repair and shipbuilding	18	38	57
Total	**41**	**125**	**152**

* Approximately 57 firms are classified as Ship Repair Afloat.

Source: MARINA *Annual Reports*, 1985, 1990, 1992.

Table 2

Industry Composition: 1972-1988

Type of Operations	Number of Plants				
	1972	1975	1978	1983	1988
Shipbuilding		9	59	14	15
Boatbuilding	9	10	10	4	6
Shipbuilding and repair	23	38	6	18	31
Total	**32**	**57**	**75**	**36**	**52**

Source: *Census of Establishments*, Censal Years 1972-1988. National Statistics Office.

In terms of employment size, the number of small and medium-sized plants increased over the 1983 to 1988 period, while the number of large plants decreased (Table 4). Share of small or medium plants in aggregate output increased by 60 percent, while that of the large plants decreased by 14 percent.

Ownership structure

The large shipyards in the country are mainly joint ventures with foreign nationals. The largest shipyard, Subic Shipyard & Engineering, Inc., formerly PHILSECO, is owned by a consortium of Philippine enterprises and some Japanese and Singaporean multinationals, while three other large shipyards are subsidiaries of a Singaporean company. Some of the medium- and small-sized firms are owned by local shipping companies which use them to service their own shipping vessels.

Location

Table 3 shows that most shipyards are concentrated in Metro Manila and Cebu. Together, these two areas constituted 69 percent of all plants nationwide in 1988. Other large shipyards are located in Batangas, Zambales and Bataan although their head offices are in Metro Manila. The geographical compactness of the sectors can be attributed to the availability of raw materials and supplies in these trade centers which can affect significantly the efficient delivery of services by the yards.

Level of Competition

As an approximation of the level of intra-industry competition, concentration indices, in terms of value-added and total revenues, are measured for 1983 and 1988 (Table 5). The concentration measures (CR-4) increased during this period reaching 63 percent, which is slightly greater than what is considered as a high degree of concentration (60 percent). Moreover, the equivalent numbers

Table 3

Distribution of Plants by Major Regions: 1983 and 1988

Area	1983		1988	
	Ships (%)	Boats (%)	Ships (%)	Boats (%)
National Capital Region	47	25	40	40
Cagayan Valley	7			
Central Luzon	9	50	8	20
Southern Tagalog			7	10
Bicol	9		2	
Western Visayas	7		7	
Central Visayas	15	25	30	30
Eastern Visayas	6			
Western Mindanao			4	
Northern Mindanao			2	
Total	**100**	**100**	**100**	**100**

Source: *Census of Establishments*, 1983 and 1988. National Statistics Office.

Table 4

Employment Size by Subsector: 1983 and 1988

Employment Size	Subsector					
	Boatbuilding			Shipbuilding and Ship Repair		
	1983	1988	% Change	1983	1988	% Change
Small (5-99)	4	4		19	35	84.21
Medium (100-199)		1		4	5	25.00
Large (≥ 200)				9	6	-33.33
Total No. of Plants	**4**	**5**	**25.00**	**32**	**46**	**43.75**

Source: *Census of Establishments*, 1983 and 1988. National Statistics Office.

Table 5

Concentration Ratios by Subsector: 1983 and 1988

Concentration Ratios	Subsector					
	Boatbuilding			Shipbuilding and Ship Repair		
	1983	1988	% Change	1983	1988	% Change
a. Concentration ratio 4						
Total revenues	1.00	0.97	-2.90	0.59	0.63	6.12
Census value-added	1.00	1.00	0.00	0.56	0.62	12.53
b. Herfindahl Index						
Total Revenues	0.90	0.45	-50.49	0.12	0.14	23.16
Census value-added	0.85	0.79	-7.01	0.10	0.12	18.26
1/N*	0.25	0.2		0.03	0.02	

* The HI will equal this value if all firms in the sector are approximately of the same sizes.

Source: Computed from the *Census of Establishments*, 1983 and 1988. National Statistics Office.

derived from the Herfindahl Indices, i.e., 1/H, indicate that in 1983, the industry was about as concentrated as an industry with only nine equal-sized firms, although there were really 32 firms.[16] This could mean that few large shipyards have control over the market but as pointed out by Porter (1990), the reason for the concentration is a more important factor in explaining the degree of intra-industry competition. As will be pointed out later, the industry is characterized by market segmentation. Large shipyards cater to large ships, while medium and small yards service the smaller vessels. Thus, it is not certain whether the large firms exercise oligopolistic powers based on the measures used here.

Production Activities

Current shipyard activities are focused on repairing and drydocking watercrafts with the existing supply less than the demand

16. The author wishes to acknowledge Dr. E. Patalinghug for his comments regarding this matter.

for yard work. A 1990 BOI study ascertains that there is an average waiting period of 2 1/2 months for drydocking. Small- and medium-sized firms concentrate on domestic ships, which are generally small, while large firms cater to both foreign and domestic vessels. Construction of small vessels is done by very few shipyards and only occasionally. Ship construction and repair activities use the same equipment and supplies so that most shipbuilders also engage in repair operations.

There is clearly economies of scale in ship production since the surface area of a ship does not increase in direct proportion to its volume. That is, a 200,000 deadweight tons (dwt) can carry ten times the cargo of a 20,000 dwt ship although the former is only about twice as long as the latter (Patalinghug 1994). Because construction costs are tied to surface area and not to volume, such costs are reduced for large vessels. Moreover, engine size and complexity of machinery do not increase dramatically in proportion to the size of the ship leading to power efficiency for large vessels.

Technology

Present technological capabilities are limited to constructing vessels below the 5,000 dwt range while repair capacities reach up to the 10,000 dwt to 300,000 dwt range. Seven shipyards account for approximately 82 percent of the overall capacity of 570, 153 dwt (Appendix 1) while only 32 firms (or 21 percent of all firms) have drydocking facilities. The other firms are small repair firms which service the small inter-island vessels using manpower and small machine shops. Although ship repair is relatively more labor-intensive than shipbuilding, current techniques used by local shipbuilders are labor-intensive, which has prolonged the construction time of these small vessels. Foreign tie-ups have been important channels for infusing new technology into the industry by way of capital investments and foreign technical personnel. Leverage International (Consultants) Inc. (1990) assessed that the large shipyards lead the industry in terms of technology but, in general, local technology still lags behind that of other countries.

Market Orientation

Demand for vessels depends on the growth of the country's merchant fleet (Marina Development Plan for Maritime Industry 1988). Thus, domestic shipbuilding and ship repair activities are closely intertwined with the sectoral requirements of the shipping industry. The major market of the SB/SR firms is the different shipping companies. Local shipbuilders must necessarily compete with foreign shipyards in getting the orders of the shipping companies.

Local shipping companies continue to source their bottoms from the foreign market of used vessels, mostly from Japan, resulting in the concentration of shipyard operations on ship repair, as in previous years (*Fookien Times Philippines Yearbook* 1991).

B. Boatbuilding Industry

The boatbuilding subsector deals with the manufacture of watercrafts having gross tonnages of less than 3 gross registered tons (grt). Most of the boat manufacturers' products are fiberglass-reinforced plastic (FRP) boats, yachts, and other vessels for both domestic and export markets. Some of them also import outboard engines and engage in boat repairs.

Structure

The actual number of boatbuilders, most of which are single proprietorships, is not known since they are not required to register with Marina or any government agency. In 1992, there were at least six boatbuilders belonging to the Boating Industries Association of the Philippines (BIAP) located in Metro Manila and Cavite, although around three foreign-owned companies were also in Cebu and Bataan. The boatbuilders in Bataan are located in the export-processing zone, giving them access to duty-free raw materials and equipment. Over the 1983 to 1988 period, new boatbuilders entered the sector, signifying an expansion of activities (Table 2).

Level of Competition

The sector is highly concentrated as shown by the large difference between the HI measures of .45 and .79 and the ratio 1/N or .16.[17] The computed 1/H for this sector shows that although there were four boat manufacturing firms in 1988, the equivalent numbers reveal that the industry is as concentrated as if only one firm existed then. There was, however, a substantial decline in the concentration index during the 1983 to 1988 period, indicating an improvement in the level of competition faced by the incumbent firms.

Production Activities

Local boatbuilders produce boats with sizes ranging from 8 to 100 feet although the bulk of commercial production is on the 8- to 30-footer pleasure crafts. Much of the production activities revolve around motorboats and sailboats, with the latter comprising the major volume of production. Current manufacturing activities include FRP boats or speedboats, and wood power boats.

Technology

The construction of boats in the local industry is generally a labor-intensive activity with skills in sculpture and carpentry as important requirements. The production of boats does not require graving docks or building berths. It does not require immediate access to rivers or seas although it would be an added advantage to the manufacturer to be located near bodies of water. There are virtually no significant structural barriers existing within the industry.

Market Orientation

Since pleasure boats are generally considered luxury items, foreign visitors or residents and the local elite are the primary customers.

17. An explanation for the 1/n rule of thumb is that, if the firms are of equal sizes, then the HI is closer to the 1/n value.

Other buyers include resort owners and boat racers. Income and price elasticities of luxury items such as these products are high, making their demand susceptible to changes in the overall economic and political climate. Thus, the 1989 political problem of the country adversely affected the sales of the local manufacturers.

The high demand for quality sea transport in the archipelago has led some boatbuilders to diversify into seacrafts which are for ferrying passengers between islands. The latest of these is the Supercats, a 280-seater catamaran targeted for plying the Bacolod-Iloilo route (*Business Day,* February 3, 1993).

A major reason for the preference of some local builders for FRP boat production is its great demand in the international market. Since the early 1980s, domestic boatbuilders have been exporting to countries like the United States, Japan, and Guam.

Government Policies and Protection Indicators

Government assistance and regulation of the sector became intensive in the early 1970s as the government realized the need to modernize the domestic maritime fleet.

Sectoral Policies

The 1968 Investments Priorities Plan of the Board of Investments (BOI) proffered numerous incentives such as accelerated depreciation, tax credit on domestic capital equipment, and pre-operating tax exemptions to the sector (Appendix 2). Capacities of local shipyards were increased to accommodate the growing domestic fleet. The Maritime Industry Authority (Marina) was established in 1974 to regulate and monitor the sector as well as administer the tax incentives under Presidential Decree (P.D.) 666. All domestic shipyards were required to acquire licenses from Marina before they could operate. Financial assistance was made available mainly through loans from the World Bank and the Development Bank of the Philippines (DBP). However, incentives were not only granted to local shipyards but also

to the shipping sector. Such laws allowed local shipping lines access to low cost imported used vessels to the detriment of local ship manufacturers. As a result, local shipyards concentrated on ship repair activities. Being a subsector of the SB/SR industry, the boatbuilding sector was also entitled to these benefits, but only a few boatbuilders availed of these incentives.

The worldwide economic recession of the early 1980s and the capital flight experienced by the country in 1983 led to the adoption of stabilization policies which included measures aimed at reducing the balance of payments and government budget deficits. Thus, the incentives under P.D. 666 were removed in 1984, which adversely affected the costs of shipyard operations, especially since 70 percent of raw material requirements are imported. Although MARINA revived these incentives in 1986, they were rescinded again after a few months by a ruling of the Department of Finance pertaining to foreign exchange problems.

At present, shipyards having capacities of 10,000 dwt and above are granted "pioneer" status, and those which locate outside Metro Manila are entitled to several incentives under the 1987 Omnibus Investments Code of the BOI. As of this writing, there is also a bill pending in the Senate which seeks to restore the duty and tax-free incentives formerly granted under P.D. 666. Again, the boatbuilding industry can also avail of these incentives provided they meet the criteria set by the BOI. One common incentive for both sectors is the duty drawback system, which entitles exporters reimbursement of their import duties.

Recent policy changes in the shipping sector which might affect the SB/SR sector include the deregulation of shipping routes and the requirement that all vessels be classed by an internationally recognized classification society. Many studies have made the observation that one of the root causes of the inefficiencies in the shipping sector has been the regulated shipping rates and routes which have rendered the activity uneconomical. The artificially-low freight rates have made the business unprofitable so that only the incumbent firms, which control various routes, could operate with profits (Nathan & Associates 1991). The recent deregulation policies implemented by the government

may help increase the efficiency of the shipping sector, which may indirectly prove helpful to the SB/SR sector as well.

Tariff Reform Program

In 1978, tariff rates for ships and boats ranged from 10 to 30 percent with an unweighted mean of 21 percent. The 1981 Tariff Reform Program (TRP), which aimed at an equal tariff protection system for all products, resulted in a 30 percent tariff rate increase for ships and 37 for pleasure boats (Appendices 5 and 6). Pleasure crafts are levied higher tariff rates than ships because they are considered as luxury items. Over the 1983 to 1988 period, tariff rates for ships and boats did not change. For reasons of quality and safety, used vessels were charged higher tariffs than new vessels.

A slightly different situation occurred for the tariff rates of their material inputs. Table 6 indicates a notable decline in nominal protection for the material inputs of boatbuilders from 27.88 percent in 1983 to only 22.87 percent in 1988. That of ship manufacturers and repairers, however, decreased slightly to 15.6 percent in 1988 from 15.7 percent in 1983. The sharp reduction in the tariff rates of fiberglass, resin products, and building boards of wood were the major reasons for the decline in nominal tariff rates for boatbuilders. On the other hand, the small reductions in the tariff rates of sheet pilings of iron or steel and transmission apparatus for navigational use led to the lowering of protection for the material inputs of the SB/SR sector. In the 1983 to 1988 interval then, there was no change in the level of tariff protection for the outputs of the two sectors, although protection of their inputs declined.

In July 1991, another major tariff rationalization scheme was effected which further reduced the tariff rates for water vessels to the 3 to 10 percent range. Tariff rates for pleasure boats, however, were initially increased to the 50 percent level in 1991, but decreased gradually to 30 percent in 1995. While the tariff structure for boatbuilders remained basically the same, i.e., higher rates for outputs than for inputs, nominal protection for the SB/SR sector underwent a drastic reversal: nominal protection for inputs of 15.14 percent but

Table 6

Protection Indicators by Subsector
(In percent)

	Subsectors							
	Boatbuilding				Shipbuilding/Ship Repair			
	1983	1986	1988	1991	1983	1986	1988	1991
Outputs								
Nominal tariffs (Average)	37	37	37	50	30	30	30	6.5
Implicit tariffs for import substitutes (Nj)	54.12	64.4	50.7	65	46.25	56	43	15.78
Implicit Tariffs for Exportables	0	0	0	0	0	0	0	0
Inputs								
Nominal tariffs (weighted by production coefficients)	27.88	22.87	22.87	16.26	15.7	15.6	15.6	15.14
Implicit tariffs (Ti)	43.87	47.45	35.16	27.89	30	38.69	27	26.65
Average implicit tariff rates on outputs*	44.6	33.04	21.65	28.15	41.54	29.66	29.66	5.21
Average implicit tariff rates on inputs*	27.88	22.87	22.87	16.26	15.56	15.58	15.45	15.14
Effective protection rate (EPR)	59.48	43.05	20.23	42.86	50.47	36.92	34.75	1.74
Net effective protection rate (NEPR)	27.58	14.44	-4.58	14.29	20.37	9.54	6.94	-18.61

* These tariff rates are averages of the implicit tariff rates on import substitutes and the implicit tariff rates on exportable goods.

Source: *Tariffs and Customs Code of the Philippines*, 1982-1991. Tariff Commission.

only 6.5 percent for outputs. These changes meant an increment in protection for boatbuilders but a drastic decrease for the SB/SR sector.

Import Liberalization Program

A complementary policy of the TRP is the Import Liberalization Program (ILP) which worked for the removal of quantitative restrictions on imported items. While pleasure crafts were liberalized in 1986, new ships and other vessels subjected to quantitative restrictions since 1977 were only liberalized in 1989. In consonance with the TRP, used vessels are still included in the List C of Restricted Items (i.e., items for continued regulation) for reasons of quality and safety (Appendix 7). MARINA officials assert that importation of used vessels have to meet particular age and size requirements to ensure their seaworthiness (MARINA Memo Circular 25-D).

The observed rise in nominal protection for the boatbuilding sector described in the preceding section can be interpreted as the "tariffication" of the quantitative restrictions for pleasure crafts which were removed in 1986.

As for the material inputs, the steel requirements of the SB/SR sector were gradually liberalized from 1986 to 1988 while radio navigational instruments were only liberalized in the latter part of 1988. Outboard engines used by boatbuilders were liberalized in 1989. Most of the major inputs of both sectors were liberalized during the ILP, which may prove helpful, especially since local manufacturers still do not have the technology to manufacture these materials.

Protection Indicators

A more relevant indicator of the protection given to the domestic sectors is the EPR, which considers protection for both inputs and outputs.

In 1974, the EPR of both sectors averaged 26 percent which is significantly lower than the manufacturing average of 44 percent (IPPP 1979). Although the EPRs for ships and boats increased to

50.47 percent and 59.48 percent, respectively, these declined during the period 1983 to 1988 as shown in Table 6. From an EPR of 59.48 percent in 1983, the boatbuilding sector's EPR went down to 20.23 percent in 1988, even lower than that of the SB/SR sector's figure of 34.75 percent. These results may prove puzzling, considering that no changes in nominal tariffs occurred during the period 1983 to 1988. Moreover, implicit tariff rates (and hence, EPRs) changed because of the removal of the 25 percent markups over cost, insurance, freight (CIF) import prices which prevailed in 1983. A reason for these results could be the fact that both sectors were exporting their products so that the "actual" tariff rates which these sectors faced were an average of their products' implicit tariff rates and that for exports, which is equal to zero. Table 6 shows these *average implicit tariff rates* for both outputs and inputs using census data. Although the average implicit tariff rates for the inputs of the boatbuilders decreased to 22.87 percent in 1988 from 27.88 percent in 1983 (which meant higher protection), its outputs' average implicit tariff rates declined sharply to 21.65 percent resulting in the low EPR. In the case of the SB/SR sector, its outputs' average tariff rates also declined drastically from 41.54 percent in 1983 to only 29.66 percent in 1988. But its inputs' average implicit tariff rates hardly changed, resulting in a small decline in EPR from 55.10 percent to 36.28 during the 1983 to 1988 period.

Table 6 also gives the sectoral net EPRs (NEPRs) which indicate protection to domestic plants or sectors afforded by the tariff or tax system without the disincentive effects of the overvalued currency (IPPP 1979). Adjusting the EPR values for the currency overvaluation signifies that the protection levels actually enjoyed by the two sectors were really low. From 1983 to 1988, NEPR for the boatbuilding sector was reduced from 27.58 percent to only -4.58 percent, while that of the SB/SR sector became 6.94 percent from 20.37 percent. These results imply that the boatbuilding sector was actually being penalized by the tariff system as shown by its negative NEPR.

EPR estimates for 1986 and 1991 were made using the industry structures of 1983 and 1988 respectively. The implicit assumption here is that the industrial structure was not altered during these years. Table 6 reveals an increase in protection for the boatbuilding sector from

20.23 percent in 1988 to 42.86 percent in 1991. The 1991 figure, however, is slightly lower than the 1986 figure of 43.05 percent. On the other hand, the SB/SR sector experienced a tremendous reduction in tariff protection from 36.92 percent in 1986 to only 1.74 percent in 1991. The main reason for these changes is that there was a reduction in output tariff rates from an average of 30 percent in 1986 to 6.5 percent in 1991 for the SB/SR sector, and an increase from 37 to 50 percent for the boatbuilding sector. Tariff rates on the inputs of the SB/SR sector hardly changed, although that of the boatbuilding sector declined from 22.87 to 16.26 percent.

Looking at the NEPRs, one finds that the SB/SR sector is receiving negative protection while the boatbuilding sector is still receiving protection. The 1991 TRP therefore increased the tariff protection received by the boatbuilding sector, while it reduced that of the SB/SR sector. How these trade policy developments will affect the performance of the firms will be discussed in the next chapter.

6

Industrial Performance

DEVELOPMENTS in the industry from 1972 until 1991 are examined in this chapter with much of the discussion focusing on the 1983 to 1988 adjustment period.

GROWTH INDICATORS

Imports

Imported vessels, especially second-hand vessels, have been the main bulk of the Philippine Maritime fleet. In the 1970s, importation of second-hand vessels was given added impetus through government incentives in order to replace the old domestic fleet. Despite import restrictions in 1977, the share of used vessels in the total value of sectoral imports even increased from 15 to 90 percent in 1978 (Table 7 and Figure 1).

In 1984, the government instituted the policy of bareboat chartering as an alternative to the purchase of the ship users' vessel requirements. This further biased the shipping lines from procuring new ships locally, and instead, they opted for the less expensive second-hand vessels. For the succeeding years, importation of new ships declined. Even with the implementation of Executive Order 226 in 1987 providing incentives to individuals who procured vessels abroad, and even with the lifting of quantitative restrictions on imported new vessels in 1989, used vessels continued to dominate the country's ship imports. As shown in Table 7, the country's importation of vessels in 1990 in terms of quantity were accounted for by used

Table 7

imports of Ships and Pleasure Crafts: 1977-1991
(In percent)

Commodity	1977		1978		1979		1980		1981	
	Qty	CIF Value	Qty	CIF Value	Qty	CIF Value	Qty	CIF Value	Qty	CIF Value
A. Used ships	69.2	15.2	76.8	89.6	56.9	90.8	70.9	79.0	82.8	57.9
B. New ships	3.8	67.5	4.9	9.5	1.6	0.4	5.5	20.7	5.1	38.1
C. Ships n.e.c.	7.7	17.0	3.7	0.9	17.1	7.9	4.7	0.3	6.1	3.8
D. Pleasure crafts	19.2	0.3	14.6	0.1	24.4	0.9	18.9	0.0	6.1	0.2
Total	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**

Commodity	1982		1983		1984		1985		1986	
	Qty	CIF Value	Qty	CIF Value	Qty	CIF Value	Qty	CIF Value	Qty	CIF Value
A. Used ships	66.0	81.9	79.6	99.0	74.4	14.3	95.4	99.3	80.0	37.9
B. New ships	2.0	17.7	0.0	0.0	2.6	4.9	0.0	0.0	14.5	61.5
C. Ships n.e.c.	12.0	0.4	2.0	0.6	10.3	80.5	0.0	0.0	1.8	0.5
D. Pleasure crafts	20.0	0.1	18.4	0.3	12.8	0.2	3.6	0.7	3.6	0.1
Total	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**

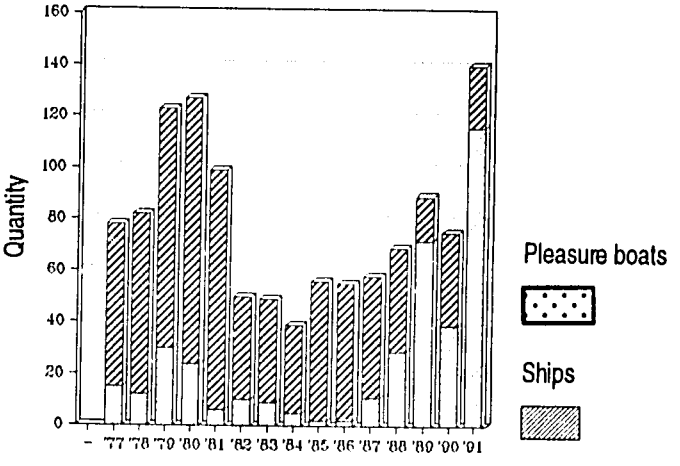
Table 7 *continued*

Commodity	1987		1988		1989		1990		1991	
	Qty	CIF Value	Qty	CIF Value	Qty	CIF Value	Qty	CIF Value	Qty	CIF Value
A. Used ships	77.6	92.1	46.4	95.3	15.7	96.2	48.0	97.2	12.1	92.0
B. New ships	0.0	0.0	1.4	0.0	0.0	0.0	0.0	0.0	3.6	5.7
C. Ships n.e.c.	3.4	2.1	10.1	1.7	3.4	0.0	0.0	0.0	1.4	0.1
D. Pleasure crafts	19.0	5.8	42.0	3.0	80.9	3.8	52.0	2.8	82.9	2.3
Total	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**

CIF : Cost, insurance, freight
N.E.C. : Not elsewhere classified

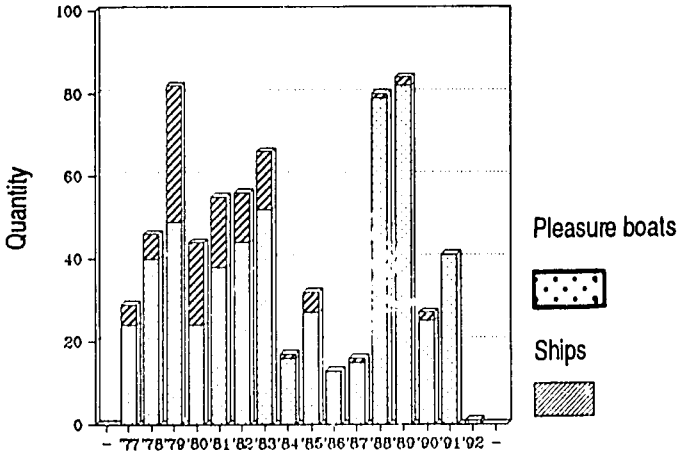
Source: *Foreign Trade Statistics*, 1977-1992. National Statistical Coordination Board.

Figure 1
Imports of Ships and Boats



Source: *Foreign Trade Statistics*, 1977-1991. National Statistical Coordination Board.

Figure 2
Exports of Ships and Boats



Source: *Foreign Trade Statistics*, 1977-1992. National Statistical Coordination Board..

vessels (97 percent) and pleasure boats (3 percent).[18] In contrast, the share of new vessels in the total volume of vessel imports rose only by 6 percent from zero in 1989.

Pleasure craft importations comprised a minor role in the country's volume of water vessel imports in the 1970s. But this decreased further with the 1981 TRP as tariff rates on these items were raised by an average of 42 percent. The economic crisis in 1983 further decreased demand for these luxury goods and only with the economic recovery in 1986 did imports begin to rise anew. Another reason for the increase could have been the removal of quantitative restrictions (QRs) in the same year.

The protection structure seemed to have a minimal effect on the importation of ships, although it contributed effectively in curtailing pleasure boats importation.

The reduction in tariff rates for some items, considered as material inputs, seemed to have increased their importation. Importation of some steel materials, such as hot-rolled metal plates and steel bars (majority of which are used mainly by the SB/SR industry) showed increments after these were liberalized in 1988. But in 1990, imports of these items declined by 37 percent which can be ascribed to the political and natural calamities experienced by the nation during the period and the ensuing Gulf Crisis.

Despite the removal of QRs for other material inputs, there were no remarkable increases in their importations except for watercraft engines (used by both boatbuilders and SB/SR firms) which were liberalized only in 1989.

Output

Value of output at constant prices for the entire shipbuilding, ship repair, and boatbuilding industry grew at different rates over the 1972 to 1988 period (Table 8). The oil price shocks in 1973 to 1974 caused output to fluctuate during the period. With the granting of several incentives and government assistance to the sector starting 1975,

18. Figures refer to the share of these vessels to the total value of imported vessels.

Table 8

Subsector Shares in Total Output, Census Value-added and Employment: 1972-1988

Year	Subsectors				Industry Aggregate
	Shipbuilding and Ship Repair		Boatbuilding		
			Value of Output*		
		% of Total		% of Total	
1972	99,589,000	94.65	5,634,000	5.35	105,223,000
1975	14,368,138	86.46	2,250,000	13.54	16,618,138
1978	44,157,968	98.44	701,771	1.56	44,859,739
1983	114,127,014	99.63	423,622	0.37	114,550,637
1988	96,871,047	96.75	3,253,810	3.25	100,124,857
			Census Value-added*		
1972	81,270,000	96.63	2,835,000	3.37	84,105,000
1975	32,705,251	77.16	9,679,594	22.84	42,384,845
1978	181,143,523	99.35	1,182,199	0.65	182,325,722
1983	54,701,118	99.79	112,441	0.21	54,813,559
1988	42,063,051	98.40	681,904	1.60	42,744,955
			Total Employment		
1972	4,769	88.84	599	11.16	5,368
1975	4,102	83.68	800	16.32	4,902
1978	12,017	98.17	224	1.83	12,241
1983	5,432	99.32	37	0.68	5,469
1988	4,824	93.15	355	6.85	5,179

*Base year = 1972

Source: *Census of Large Establishments*, Censal Years 1972-1988. National Statistics Office.

output composition changed. From nine shipbuilders in 1975, the number jumped to 31 in 1978, contributing 43 percent of total output. Despite these incentives, there was no change in the number of boatbuilders, and their output even decreased by 49 percent during the period 1975 to 1978.

With the foreign exchange controls in 1983 and the lifting of incentives in 1984, declines in shipbuilding projects occurred (Table 9). The worldwide recession and the stiff competition offered by the second-hand market for ships also contributed to the decline. Faced with the foreign exchange controls and slowdown in production activities resulting from the depressed demand for new ships, several shipyards shifted to ship repair activities. Despite the economic recovery in 1986, no resurgence in building activities surfaced since demand for ships was adequately met by used vessels from Japan. Growth in the sector's output was mainly due to repair activities which, because of the aging domestic fleet, flourished rapidly. In 1988, approximately 97 percent of the sector's output was contributed by SB/SR firms. Although the boatbuilders' share in industry output was only 3 percent in 1988, they experienced a 670 percent increase during the period 1983 to 1988.

Census Value-Added and Employment

Value-added and employment indicators during the 1972 to 1988 interval reveal varied trends basically analogous to the entire economy's growth pattern. As the economy picked up in 1988, the boatbuilding subsector increased its census value-added (CVA) from P112,441 in 1983 to P681,904. However the SB/SR sector's CVA decreased from P54,701,118 to only P42,063,051 (Table 8). In spite of the remarkable increments in the boatbuilding sector's value-added, its share in aggregate industry CVA remained low (0.37 percent in 1983 and 3.25 in 1988). The employment situation showed a similar pattern with the boatbuilding sector's share in total industry workforce increasing from 0.68 to 6.85 percent during the same period.

Table 9

Marina-registered Shipbuilding Projects: 1980 - 1991

	1980		1981		1982		1983		1984		1985	
Type of Project	No.	GRT*	No.	GRT	No.	GRT	No.	GRT	No.	GRT	No.	GRT
Barges	42		36		41	25,670	17	6,593	4	1,800	1	450
Tugboats	18		18		21	10,450	7	3,500			1	500
Cargo/passenger	8		6		23	22,500	5	3,096	1	5,000		
Fishing boat	40		12		15	606	7	436			1	40
Tanker	4		1				3	3,514				
Skiff/light boat							4		3		4	
Fiberglass-reinforced plastics	50		21				80		13		2	
Wooden												
Yacht												
Others					32		8		1	1437		
Total	**162**		**94**		**132**	**59,226**	**131**	**17,139**	**22**	**8,237**	**9**	**990**

Table 9 *continued*

Type of Project	1986		1987		1988		1989		1990		1991	
	No.	GRT*	No.	GRT	No.	GRT	No.	GRT	No.	GRT	No.	GRT
Barges	1	625	2	2,500	2		2	3,125			2	1,520
Tugboats	1	311	1	21	1						1	42
Cargo/passenger							3	1,093	2	957	3	809
Fishing boat	1											
Tanker					2		3	1.620	3	1.895		
Skiff/light boat	3				6							
Fiberglass-reinforced plastics												
Wooden												
Yacht		2							1			
Others											2	169
Total	**6**	**936**	**5**	**2,521**	**11**	**0**	1	865				
							9	**6,703**	**6**	**2,852**	**8**	**2,539**

*GRT (gross registered tons) = one of the standard measures for measuring the weight of water vessels.

Source: Maritime Industry Authority.

Exports

The country's exports of water vessels have been dominated by pleasure boats and small cargo ships since the 1970s. Other exports included small-sized fishing vessels. Industry informants, however, clarify that some of these ships were imported vessels which underwent conversion prior to export. Table 10 shows a comparison of the export performance of the SB/SR industry relative to the boatbuilding sector. Before 1981, ships, including used barges, cargo vessels, and ships below 3,000 gross tons dominated the total value of water vessel exports of the country, except in 1979 when exports of pleasure crafts amounted to $765,109 against $20,629 for ships. During the 1982 to 1984 period, exports of pleasure boats increased while that of ships declined. In 1983, exports of the sector were reduced, although pleasure boats still occupied a large part of the sector's export products. The succeeding years showed changing patterns, albeit after 1988, exports of ships became minimal. In 1991, the country exported pleasure crafts amounting only to $17,895 down from a peak of $759,737 in 1982. This can partly be explained by the economic slump which the country experienced in 1991.

Industry Structure Changes

Table 11 shows that, in terms of employment size, there was a distinctive increase in the number of small firms from 1983 to 1988, supporting the view that no substantial entry barriers existed for small repair and building yards. While there was no increment in the number of medium-sized plants, the large plants decreased from 10 to only six in 1988. Although these changes indicate an exit of large plants, another plausible reason is the decline in the number of employees, as plants moved to more capital-intensive production techniques. To verify this, the plants were again classified according to their capital assets.[19] Table 11 reveals that with the new classification,

19. Capital assets are measured in terms of the replacement costs of the firms' assets.

Table 10

Exports of Ships and Pleasure Crafts: 1977-1992
(In percent)

Commodity	1977		1978		1979		1980	
	Qty	CIF Value	Qty	CIF Value	Qty	CIF Value	Qty	CIF Value
A. Used ships	6.9	34.9	0.0	0.0	0.0	0.0	2.3	33.5
B. New ships	0.0	0.0	0.0	0.0	0.0	0.0	2.3	56.7
C. Ships n.e.c.	10.3	3.1	13.0	80.7	40.2	2.6	40.9	7.7
D. Pleasure crafts	82.8	62.0	87.0	19.3	59.8	97.4	54.5	2.2
Total	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**

Commodity	1981		1982		1983		1984	
	Qty	CIF Value	Qty	CIF Value	Qty	CIF Value	Qty	CIF Value
A. Used ships	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
B. New ships	3.6	58.4	0.0	0.0	0.0	0.0	0.0	0.0
C. Ships n.e.c.	27.3	15.4	21.4	35.0	21.2	8.0	5.9	7.7
D. Pleasure crafts	69.1	26.1	78.6	65.0	78.8	92.0	94.1	92.3
Total	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**

Commodity	1985		1986		1987		1988	
	Qty	CIF Value	Qty	CIF Value	Qty	CIF Value	Qty	CIF Value
A. Used ships	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
B. New ships	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
C. Ships n.e.c.	15.6	71.3	0.0	0.0	6.3	87.4	12.5	1.9
D. Pleasure crafts	84.4	28.7	100.0	100.0	93.8	12.6	87.5	98.1
Total	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**

Commodity	1989		1990		1991		1992	
	Qty	CIF Value	Qty	CIF Value	Qty	CIF Value	Qty	CIF Value
A. Used ships	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
B. New ships	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
C. Ships n.e.c.	20.0	10.7	40.7	0.4	0.0	0.0	0.0	0.0
D. Pleasure crafts	80.0	89.3	59.3	99.6	100.0	100.0	100.0	100.0
Total	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**

Source: *Foreign Trade Statistics*, 1977-1992. National Statistical Coordination Board.

Table 11
Plant Size by Subsector: 1983 and 1988

	Subsector					
	Boatbuilding			Shipbuilding and Repair		
	1983	1988	Change (%)	1983	1988	Change (%)
Employment size						
Small (5-99)	4	4		19	35	84.21
Medium (100-199)		1		4	5	25.00
Large (≥ 200)				9	6	-33.33
Total no. of plants	4	5	25.00	32	46	43.75
Capital Assets (Pesos)						
Small (< 5 Million)	4	5	25.00	11	31	181.82
Medium (5 - 20 Million)				11	9	-18.18
Large (≥ 20 Million)				10	6	-40.00
Total no. of plants	4	5	25.00	32	46	43.75

Source: *Census of Establishments*, 1983 and 1988. National Statistics Office.

the number of medium and large plants still declined signifying that the industry's structure was rationalized as the large inefficient plants were eased out.

Even with the absence of high entry barriers, the number of boatbuilders slightly increased from four in 1983 to only five in 1988. Majority of the plants in 1988 were all relatively larger than those in 1983.

To examine whether there was an increase in import competition, IPRs for the boatbuilding sector during 1983 and 1988 were computed. Note that Phase II of the ILP removed QRs for pleasure boats in 1986 while QRs for new ships remained until 1989. From a negative index in 1983, the IPRs became significantly high in 1988: 1.284 (Table 12). The negative IPR for 1983 can be explained by the fact that some imported pleasure boats were re-exported after these were "modified" by local boatbuilders. Since importation of these

Table 12

Indicators of Industry Structure: 1983 and 1988

Indicators	Boatbuilding			Shipbuilding and Ship Repair					
				Small and Medium**			Large**		
	1983	1988	Change (%)	1983	1988	Change (%)	1983	1988	Change (%)
Concentration ratios									
Concentration ratio 4									
Total revenues	1.00	0.97	-2.90	0.44	0.54	22.73	0.67	0.84	25.37
Census value-added	1.00	1.00	0.00	0.49	0.54	10.20	0.59	0.79	33.90
Herfindahl index									
Total revenues	0.90	0.45	-50.49	0.05	0.11	120.00	0.17	0.28	64.71
Census value-added	0.85	0.79	-7.01	0.06	0.12	100.00	0.17	0.26	52.94
1/N +	0.25	0.2		0.04	0.025		0.11	0.16	
Price-cost margin	0.08	-0.05	decreased	0.45	0.2	-55.56	0.32	0.17	-28.89
Import-penetration ratio	-0.05	1.284	increased		*			*	

* Cannot be computed due to lack of data.

** Size in terms of employment.

\+ Approximate shares of plants in terms of census value-added or total revenues if all of them have equal sizes.

Source: Computed from *Census of Establishments*, 1983 and 1988. National Statistics Office.

pleasure crafts were not done during the current year, this indicated that there was some increase in the sector's external competition.

Table 12 shows that during the 1983 to 1988 period, the concentration indices for the boat manufacturing sector declined, which may have been caused by increased internal competition. As noted earlier, the market for the SB/SR sector is segmented so that separate concentration indices for small or medium plants and large ones need to be calculated. Despite the increase in the number of small plants, their concentration indices rose, although the CR-4 values are still below the 60 percent benchmark for high concentration. A reason for this increase could be that highly efficient new entrants were able to get a large share of the market. For this segment of the sector then, there was an improvement in competition. The increased concentration for the large plants can be explained by the remaining plants' acquisition of the market shares of those which ceased operations. CR-4 indices for large plants, however, were greater than 60 percent in 1988. Although this might indicate an oligopolistic structure, industry sources elucidate that large plants, which have more advanced technology and bigger facilities, would have an advantage since they can service larger vessels more efficiently than other large plants with inferior technology and facilities with lower capacities. *Concentration indices therefore are not sufficient to prove collusive behavior* among the plants. Over this adjustment period then, the expansion and entry of small plants and the exit of inefficient large and medium ones occurred. Price-cost margins for the two sectors, however, declined implying a reduction in the profitability of these manufacturing activities.

Based on these findings, it could be inferred that the ILP contributed to better competitive conditions for the boatbuilding sector while changes in the structure for the SB/SR sector were not directly influenced by the trade liberalization episode.

Efficiency Performance

Domestic Resource Costs

A commonly used measure of efficiency in distorted economies is the domestic resource costs (DRC) criterion, which indicates the quantity of domestic resources used for every unit of foreign exchange earned or saved in the production of an economic good (Bautista et al. 1979). Comparative advantage of the producing sector is determined by comparing the DRC with the shadow exchange rate (SER). A positive DRC less than or equal to SER (DRC greater than SER) implies comparative advantage (disadvantage).

1983-1988 census of establishments data

Table 13 reveals that the DRCs of both sectors improved (i.e., decreased), with the boatbuilding industry showing a remarkable decrease in shadow DRC from 40.00 in 1983 to 33.11 in 1988. Comparison of the absolute values of the DRCs of the two sectors show that the boatbuilding sector has relatively lower DRCs than the SB/SR sector for both years. This means that the 66 percent reduction in EPR for the boatbuilding sector helped it in remaining less inefficient than the SB/SR sector in allocating its resources.

However, both subsectors did not meet the efficiency criterion defined by a DRC less than or equal to SER, signifying that they still had a comparative disadvantage in their respective activities in relation to other manufacturing activities. But the boatbuilding subsector's DRC/SER was lower than that of the SB/SR for both years implying that the former was a more efficient saver or earner of foreign exchange than the latter sector.

Results of the sensitivity analysis with respect to the interest rate show that higher interest rates lead to higher DRCs.

At the plant level, the number of efficient (or low-cost) SB/SR plants rose with 11 plants becoming efficient in 1988 from only nine in 1983 (Table 14). Moreover, from six small efficient plants in 1983, this increased to seven in 1988, although it could not be determined

Table 13

Efficiency and Protection Indicators by Subsector

Efficiency Measures	Shipbuilding/ Ship Repair			Boatbuilding		
	1983	1988	Change (%)	1983	1988	Change (%)
Domestic Resource Costs						
DRCs* (10% interest rate)	121.52	107.25	-11.74	40.00	33.11	4.96
DRCs (s.d.*)	225.34	270.63	20.10	1,064.77	2,010.93	88.86
DRC/SER	8.75	4.07	-53.51	2.66	1.47	-44.71
DRCm*	131.23	116.18	-11.47	39.96	42.80	7.10
DRC/OER	11.81	5.51	-53.34	3.60	2.03	-43.55
DRCs* (12% interest rate)	159.45	126.23	-20.83	39.54	41.72	5.51
DRCs (s.d.)*	103.43	278.88	169.63	399.01	5,292.35	1,226.37
DRC/SER	11.48	4.79	-58.30	2.85	1.58	-44.42
Technical efficiency index	0.39	0.29	-26.51	—	—	
Protection measure						
Effective protection rate	55.10	36.28	-34.15	60.14	20.44	-66.02
EPR (s.d.)	49.39	6.30	-87.24	1.73	0.56	-67.38

DRCs* = DRC at shadow prices
DRCm* = DRC at market prices
(s.d.*) = standard deviation
1983 Shadow exchange rate = 13.89
1988 Shadow exchange rate = 26.368
1983 Official exchange rate = 11.1147
1988 Official exchange rate = 21.0947

Source: *Census of Manufacturing Establishments*, 1983 and 1988.

Table 14

Domestic Resource Cost (DRC) by Plant Size

Plant Size (Employment)	Number of Plants: 0 < DRC/SER ≤ 1.2 Efficient		1.2 < DRC/SER ≤ 1.5 Moderately Inefficient		DRC/SER > 1.5 Inefficient		DRC/SER ≤ 0 Dissaving Foreign Exchange		Total	
	1983	1988	1983	1988	1983	1988	1983	1988	1983	1988
Boatbuilding										
5-99		1			3	3	1		4	4
100-199						1				1
>200										0
Total	**0**	**1**	**0**	**0**	**3**	**4**			**4**	**5**
Shipbuilding/Ship Repair										
5-99	5	6	1	6	10	18	3	5	19	35
100-199	2	3				2	2		4	5
>200		1			7	5	2		9	6
Total	**9**	**11**	**1**	**6**	**17**	**25**	**7**	**5**	**32**	**46**

Source: *Census of Manufacturing Establishments*, 1983 and 1988. National Statistics Office.

whether the same plants in 1983 were efficient in 1988. For medium-sized plants, the number of efficient firms remained the same during the period. Although no large plants were efficiently saving foreign exchange in 1983, one large efficient plant was observed in 1988. During this period, the share of efficient SB/SR plants in census value-added increased from 9.75 to 19.34 percent.

Out of five boatbuilders, only one was efficient in 1988, but this was an improvement over the year 1983 when no boat manufacturer was efficient. Looking at the standard deviations of SB/SR sectors' DRCs, one finds a decrease from 101.79 to 88.34. These results are still widely disparate, indicating that high-cost firms were allowed to operate along with the more efficient ones.

1986-1991 Survey of establishments data

The survey data covers the period when the tariff rates for the two sectors' products were altered and import restrictions on some ships were removed. This interval also covers the period when the boatbuilding firms were making adjustments to the removal of QRs, although they experienced higher protection (i.e., higher tariff rates) in 1991. Approximately 20 SB/SR firms responded to the survey with only 10 of them giving fairly complete data.

The calculated DRCs for these firms are presented in Table 15. From three efficient SB/SR firms in 1986, this dropped to only two in 1991. Of the three efficient ones in 1986, only one remained efficient in 1991 while the rest became highly inefficient.

Only two boatbuilding firms out of six had sufficient data for DRC calculations. The results showed that both firms became inefficient savers or earners of foreign exchange in 1991. This sector became even more protected in 1991, so that this could be one of the reasons for the observed inefficiency.

For both sectors then, the improvement in efficiency during the 1983 to 1988 period was not sustained in 1991. A major reason for this could be the existence of external factors which might have detrimentally affected the performance of the firms. As most shipyard managers claim, the general economic climate, which prevails over

Table 15

Domestic Resource Costs (1986 and 1991 Survey of Establishments)

A. Boatbuilding Subsector

(In shadow prices)

Firms	DRCs			DRC/SER**		
	1986	1991	Change (%)	1986	1991	Change (%)
F1	54 52	*	increased	1.95	*	increased
F2	236.03	*	increased	8.43	*	increased

(In market prices)

Firms	DRCm			DRC/OER***		
	1986	1991	Change (%)	1986	1991	Change (%)
F1	81.14	*	increased	3.62	*	increased
F2	250.30	*	increased	11.18	*	increased

B. Shipbuilding/Ship Repair Subsector

(In shadow prices)

Firms	DRCs			DRC/SER**		
	1986	1991	Change (%)	1986	1991	Change (%)
F1	24.33	310.85	11.78	0.87	9.05	9.41
F2	*	*	increased	*	*	increased
F3	*	*	increased	*	*	increased
F4	79,901.21	38.65	decreased	2,854.89	1.13	decreased
F5	58.69	36.89	-0.37	2.10	1.07	-0.49
F6	*	4,581.39	decreased	*	133.37	decreased
F7	*	*	increased	*	*	increased
F8	15.64	*	increased	0.56	*	increased
F9	35.30	*	increased	1.26	*	increased
F10	15.56	34.95	1.25	0.56	1.02	0.83

Table 15 *continued*

Firms	C. Shipbuilding/Ship Repair Subsector (In market prices) DRCm 1986	DRCm 1991	DRCm Change (%)	DRC/OER*** 1986	DRC/OER*** 1991	DRC/OER*** Change (%)
F1	28.86	349.48	11.11	1.29	12.72	8.87
F2	*	*	increased	*	*	increased
F3	*	*	increased	*	*	increased
F4	*	46.55	decreased	*	1.69	decreased
F5	138.95	43.61	-0.69	6.21	1.59	-0.74
F6	116.02	5,522.42	increased	5.18	200.96	increased
F7	*	*	increased	*	*	increased
F8	19.97	*	increased	0.89	*	increased
F9	38.72	*	increased	1.73	*	increased
F10	19.01	39.43	1.07	0.85	1.43	0.69

* Indicates that firms are negative savers/earners of foreign exchange

** 1986 Shadow exchange rate (SER) = 27.988

** 1991 Shadow exchange rate (SER) = 34.35

*** 1986 Official exchange rate (OER) = 22.39

*** 1991 Official Exchange Rate (OER) = 27.48

If a firm has a DRC/SER ≤ 1.2, it has comparative advantage over other firms.

If a firm has a DRC/OER ≤ 1.2, it has competitive advantage over other firms.

Source: *Survey of Manufacturing Establishments*, 1983 and 1988.

the year, greatly affects their operations. While the economy grew by 1.86 percent in 1986, the country posted only a .32 percent GNP growth rate for 1991 (NEDA 1992). The low growth rate in 1991, coupled with natural calamities and political instabilities, might have induced firms to perform less productively. Boatbuilders also explain that such problems damage their business as less people are likely to engage in cruising or yachting.

Small yards, however, blame too much competition as the reason for their underutilized facilities. Interviews with industry people reveal that trade policy changes affected their operations differently. With the increased imports of vessels, the small firms, which

constructed small fishing vessels and tugboats, had to institute certain cost-cutting measures, while firms engaged primarily in repair services felt that they benefitted from the proliferation of imported vessels.

Most of them claim, however, that it was the institution of the value-added tax and the removal of incentives similar to P.D. 666 which adversely affected their operating costs. Faced with higher costs, they simply adjusted their prices upward, which again affected their ability to compete with other yards, especially foreign ones. Given that most of them are engaged in fairly the same repair jobs, this would have minimal repercussions on their competitive positions if not for some yards which practiced underpricing.

One firm also pointed out that it was unable to perform efficiently because of some government policies, which prohibited its servicing of foreign vessels with a crew espousing different ideological beliefs. In effect, their facilities were often underutilized because of this clause in the firm's charter.

Most shipyard managers maintain that they have minimal problems with workers in terms of training and skills. However, there has been a growing shortage of qualified technical personnel in recent years because of the more lucrative opportunities offered by jobs abroad, especially in the Middle East.

The respondent boatbuilders explained that the recent trade reforms affected their operations in diverse ways. Although they benefitted from the reduction of tariff rates on their inputs, they felt that these were not enough to make them competitive internationally. Compared to other Asian boatbuilders who have duty-free privileges in importing raw materials and access to automated building equipment, local boatbuilders can not compete effectively.

Technical Efficiency

The Technical Efficiency Index (TEI) depicts how the resources of the plant were used effectively. A TEI close to one means that the plant is using its resources efficiently, or it is near the frontier which indicates the domestic 'best practice' technology. Due to the limited number of sample plants for the boatbuilding industry, TEI estimates

were done for the SB/SR subsector only. Table 13 reveals that the subsector's TEI showed a decrease from 39.46 percent in 1983 to only 29 in 1988. This means that the sector's efficiency in maximizing its output, given its resources, declined in spite of the fact that it became efficient in allocating its resources. The number of plants which had TEI's of 75 to 100 percent, i.e., the range of technically efficient plants according to Hill and Kalirajan (1991), dwindled from seven efficient plants (or 25 percent of the total plants) in 1983, to only two plants (or 4.3 percent of the total plants) in 1988. This decline could be attributed to the reduction in the number of technical and skilled personnel such as naval architects or engineers who were lured by more financially rewarding jobs abroad (Marina-JICA 1991). Another cause was the aging facilities of the shipyards which could not be upgraded immediately because of the large sums of money such an activity entailed.

Competitive Advantage

An industry's private profitability in the marketplace can be measured by the DRC, expressed in market prices (DRCm). Firms or plants with positive DRCm/OER less than or equal to 1.2 are considered efficient in the marketplace, relative to those having DRCm/OER greater than 1.2. Computations based on census data show that the two sectors were not performing profitably as shown by their high DRCms (Table 13). The decline in DRCm/OER over the adjustment period was not enough to make the two sectors competitive. The boatbuilding sector still had a competitive edge over the SB/SR sector as shown by its DRCm/OER ratio of 1.68, which is lower than the SB/SR sector's figure of 4.9 in 1988.

Looking at specific plants in the SB/SR sector, the number of plants having comparative advantage increased from seven to 10 plants during the 1983 to 1988 period. Only three plants showed competitive advantage during the same time interval. This indicates that socially efficient plants were not necessarily earning private profits.

Albeit no boatbuilder was performing profitably in 1983, one plant which showed a DRCm less than or equal to OER was observed in 1988. This plant also showed a comparative advantage over other plants.

Looking at specific factors which raised DRCm above shadow DRC, one finds that value of fixed assets and working capital increased, signifying that the high capital costs incurred by both sectors affected their competitiveness. Labor costs also increased by more than capital costs for the boat manufacturers, which may indicate that the distortive effects on wages of labor laws also had a negative impact on the efficiency of the sector in the market. For the SB/SR sector, its labor costs increased as well, but not as much as its capital costs.

The survey data revealed a similar pattern with the firms which were socially unprofitable, not earning as well in terms of private profits (Table 15).

Factor Intensity and Productivity Indicators

Both subsectors showed increases in their capital productivities (in real terms) with that of the boatbuilding sector increasing from .10 in 1983 to .14 in 1988 (Table 16). Capital productivity for the SB/SR sector rose slightly to .038 in 1988 from .037 in 1983. This could have resulted from the greater utilization of excess capacity which the firms maintained in 1983. During the same period, labor productivity for both sectors decreased with that of the boatbuilding sector declining from P3,038.95 to only P1,920.86 and that of the SB/SR falling from P10,070 to P8,719. The SB/SR sector, however, still remained more labor-intensive than the boatbuilding sector in absolute terms. The expansion of the boatbuilding sector's output was thus accompanied by an increase in its capital productivity, which could explain the table with observed improvement in efficiency performance. The rise in capital productivity for the SB/SR subsector could also be the cause of the improvement in the sector's efficiency. Capital-intensity for both subsectors declined, which might have caused the decrease in their labor productivity indices.

Table 16

Performance Indicators by Subsectors: 1983 and 1988

Performance Indicators	Shipbuilding/Ship Repair			Boatbuilding		
	1983	1988	Change (%)	1983	1988	Change (%)
Capital productivity (CVA/K)	0.037	0.038	1.83	0.10	0.14	43.09
Labor productivity (CVA/L)	P10,070.16	P8,719.54	-13.41	P3,038.95	P1,920.86	-36.79
Capital intensity (K/L)	268,903.71	228,648.41	-14.97	31,394.80	13,867.90	-55.83
Output per capital (VO/K)	0.08	0.09	12.41	0.36	0.66	81.23
Output per labor (VO/L)	21,010.13	20,081.06	-4.42	11,449.25	9,165.66	-19.95

Source: *Census of Manufacturing Establishments*, 1983 and 1988.

Discriminant Analysis

To provide a quantitative assessment of the relationship between industrial efficiency and certain plant characteristics, canonical discriminant analysis was employed. Two equations were specified: Equation 1 used the capital productivity index (CVA/K) as the discriminant variable for measuring factor productivity, while Equation 2 used the labor productivity index (CVA/L). Whether the discriminant function can effectively discriminate between the efficient and inefficient pla..ts, depends on the values of the Wilk's lambda and the canonical correlation coefficient (CCC). Table 17 shows that Equation 1 had a lower Wilk's lambda and a higher CCC than Equation 2. This implies that the discriminating variables of Equation 1 are more reliable than Equation 2. Thus, the CVA/K can be considered as a more important discriminating variable than CVA/L. The Wilk's lambda and CCC of Equation 1 equal .4493 and

Table 17

Results of Canonical Discriminant Analysis

	Equation 1	Equation 2
Wilk's lambda	0.4493	0.4756
Canonical correlation coefficient	0.7421	0.7246
Class means on canonical variables		
Low costs (efficient)	-0.9717	-0.9217
High costs (inefficient)	1.1799	1.1192
Variables	**Coefficient**	
Capital intensity (K/L)	0.9667	1.0369
Price-cost margin	-0.4911	-0.6012
Period of operation	0.4194	0.3955
Age of equipment	0.6733	0.6837
Legal organization	0.2473	0.3135
Capital productivity (CVA/K)	-0.3588	—
Labor productivity (CVA/L)	—	-0.3449

Source: *Census of Manufacturing Establishments*, 1983 and 1988.

.74, respectively, which means that the discriminating variables can be relied upon in distinguishing between low cost and high cost plants.

The variable that can discriminate effectively between the efficient plants and the inefficient ones (i.e., variables with high coefficients in absolute terms) is the capital-labor ratio (or capital-intensity) for both equations. For equation 1, the age of equipment index is the second most important variable, while in Equation 2, capital-intensity is the second most critical. These results suggest that capital is a vital element in determining the efficiency of the plants. They also imply that efficient and inefficient plants vary considerably in the amount of capital equipment which they employ. The existence of the PCM as a significant discriminating variable indicates the importance of the industrial structure in determining the relative efficiency of the plants.

The subgroup or class designated as efficient has a mean bearing the negative sign for both equations. Thus, coefficients of variables with values close to the value of the subgroup efficient (i.e., negative values) are directly correlated with efficiency. The farther the values of the coefficients are (i.e., the higher positive values of the variables) from the subgroup efficient, the more correlated they are with the subgroup inefficient. Two variables show negative signs for both equations: PCM and the factor productivity indices. This, therefore, implies that the factor productivity and the profitability measure (PCM) played an important role in the efficient performance of the plants. The positive value of the capital-intensity index signifies that plants, which used more capital-per unit of labor, were not necessarily efficient. The positive relationship between the PCM and efficiency implies that the more efficient plants were also operating profitably.

Factors Affecting Industrial Performance

External factors, such as demand conditions and the production environment, can have distinctive influences on the efficiency of the firms. Not all of these factors, however, can be influenced by policies so that any trade policy changes may not be adequate to make firms perform efficiently.

Demand Conditions

Although there are minimal problems with respect to the demand for ship repair, demand for new local ships has been low. As stated earlier, the primary constraints for local domestic construction include limited financing and the competition proffered by imported used vessels. Industry sources explain that domestic construction of a 1,000 dwt tanker in 1992 would reach around P35 to P40 million, while importation of second-hand 1,000 dwt tankers would cost only around P20 million. Furthermore, local construction would take approximately eight to 13 months, while importation of vessels would take only three to five months with lesser capital risks involved. At present, bareboat chartering provides the cheapest way for importing vessels, since it entails paying only a 4.5 percent tax as compared to building new vessels which leads to paying 35 percent in import duties and taxes (Study on Shipbuilding Industry 1989). The 12 percent limit on the rate of return on shipping investments and the numerous administrative problems regarding shipping rates and voyage routes have rendered the construction of new vessels not viable (Leverage International [Consultants], Inc. 1990). This lack of demand for new ship construction has not allowed the shipyards to gain the benefits of economies of scale which can lead to more efficiency gains.

Industry sources also claim that the long run costs of importing second-hand vessels are roughly equivalent to the long run costs of having ships locally built, because imported vessels have higher quality due to the technology applied in their construction. Thus, shipping lines prefer to buy second-hand vessels which require low initial capital requirements.

Some shipyard managers believe that growth of the SB/SR industry depends on developments in the shipping sector, and that the recent move to deregulate the shipping industry will have a positive impact on their operations.

As for the boatbuilding subsector, domestic demand has also been limited because of the high cost of these pleasure crafts. But the export market has been favorable for certain types of boats.

Barriers to Entry/Expansion

Entry barriers for the SB/SR sector include the large capital requirements for setting up the drydocking facilities. Based on survey data, high interest rates prove to be the most significant barrier to both entry and expansion, followed by technology acquisition, access to finance, and excessive competition. The last barrier is more pronounced in the case of small firms engaged mostly in repair jobs, where entry does not require much capital. New technology acquisition has also became an important entry barrier, since demand for quality repair jobs require the latest technology. One policy-related entry barrier, which foreigners find restrictive, is the constitutional prohibition of sole ownership by foreign nationals of firms engaged in particular production activities.

For the respondent boatbuilding firms, the most important barriers to entry are the limited domestic demand for their products, control by existing firms of the distribution channels, and bureaucratic procedures (for the new entrant). The limited local demand for pleasure boats arise from its nature as a luxury commodity and hence its high cost.

Technology-Related Factors

Most of the equipment and facilities found in domestic shipyards are old and require upgrading. This situation has effectively decreased the shipyards' ability to compete with other foreign yards. Only firms with foreign tie-ups enjoy the latest technology in their respective fields of operations.

Unlike shipbuilding nations such as Japan and South Korea where shipyards have close links with research institutions, the country has no research institution which caters to the technology needs of the industry.

The present technology practiced by boatbuilders may be labor-intensive but their products are competitive in the world market in terms of quality. Their main problem is the delivery time of their products, which is determined by the labor-intensive nature of their production techniques.

Ancillary Industries

Most of the SB/SR's raw material requirements are imported because the local support industries are unable to meet the quality standards required by the shipyards. The local iron and steel industry can only provide steel sheets and structures up to a certain thickness (Leverage International [Consultants] Inc. 1990). No industrial machinery industries exist in the country which caters to the specific needs of the sector so that engines and other equipment have to be imported. Faced with high tariff rates and numerous bureaucratic requirements, most firms are unable to meet the delivery schedules set by the client ships.

All these elements affecting industrial productivity clearly supports the idea that the industry faces several constraints in their productivity growth, which may not be effectively minimized by trade policy reforms. Assistance programs aimed at helping the sector should be geared towards reducing or even eliminating these bottlenecks toward the sector's productivity growth.

Shipbuilding/Repair Policies of Selected Asian Countries

Among the leading SB/SR nations in the world, Korea and Japan have successfully implemented policies geared at improving their SB/SR sectors. The current policies of the Korean government revolve around three aspects: upgrading and maintenance of present facilities, technology development, and "localization" of equipment and machineries. Similarly, the Japanese government puts emphasis on technological development, specifically, manpower development training, and the development of "ships of the next generation." Another policy currently pursued by Japan is the provision of technology-related assistance grants to other countries through manpower training schemes. This has been a major source of assistance for Philippine shipbuilders and repairers.

The Indonesian and Thailand governments are actively promoting their SB/SR industries through several fiscal and marketing assistance

schemes. Both countries offer duty-free importations of equipment, machineries, and raw materials used by the sector. What is very important in these laws are that they are effectively followed and executed by the implementing agencies.

Singapore also promotes its SB/SR industry, but the development of its maritime industry, however, is due to its location as the crossroads for major shipping lanes in the Asia Pacific. Industry experts assess that Singaporean yards are able to compete effectively in terms of price and quality, so that current policies are addressed at optimizing and enhancing skills training, application of mechanized technology to shipyard operations, closer cooperation between specialized tertiary institutions and shipyards, and continued government investment in research and development (R&D) infrastructure.

These policies show some similarities with Philippine SB/SR laws and regulations. What is lacking is strict enforcement and sustainability in policy implementation. The Marina is tasked with regulating the sector, but its limited resources has severely restricted its efficiency. Its regulatory decisions may also have introduced some distortions which have affected the sector adversely (Balisacan 1990).

7

Conclusion and Recommendations

THE study reveals that the 1981 trade reforms resulted in lower protection levels for the SB/SR and boatbuilding sectors during the 1983 to 1988 period, but the changes were minimal because the tariff rates for the two sectors' outputs were not altered. Quantitative restrictions were still pervasive in the SB/SR during this period, while importation of pleasure boats were liberalized only in 1986. Estimates of the EPRs, however, reveal that the boatbuilding sector became less protected than the SB/SR sector in 1988 and the EPRs within the two sectors were narrowed down. But the 1991 TRP resulted in a different outcome: very low tariff rates for ships and high tariff rates for pleasure boats. This implies that the effective protection received by the SB/SR sector continued to decline while that of the boatbuilding sector increased.

Trade liberalization benefitted the sectors by lowering high tariff rates and removing non-tariff barriers on imported raw materials, making these more accessible to domestic producers. As a result, both sectors posted gains in their productivity performance between 1983 and 1988 with the boatbuilding subsector performing relatively better. Capacity utilization and capital productivity were raised. More competition from foreign pleasure boats also induced domestic boatbuilders to adopt cost-cutting measures, thereby improving their efficiency and competitiveness. These results, along with the normalization of economic and political activities in 1986, led to the expansion of the outputs of firms in both sectors.

While ship repair operations expanded, shipbuilding activities further declined because of market conditions and government policies which discouraged ship manufacturing activities. Unable to

compete efficiently with imported used vessels, local ship producers shifted to repair activities. This flexibility in shipyard operations has been the main reason why shipyards continue their activities even with the decline of orders for new ships.

Mixed changes in the structure of the two sectors occurred during the adjustment period. Concentration in the boatbuilding sector declined, but that in the SB/SR sector increased despite the rise in the number of small- and medium-sized SB/SR plants. An explanation for this could be that some of the new entrants were very efficient, which allowed them to take a large share of the market, resulting in the increase in concentration. Profitability for both subsectors, however, declined.

All these findings can only be partly attributed to the relaxation of trade policies, since there were other macroeconomic events and non-price factors which might have influenced the firms' responses. Thus, despite some favorable developments on the trade policy side, the industry still did not attain the efficiency level (defined by a positive DRC/SER less than or equal to one which would have allowed it to gain comparative advantage. One should note, however, that the analysis covers the 1983 to 1988 period which is considered only as a transition period, since the TRP is still in progress. Results of the analysis show that the observed improvement in 1988 were not sustained in 1991. Structural- and policy-related factors have probably been responsible for these inefficiencies. On the supply side, outdated technologies, huge capital requirements for expansion or technology acquisition, and lack of quality raw materials are among the structural impediments to the better performance of the sectors. Under strong demand growth conditions, these impediments would normally be overcome but obstacles on the demand side, such as scarcity of capital for ship construction, ship financing, and the oligopolistic nature of the domestic shipping industry, proved to be problematic as well. Like the SB/SR sector, the boatbuilders also faced serious constraints such as lack of information and scarce domestic marketing channels and infrastructure problems, specifically, the lack of marinas for launching their boats. In addition, inconsistent and restrictive government policies have adversely affected the performance of the sectors. One

glaring example of this was the implementation and withdrawal of incentives under P.D. 666 over a few months.

These concerns were pointed out in past studies and most of them concluded that government should actively participate in developing the industry. The SB/SR sector plays a vital role in the growth of the entire maritime industry, and the shipping sector cannot perform efficiently without its capable support. A review of SB/SR policies of our Asian neighbors also reveals active government involvement with the sector. Whatever decisions the government make, serious consideration must first be made as to whether the promoted sector has a potential dynamic comparative advantage or not.

Results of the study indicate that the boatbuilding sector is a relatively less inefficient foreign exchange earner or saver than the SB/SR sector. This supports the view that manufacturers of water vessels in the country have the potential for being competitive in the construction of small boats. It is recommended then that shipyards tap their resources in the production of boats. Just recently, some foreign boatbuilders successfully manufactured yachts to ply the inter-island routes. This practice can be a starting point before construction of larger vessels is undertaken. Besides, the favorable export market for these boats will allow the firms to take advantage of scale economies. Shipbuilders and repairers should also continue to upgrade their technology to become competitive. Boatbuilders should also consider entering into joint ventures with foreign partners for purposes of technology acquisition and marketing collaboration. They should also continue joining international pleasure boats exhibits to improve their designs and image.

It is also recommended that further studies be made on the impact of domestic policies, especially with the 1991 trade policy reforms which have further decreased trade protection for the SB/SR sector but increased that for the boatbuilding sector. It is also interesting to look into how the recent deregulation of the shipping industry affects the SB/SR sector.

The policy implications of the study include the continued liberalization of the sectors concerned, especially on the input side, to improve access to necessary material inputs. Policy reforms should

also be made to address the high interest rates, foreign exchange controls, and wage distortions which have prevented the firms from achieving international competitiveness. Government should also:

1) Improve customs administration;
2) Foster and strengthen the access of local firms to more advanced technologies by continuing its programs on developing appropriate technologies through the Marina and the large shipyards;
3) Develop the sectors' access to financial resources, especially for acquiring new technologies;
4) Help in the dissemination of information regarding government policies affecting the industry (e.g., duty drawbacks);
5) Implement efficiently the duty drawback system and other incentive policies so as to encourage domestic firms to export their products, and to remove the bias against small firms; and
6) Assist in the dissemination of market information.

More significantly, the government should continue to develop the country's infrastructure services (telecommunications, power supply, marinas for boats, ports and wharves) which are dismally inadequate.

Recent developments in the SB/SR sector reveal that foreign shipyards are interested in investing in the country due to its abundant labor force. From a policy viewpoint, it is beneficial then if the government continue to simplify its investment procedures. Owing to the large capital outlays needed by the SB/SR sector, foreign capital is of great help in alleviating the sector's plight.

▲

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Appendices

Appendix 1

Top Seven Shipyards in the Philippines (As of 1992)

	Company Name	Capacity (DWT)	Percentage
*	1. Subic Shipyard and Engineering, Inc. (formerly PHILSECO)	300,000	52.62
**	2. Keppel (Philippines) Shipyard, Inc. subsidiary: Cebu Shipyard & Engineering Works, Inc.	43,550	7.64
	3. AG &P Batangas Marine and Fabrication Yard	39,900	7.00
	4. 7-R Port Services	24,000	4.21
	5. Sandoval Shipyard, Inc.	19,000	3.33
	6. Philippine Trigon Shipyard	9,750	1.71
	7. F.F. Cruz & Co., Inc.	7,500	1.32
	8. Others	126,453	22.18
	Total capacity	**570,153**	**100**

* Acquired by Philyard Holdings Inc. in December 1993.

** Acquired the Philippine National Oil Corporation (PNOC) Dockyard in 1992 but started operations only in mid-1993.

Source: *Malaya* Shipping Special Feature, June 28, 1993 (based on MARINA Reports).

Appendix 2

Government Policies Affecting the Shipbuilding/Repair and Boatbuilding Industry

A. Pre-TRP Policies/Programs

Laws/Programs	Description	Remarks
Executive Order No. 356 (1950)	Established the National Shipyards and Steel Corp.(NASSCO) to embark upon a Shipbuilding Program and to develop iron and steel mills/foundries.	Lack of capital hampered NASSCO from operating efficiently. Its facilities, e.g., Bataan National Shipyards, were too large for the interisland ships, yet too small for ocean-going vessels.
Republic Act No. 1407 Philippine Shipping Act of 1955 (August 1955)	Allocated funds from the National Treasury not otherwise used for the procurement of vessel from domestic or foreign sources through the National Development Corporation (NDC) and Reparations Commission.	Discouraged local construction as shipping lines opted for the purchase of imported vessels which were readily available.
Republic Act No. 1909 Philippine Coastwise Shipping Act of 1956 (22 June 1957)	Appropriated funds for financing the local construction of vessels.	The law was never implemented since Congress did not indicate the source of the funds.
Republic Act No. 5186 Investment Incentives Act Omnibus Investments Code of 1967 Board of Investments (BOI)	The industry was included in the first Investments Priorities Plan as a preferred area of investment.	The industry was finally afforded incentives which included, among others, accelerated depreciation, tax credit on domestic capital equipment, and pre-operating expenses tax exemptions.

Appendix 2 *continued*

Republic Act No. 6135 Export Incentives Act of 1970 Board of Investments (BOI)	Provides incentives to export-oriented industries.	The boatbuilding sector was a beneficiary of such incentives.
4th Investments Priorities Plan (02 May 1970)	The industry was still classified as a pioneer non-pioneer industry depending on the size of vessels constructed or plant facilities.	Several shipyards availed of the incentives and total approved capacities as of 1972 were: a) Barges and tugboats - 65,600 dwt b) Fishing vessels - 12,565 gt c) Inter-island ships - 21,400 gt
Republic Act No. 37 Revised Tariff Customs Code of the Philippines as amended by Presidential Decree No. 34 (October 1972)	Levied parts and raw materials of the SB/SR industry a minimum rate of 10 percent.	The industry claimed that this law penalized them since most of their construction materials were imported.
Presidential Decree No. 474 Maritime Industry Decree Maritime Industry Authority(MARINA) (01 June 1974)	Instituted the MARINA which is an attached agency of the Department of Transportation and Communications (DOTC).	The agency was tasked with accelerating the integration of the entire maritime industry.
Philippine Merchant Marine Rules and Regulations (PMMRR)	Governs the rules regarding the construction of vessels in the country to ensure that vessels meet the highest standards of safety. Requires passenger vessels to be drydocked annually and for cargo ships to be drydocked once every 2 years.	Law is based on U.S. Coast Guard Rules and American Bureau of Shipping Rules which are not suited for Philippine purposes. At present, the law is being revised.

Appendix 2 *continued*

BOI 1973 10-Year Shipping Program (February 1973)	Foreign consultants were hired to assess the state of the industry. The program established the Shipping Fund through the Development Bank of the Philippines (DBP).	The program came up with plans to integrate the four sectors of the maritime industry.
Presidential Decree No. 666 (05 March 1975)	Provided incentives to the industry even if they were not registered with BOI, so long as they were licensed by MARINA.	Helped tremendously the small shipyards who had difficulty acquiring support from BOI.
1977 Central Bank Circular	Importation of ships and boats required approval from the Central Bank, but those ships which fall under the capacity of the local shipyards were restricted.	
Presidential Decree No. 1059	Tasked the MARINA with regulating the operations of the SB/SR industry.	
Presidential Decree No. 1221 (17 October 1977)	Required all Philippine-owned or registered vessels to undertake repairs and drydocking with MARINA-registered shipyards only.	The law would have ensured a captured market for the SB/SR industry but the existence of exemptions and low penalty rates rendered the law somewhat ineffective.

Appendix 2 *continued*

B. Trade Reform Program		
1981 Tariff Reform Program (TRP)	Revised the tariff rates for the importation of vessels to the 10 to 50 percent range over a 5-year period.	Refer to Appendices 5 and 6 for details.
1981 Import Liberalization Program (ILP)	Aimed for the removal of quantitative restrictions on several imported items.	Shelved because of the foreign exchange crisis in 1983.
C. Post-TRP Policies/Programs		
P.D. No. 1955 (15 October 1984)	Cancellation of P.D. 666	The increase in operating costs for the small shipyards adversely affected their operations .
Marina Memo Circular (MC) No. 32 FIRB Resolution No. 3-86 (04 February 1986)	Restored the incentives under P.D. 666 formerly granted to the industry.	The SB/SR were again given incentives such as tax-free importation of raw materials.
Marina MC No. 25-D (01 July 1986)	Revised the age limitation (vessels must be <15 years) and other guidelines in the importation or bareboat charter of inter-island vessels.	Totally restricted the importation of pleasure crafts and barges.
Import Liberalization Program Phase (April 1986- April 1988) CB Circular 1109 (18 July 1986)	Removed the quantitative restrictions on the importation of pleasure crafts and yachts.	Approval from Central Bank is no longer required when importing pleasure crafts.

Appendix 2 *continued*

Executive Order No. 93 which took effect only on March 10, 1987 as per department order No. 44-87 of the Department of Finance (17 December 1986)	Cancelled FIRB Resolution No 3-86.	Once again, the incentives were removed causing the operating costs of shipyards to surge.
Executive Order No. 226 (1987 Omnibus Investments Code)	Incentives were still afforded to SB/SR firms who were registered with BOI	Only the large firms in the industry were able to enjoy these incentives.
BOI Incentives (1989)	Granted pioneer status to SB/SR firms with capacities of 10,000 and above.	This effectively limited the availment of incentives to the large shipyards in the country.
Import Liberalization Program Phase II (December, 1988-) CB Circular No. 1210 (14 September 1989) and CB Circular No. 1212 (06 October 1989)	New vessels can now be imported without any limit on the quantity of such watercrafts.	(Refer to Table 7 for details) Certain items are still subject to regulation and are included in the List C of CB Regulated Items.
Executive Order 125 Marina MC No. 55 Guidelines for the Legalization of Colorum Shipbuilder/Repairers (03 July 1990)	Required small shipbuilders/repairers licenses from MARINA or else pay a fine of Pt25,000.00.	Although the law was implemented to reduce the number of shipyards operating without license, only eight colorum shipyards registered with Marina as of July 10, 1993.

Appendix 2 *continued*

National Emergency Memo No. 8 (26 January 1990)	Modified the tariff rates for certain inputs of the industry.	The sector benefited from the reduction in the tariff rates of their material inputs.
1991 Tariff Reform Program (E. O. 470)	Further reduced the tariff rates on imported water vessels.	
Memo Order No. 363 (1991)	Approved the 1991 Investment Priorities Plan of BOI which granted pioneer/non-pioneer status to the SB/SR Industry.	
Senate Bills supporting the industry		
Senate Bill 774 Shipbuilding and Ship Repair Industry Incentives Act of 1992	Exempts from import duties and taxes the importation of machinery, equipment and materials for the SB/SR industry.	Currently being discussed in the Senate although no substantial developments are forthcoming.

Sources: Policy and Planning Division, Marina.
"DBP Study on Shipping and Ship Repair Industry," 1990.
Tariffs and Customs Code of the Philippines, 1986 and 1991.
"DCP Study on the Shipbuilding and Shiprepair Industry, 1972.

Appendix 3

Government Policies Affecting the Shipping Industry

Shipping Policies and Laws	Description	Remarks
Presidential Decree No. 215 (16 June 1973)	Exempts Filipinos who import ocean-going vessels from the 10 percent customs duty and 7 percent compensating tax.	
Presidential Decree No. 667 (05 March 1975)	Grants additional deductible items for income tax purposes to individuals who import ships/vessels.	
Presidential Decree No. 760 (31 July 1975)	Allowed the temporary registration of foreign-owned vessels (under a particular time period or lease) to Philippine nationals for use in domestic shipping.	
Presidential Decree No. 806 (03 October 1975)	Provides for several other incentives to businessmen who engage/develop overseas shipping.	
Bareboat Chartering Program (1984)	Allowed Filipino entrepreneurs access to foreign-owned vessels to further their businesses abroad.	

Appendix 3 *continued*

Executive Order No. 226 (1987 Omnibus Investments Code)	Shipping firms can avail of incentives like import tax exemption for capital equipment and domestic tax credit for the acquisition of locally-made container vessels.	
Marina Memo Circular No. 51	Requires all shipping lines which wish to avail of incentives under E.O. 226 to get accreditation from the Marina.	Data from the Marina reveal that as of 1993, 18 vessels have been purchased through EO No. 226.
Republic Act No. 6647 (February 1988)	Reduced the import duties and taxes on vessels from 70 to 20 percent with certain age and size requirements set by Marina.	
Marina Memo Circular No. 71 (22 October 1992)	Defined the implementing guidelines on the regulation of the water transport services pursuant to DOTC Dept. Order No. 92-587.	Simplified the rules governing the entry and exit of firms into the industry, rates and fare setting and other provisions which might lead to a more competitive industry.
Marina Memo Circular No. 25-E (23 November 1992)	Required all passenger, cargo-passenger and ferry vessels belonging to the existing inter-island fleet to be classed by any internationally recognized classification society.	

Sources: Policy and Planning Division, Marina; DBP Study on Shipping and Ship Repair Industry, 1990; PDCP Study on the Shipbuilding and Ship Repair Industry; 1972.

Appendix 4

Recipients of Board of Investments Incentives: 1967-1991

Date Registered	Firms	Permit Status	Market Orientation	Registration Law
01/24/72	Cebu Shipyard & Engineering Works, Inc.	Non-pioneer	Domestic	RA 5186
07/17/72	Philippine Iron Construction and Marine Works	Pioneer	Domestic	RA 5186
04/11/75	Sandoval Shipyard, Inc.	Non-pioneer	Domestic	RA 5186
11/10/75	Keppel (Philippines) Shipyard, Inc.	Non-pioneer	Domestic	RA 5186
07/20/90		Non-pioneer	Export	EO 226
01/05/76	AG & P Batangas Marine and Fabrication Yard	Non-pioneer	Domestic	RA 5186
01/16/78	Philippine Shipyard and Engineering Co. (PHILSECO) (later renamed Subic Shipyard and Engineering, Inc.)	Pioneer	Domestic	RA 5186
01/28/82	Philippine Aerospace Development Corp.	Pioneer	Domestic	PD 1789
11/04/87	Philippine Aircraft Co., Inc.	Non-pioneer	Export	EO 226
01/14/88	Aviation Composite Tesh	Non-pioneer	Export	EO 226
07/18/88	TSI Ship & Yacht Builders, Inc.	Non-pioneer	Export	EO 226
07/21/89	PADACO Marine Works and Shipbuilding Corp.	Non-pioneer	Domestic	EO 226
07/26/89	Mayon Docks, Inc.	Pioneer	Domestic	EO 226

Source: Board of Investments.

Appendix 5

Tariff Rates for the Shipbuilding/Repair Subsector: 1972-1995

	Description	Rate of Duty (%)							
		1972	1978	1981	1983	1988	1991	1993	1995
Output									
	Ships								
1	Tankers	25	20	30	30	30	3	3	3
2	Other vessels for goods and passenger	25	20	30	30	30	6	6	6
3	Fishing vessels	25	20	30	30	30	6	6	6
4	Other ships and boats	15	15	30	30	30	6	6	6
	Average	**22.50**	**18.75**	**30.00**	**30.00**	**30.00**	**5.25**	**5.25**	**5.25**
Inputs									
	Iron and steel								
1	Alloy pig iron	0	10	5	5	5	3	3	3
2	Other bars and rods of iron or non-alloy steel not further worked then forged, hot-rolled	0	0	20	20	20	10	10	10
3	Angles, shapes and sections of iron or non-alloy steel (average tariff)	80	70	20	20	20	15	15	15
4	Wire of iron or non-alloy steel (average tariffs)	0	0	10	10	10	30	30	30
5	Wire of other alloy steel	0	20	10	10	10	10	10	10
6	Sheet piling of iron or steel	100	50	50	30	20	20	20	20
7	Stranded wire, ropes and cables	30	20	10	10	10	10	10	10
8	Barbed wire of iron or steel	30	30	30	30	30	30	30	30
9	Anchors, grapnels and parts thereof of iron and steel	0	0	10	10	10	10	10	10

Appendix 5 *continued*

Description	Rate of Duty (%)							
	1972	1978	1981	1983	1988	1991	1993	1995
10 Screws, bolts, nuts, washers, rivets and similar articles of iron or steel	50	50	10	10	10	30	30	30
11 Springs of iron and steel	30	30	30	30	30	30	30	30
12 Other articles of iron or steel	50	50	60	40	40	40	35	30
13 Ships rudders of steel	0	0	30	30	30	10	10	10
Average	**28.46**	**25.38**	**22.69**	**19.62**	**18.85**	**19.08**	**18.69**	**18.31**
Outfitting metals								
1 Refined copper and copper alloys	10	10	10	10	10	3	3	3
2 Copper bars, rods and profiles	10	10	20	20	20	30	20	20
3 Aluminum	15	15	20	20	20	30	30	30
Average	**11.67**	**11.67**	**16.67**	**16.67**	**16.67**	**21.00**	**17.67**	**17.67**
Machineries								
1 Marine propulsion engines	10	10	10	20	20	20	10	10
2 Other engines	10	10	10	20	20	20	10	10
3 Parts of engines	10	10	10	20	20	20	10	10
4 Other engines and motors includes turbo-propellers, reaction engines, and parts	10	10	10	10	20	20	10	10
Average	**10**	**10**	**10**	**17.5**	**20**	**20**	**10**	**10**
Electrical equipment								
1 Motors and generators	30	30	20	20	20	25	15	15

Appendix 5 *continued*

Description	Rate of Duty (%)							
	1972	1978	1981	1983	1988	1991	1993	1995
2 Other transformers	50	50	30	30	30	20	20	20
3 Primary cells and batteries	50	50	40	30	30	30	30	30
4 Electrical starting and ignition equipment for internal combustion engines	30	30	30	30	30	10	10	10
5 Transmission apparatus for navigational use	100	100	80	60	50	10	10	10
6 Electrical wirings	30	30	20	20	20	10	10	10
Average	**48.33**	**48.33**	**36.67**	**31.67**	**30.00**	**17.50**	**15.83**	**15.83**
Paints and varnishes								
1 Water-thinned paints	130	100	70	40	40	40	30	30
2 Other paints or enamels; varnishes	100	100	70	40	40	40	40	30
3 Pigments in paint or enamel media	0	0	70	40	40	20	20	20
Average	**76.67**	**66.67**	**70.00**	**40.00**	**40.00**	**33.33**	**30.00**	**26.67**
Others								
1 Cement	50	50	50	50	40	50	30	30
2 Wood	100	50	47	40	37	43	40	30
Average	**75.00**	**50.00**	**48.33**	**45.00**	**38.33**	**46.67**	**35.00**	**30.00**
Total material inputs average (Unweighted)	**35.97**	**32.10**	**29.41**	**25.00**	**24.25**	**22.24**	**19.06**	**18.26**

Source: *Tariff and Customs Code of the Philippines*, 1972, 1978, 1982, 1991.

Appendix 6

Tariff Rates for the Boatbuilding Subsector: 1972-1995

Description	Rate of Duty (%)								
	1972	1978	1981	1983	1986	1988	1991	1993	1995
Output									
Boats (Pleasure/Sports)									
1 Yachts and pleasure boats	25	30	37	37	37	37	50	40	30
Input									
Wood									
1 Fibre building board of wood	100	50	60	40	30	30	50	40	30
2 Plywood	100	50	40	40	40	40	50	50	50
3 "Improved" wood, in sheets or blocks	100	50	40	40	40	40	30	30	30
Paints and varnishes									
1 Water-thinned paints	130	100	70	40	40	40	40	30	30
2 Other paints or enamels; varnishes	100	100	70	40	40	40	40	40	40
3 Pigments in paint or enamel media	0	0	70	40	40	40	20	20	20

Appendix 6 *continued*

Description	Rate of Duty (%)								
	1972	1978	1981	1983	1986	1988	1991	1993	1995
Iron and steel									
10 Screws, bolts, nuts, washers, rivets and similar articles of iron or steel	50	50	10	10	10	10	30	30	30
11 Springs of iron and steel	30	30	30	30	30	30	30	30	30
12 Other articles of iron or steel	50	50	60	40	40	40	40	35	30
14 Rails	20	20	20	20	20	20	20	20	20
Resin and fiberglass									
1 Condensation and polycondensation products	60	50	40	30	25	25	20	20	20
2 Natural resins and artificial resins obtained by natural means	40	40	35	30	25	25	20	20	20
3 Other artificial resins	50	50	50	40	30	30	20	20	20
4 Fiberglass	70	50	50	40	30	30	20	20	20
Average	**64.2**	**49.2**	**46.0**	**34.2**	**31.4**	**31.4**	**30.7**	**28.9**	**27.8**

Source: *Tariff and Customs Code of the Philippines*, 1972, 1978, 1982, 1991.

Appendix 7

List C: Items for Continued Regulation for the Shipbuilding, Ship Repair and Boatbuilding Industry

1. Warships of all kinds
2. Tankers of all kinds, used
3. Barges of all kinds, used
4. Other vessels for goods transport (including those for both passenger and goods), used
5. Trawlers and other fishing vessels; factory ships used in fishing-related operations, used

Restrictions are imposed for reasons of safety and quality.

Source: Central Bank of the Philippines.

Appendix 8

Imports of Ships: 1977-1991

Commodity	1977		1978		1979		1980	
	Qty	CIF Value	Qty	CIF Value	Qty	CIF Value	Qty	CIF Value
Used								
Tankers	2	1,765,965	1	398,450	3	3,283,058	7	32,936,370
Barges	1	14,970	0	0	0	0	2	780,500
Other cargo and passenger ships	24	1,934,884	38	39,349,499	33	39,381,147	40	59,832,976
Trawlers and fishing vessels	27	2,035,459	24	4,737,124	34	9,847,504	41	3,248,245
Subtotal	54	5,751,278	63	44,485,073	70	52,511,709	90	96,898,091
New								
Tankers	0	0	0	0	0	0	0	
Barges	0	0	2	696,450	0	0	2	24,663,788
Other cargo and passenger ships	3	25,481,823	1	3,951,750	2	221,272	0	0
Trawlers and fishing vessels	0	0	1	58,000	0	0	5	736,000
Subtotal	3	25,481,823	4	4,706,200	2	221,272	7	25,399,788
Ships not elsewhere classified								
Ships from 250 to 3,000 gross tonnage	3	2,968,957	0	0	1	4,500,000	1	200,000
Ships more than 3,000 gross tonnage	2	3,400,670	0	0	0	0	0	0
Ships less than 250 gross tonnage	1	40,045	3	422,298	20	77,064	5	113,099
Subtotal	6	6,409,672	3	422,298	21	4,577,064	6	313,099
Total	**63**	**37,642,773**	**70**	**49,613,571**	**93**	**57,310,045**	**103**	**122,610,978**

Appendix 8 *continued*

Commodity	1981 Qty	1981 CIF Value	1982 Qty	1982 CIF Value	1983 Qty	1983 CIF Value	1984 Qty	1984 CIF Value
Used								
Tankers	1	6,200,000	0	0	0	0	1	709,622
Barges	0	0	1	122,976	2	390,690	0	0
Other cargo and passenger ships	25	29,938,426	15	10,760,310	14	8,445,127	4	585,984
Trawlers and fishing vessels	56	11,345,794	17	654,4931	23	699,367	24	295,957
Subtotal	82	47,484,220	33	17,428,217	39	9,535,184	29	1,591,563
New								
Tankers	0	0	0	0	0	0	1	549,837
Barges	1	44,186	0	0	0	0	0	0
Other cargo and passenger ships	3	30,817,044	0	0	0	0	0	0
Trawlers and fishing vessels	1	375,000	1	3,758,655	0	0	0	0
Subtotal	5	31,236,230	1	3,758,655	0	0	1	549,837
Ships not elsewhere classified								
Ships from 250 to 3,000 gross tonnage	1	3,145,928	0	0	0	0	0	0
Ships more than 3,000 gross tonnage	0	0	0	0	0	0	0	0
Ships less than 250 gross tonnage	5	10,878	6	81,983	1	62,437	4	8,948,261
Subtotal	6	3,156,806	6	81,983	1	62,437	4	8,948,261
Total	**93**	**81,877,256**	**40**	**21,268,855**	**40**	**9,597,621**	**34**	**11,089,661**

Appendix 8 *continued*

Commodity	1985 Qty	1985 CIF Value	1986 Qty	1986 CIF Value	1987 Qty	1987 CIF Value	1988 Qty	1988 CIF Value
Used								
Tankers	0	0	1	72,000	2	400,000	1	1,210,000
Barges	0	0	0	0	0	0	0	0
Other cargo and passenger ships	2	201,026	6	760,770	16	2,539,082	11	7,804,141
Trawlers and fishing vessels	52	1,015,154	37	95,6853	27	727,002	20	589,188
Subtotal	54	1,216,180	44	1,789,623	45	3,666,084	32	9,603,329
New								
Tankers	0	0	0	0	0	0	0	0
Barges	0	0	0	0	0	0	0	0
Other cargo and passenger ships	0	0	0	0	0	0	1	557
Trawlers and fishing vessels	0	0	8	2,900,118	0	0	0	0
Subtotal	0	0	8	2,900,118	0	0	1	557
Ships not elsewhere classified								
Ships from 250 to 3,000 gross tonnage	0	0	0	0	0	0	0	0
Ships more than 3,000 gross tonnage	0	0	0	0	0	0	0	0
Ships less than 250 gross tonnage	0	0	1	23,374	2	82,174	7	174,285
Subtotal	0	0	1	23,374	2	82,174	7	174,285
Total	**54**	**1,216,180**	**53**	**4,713,115**	**47**	**3,748,258**	**40**	**9,778,171**

Appendix 8 *continued*

Commodity	1989 Qty	1989 CIF Value	1990 Qty	1990 CIF Value	1991 Qty	1991 CIF Value
Used						
Tankers	0	0	0	0	0	0
Barges	1	119,340	0	0	0	0
Other cargo and passenger ships	7	5375920	12	1,356,789	2	481,500
Trawlers and fishing vessels	6	105,764	24	2,031,911	15	11,165,324
Subtotal	14	5,601,024	36	3,388,700	17	11,646,824
New						
Tankers	0	0	0	0	0	0
Barges	0	0	0	0	0	0
Other cargo and passenger ships	0	0	0	0	1	6168
Trawlers and fishing vessels	0	0	0	0	4	720,025
Subtotal	0	0	0	0	5	726,193
Ships not elsewhere classified						
Ships from 250 to 3,000 gross tonnage	0	0	0	0	0	0
Ships more than 3,000 gross tonnage	0	0	0	0	0	0
Ships less than 250 gross tonnage	3	2,820	0	0	2	7,000
Subtotal	3	2,820	0	0	2	7,000
Total	**17**	**5,603,844**	**36**	**3,388,700**	**24**	**12,380,017**

Source: *Foreign Trade Statistics,* 1977-1990. National Statistical Coordination Board.

Appendix 9

Exports of Ships: 1977-1992

Commodity	1977		1978		1979		1980	
	Qty	CIF Value	Qty	CIF Value	Qty	CIF Value	Qty	CIF Value
Used								
Tankers	0	0	0	0	0	0	0	0
Barges	2	190,710	0	0	0	0	0	0
Other cargo and passenger ships	0	0	0	0	0	0	1	323,642
Trawlers and fishing vessels	0	0	0	0	0	0	0	0
Subtotal	2	190,710	0	0	0	0	1	323,642
New								
Tankers	0	0	0	0	0	0	0	0
Barges	0	0	0	0	0	0	1	548,765
Other cargo and passenger ships	0	0	0	0	0	0	0	0
Trawlers and fishing vessels	0	0	0	0	0	0	0	0
Subtotal	0	0	0	0	0	0	1	548,765
Ships not elsewhere classified								
From 250 to 3,000 gross tonnage	1	1,686	3	1,919,000	0	0	5	0
More than 3,000 gross tonnage	0	0	0	0	0	0	0	0
Less than 250 gross tonnage	2	15,111	3	5,700	33	20,629	13	69,150
Subtotal	3	16,797	6	1,924,700	33	20,629	18	74,056
Total	**5**	**207,507**	**6**	**1,924,700**	**33**	**20,629**	**20**	**946,463**

Appendix 9 *continued*

Commodity	1981		1982		1983		1984	
	Qty	CIF Value	Qty	CIF Value	Qty	CIF Value	Qty	CIF Value
Used								
Tankers	0	0	0	0	0	0	0	0
Barges	0	0	0	0	0	0	0	0
Other cargo and passenger ships	0	0	0	0	0	0	0	0
Trawlers and fishing vessels	0	0	0	0	0	0	0	0
Subtotal	0	0	0	0	0	0	0	0
New								
Tankers	1	137,460	0	0	0	0	0	0
Barges	1	868,117	0	0	0	0	0	0
Other cargo and passenger ships	0	0	0	0	0	0	0	0
Trawlers and fishing vessels	0	0	0	0	0	0	0	0
Subtotal	2	1,005,577	0	0	0	0	0	0
Ships not elsewhere classified								
From 250 to 3,000 gross tonnage	2	7,800	0	0	0	0	0	0
More than 3,000 gross tonnage	0	0	0	0	0	0	0	0
Less than 250 gross tonnage	13	257,586	12	408,644	14	60,455	1	38,658
Subtotal	15	265,386	12	408,644	14	60,455	1	38,658
Total	**17**	**1,270,963**	**12**	**408,644**	**14**	**60,455**	**1**	**38,658**

Appendix 9 *continued*

Commodity	1985 Qty	1985 CIF Value	1986 Qty	1986 CIF Value	1987 Qty	1987 CIF Value	1988 Qty	1988 CIF Value
Used								
Tankers, barges, etc.	0	0	0	0	0	0	0	0
New								
Tankers, barges, etc.	0	0	0	0	0	0	0	0
Ships not elsewhere classified								
From 250 to 3,000 gross tonnage	3	329,254	0	0	0	0	0	0
More than 3,000 gross tonnage	1	125,000	0	0	1	443,609	0	0
Less than 250 gross tonnage	1	17,482	0	0	0	0	1	4,630
Subtotal	5	471,736	0	0	1	443,609	1	4,630
Total	5	471,736	0	0	1	443,609	1	4,630

Appendix 9 *continued*

Commodity	1989		1990		1991		1992	
	Qty	CIF Value	Qty	CIF Value	Qty	CIF Value	Qty	CIF Value
Used								
Tankers, barges, etc.	0	0	0	0	0	0	0	0
New								
Tankers, barges, etc.	0	0	0	0	0	0	0	0
Ships not elsewhere classified								
From 250 to 3,000 gross tonnage	1	10,887	0	0	0	0	0	0
More than 3,000 gross tonnage	0	0	0	0	0	0	0	0
Less than 250 gross tonnage	1	15,738	2	1,873	0	0	0	0
Subtotal	2	26,625	2	1,873	0	0	0	0
Total	2	26,625	2	1,873	0	0	0	0

Source: *Foreign Trade Statistics*, 1977-1992. National Statistical Coordination Board.

Appendix 10

Exports of Pleasure boats: 1977-1992

Commodity	1977		1978		1979		1980	
	Qty.	CIF Value	Qty.	CIF Value	Qty.	CIF Value	Qty.	CIF Value
Yachts and other vessels for pleasure or sports	24	338,550	40	459,589	49	765,109	24	21,064
	1981		1982		1983		1984	
	Qty.	CIF Value	Qty.	CIF Value	Qty.	CIF Value	Qty.	CIF Value
	38	449,467	44	759,737	52	691,312	16	461,847
	1985		1986		1987		1988	
	Qty.	CIF Value	Qty.	CIF Value	Qty.	CIF Value	Qty.	CIF Value
	27	190,123	13	392,304	15	63,909	7	234,951
	1989		1990		1991		1992	
	Qty.	CIF Value	Qty.	CIF Value	Qty.	CIF Value	Qty.	CIF Value
	8	221,566	25	495,933	41	117,895	1	4,020

Source: *Foreign Trade Statistics*, 1977-1992. National Statistical Coordination Board.

Appendix 11

Imports of Pleasure Boats: 1977-1991

Commodity	1977		1978		1979		1980	
	Qty.	CIF Value	Qty.	CIF Value	Qty.	CIF Value	Qty.	CIF Value
Yachts and other vessels for pleasure or sports	15	125,868	12	40,795	30	521,145	24	21,064

1981		1982		1983		1984	
Qty.	CIF Value	Qty.	CIF Value	Qty.	CIF Value	Qty.	CIF Value
6	201,118	10	23,491	9	33,087	5	25,029

1985		1986		1987		1988	
Qty.	CIF Value	Qty.	CIF Value	Qty.	CIF Value	Qty.	CIF Value
2	8,890	2	2,877	11	230,250	29	301,078

1989		1990		1991	
Qty.	CIF Value	Qty.	CIF Value	Qty.	CIF Value
72	219,085	39	95,986	116	285,406

Source: *Foreign Trade Statistics*, 1977-1990. National Statistics Coordination Board.

Appendix 12
Tariff Rates and Other Variables Used in DRC-EPR and TEI Estimations

	Boatbuilding				Shipbuilding and Repair			
	1983	1986	1988	1991	1983	1986	1988	1991
Sales taxes* (%)								
Output j	10.00	20.00	10.00	10.00	10.00	20.00	10.00	10.00
Inputs i	10.00	20.00	10.00	10.00	10.00	20.00	10.00	10.00
Import mark-up	25.00	0.00	0.00	0.00	25.00	0.00	0.00	0.00
Assets	10.00	20.00	10.00	10.00	10.00	20.00	10.00	10.00
Nominal tariff rates (%)								
Output j	37.00	37.00	37.00	50.00	30.00	30.00	30.00	6.50
Inputs i	27.88	22.87	22.87	16.26	15.70	15.60	15.60	15.40
Implicit tariff rates (%)								
Output j	53.75	64.00	50.34	65.00	45.13	54.80	41.90	17.15
Inputs i	43.87	47.45	35.16	27.89	30.00	38.69	27.00	26.65
Machinery and equipment	57.22	42.93	30.93	28.81	57.22	42.93	30.93	28.81
Other fixed assets	—	76.00	61.70	61.00	—	76.00	61.70	61.00
Transportation equipment	63.24	45.00	42.00	26.00	63.24	45.00	42.00	26.00
Estimated useful life of assets (in years)								
Buildings	50	50	50	50	50	50	50	50
Production machinery and equipment	20	20	20	20	25	20	25	20
Office equipment and other supplies	20	20	20	20	20	20	20	20
Transportation equipment	15	15	15	15	15	15	15	15
Shadow price factors								
Labor (%)	70	70	70	70	70	70	70	70
Capital interest rate (%)	10	10	10	10	10	10	10	10
Foreign exchange (in peso terms)	13.89	27.99	26.37	33.59	13.89	27.99	26.37	33.59

Appendix 12 *continued*

	Boatbuilding				Shipbuilding and Repair			
	1983	1986	1988	1991	1983	1986	1988	1991
Other constants								
Official exchange rate (in peso terms)	11.11	22.39	21.09	26.87	11.11	22.39	21.09	26.87
Export-output ratio (%)	16.00	+	16.00	+	4.00	+	4.00	+
Ratio of imported raw material	90.00	+	90.00	+	70.00	+	70.00	+
Ratio of 1988 inventories (%) (applicable for 1983 only)	23.49	—	—	—	92.00	—	—	—
Minimum wage rates (in peso terms)	34.22	57.08	69.33	127.83	34.22	57.08	69.33	127.83

Allocation Ratios for the Assets for All Years (In percent)

	Depreciation Costs		Interest Costs	
	Foreign	Domestic	Foreign	Domestic
Cost components (%)				
Buildings		100		100
Production machinery and equipment	100		15	85
Other fixed assets	85	15		100
Transportation equipment	80	20	15	85
Inventories				
Material inputs			85	15
Finished goods and work-in-process goods			85	15

Appendix 12 *continued*

	Total costs	
	Domestic (%)	Foreign (%)
Material inputs		
Boatbuilding	10	90
Shipbuilding and ship repair	30	70
Utilities		
Water	100	
Electricity	100	
Packaging materials	10	90
Fuels		100
Lubricants		100
Office supplies	15	85
Lubricants, diesel, gasoline		100
Liquid petroleum gas, bunker oil, other fuels		100
Others		
Cost of industrial services done by others	100	
Cost of non-industrial services done by others	100	
Subsidies	100	

+ Figures reported by firms in the survey were used.
* Advance sales taxes are equivalent to the domestic sales taxes.

Sources: *Tariff and Customs Code of the Philippines*, 1983, 1986, 1988, 1991. Tariff Commission
National Internal Revenue Code, 1983, 1986, 1983, 1991.
Tariff Commission-PIDS Working Paper No. 86-13

Appendix 13

Price Indices Used in DRC Computations
(1972=100)

Year	Assets			
	Buildings*	Machines	Transport Equipment	Other Fixed Assets
1930	33.31	17.10	17.10	48.07
1931	33.90	17.42	17.42	48.92
1932	34.51	17.75	17.75	49.81
1933	35.14	18.09	18.09	50.73
1934	35.80	18.45	18.45	51.68
1935	36.48	18.82	18.82	52.67
1936	37.19	19.21	19.21	53.70
1937	37.92	19.61	19.61	54.77
1938	38.68	20.04	20.04	55.88
1939	39.48	20.47	20.47	57.04
1940	40.31	20.93	20.93	58.25
1941	41.17	21.41	21.41	59.51
1942	42.07	21.92	21.92	60.82
1943	43.02	22.44	22.44	62.20
1944	44.00	23.00	23.00	63.64
1945	45.03	23.58	23.58	65.15
1946	52.95	24.19	24.19	66.73
1947	53.09	24.83	24.83	68.39
1948	53.46	25.51	25.51	70.13
1949	54.34	26.23	26.23	71.97
1950	59.39	26.99	26.99	73.90
1951	56.10	27.79	27.79	75.94
1952	55.88	28.64	28.64	78.10
1953	56.83	29.55	29.55	80.38
1954	54.78	30.51	30.51	82.80
1955	54.85	31.54	31.54	85.37
1956	55.58	32.65	32.65	88.11
1957	56.02	33.83	33.83	91.03
1958	56.76	35.10	35.10	94.14
1959	58.22	31.24	31.24	97.48
1960	62.32	33.23	33.23	101.06
1961	62.54	35.06	35.06	104.92

Appendix 13 *continued*

Year	Assets			
	Buildings*	Machines	Transport Equipment	Other Fixed Assets
1962	66.20	37.35	37.35	109.08
1963	69.57	40.85	40.85	113.59
1964	71.48	42.95	42.95	118.48
1965	73.16	46.43	46.43	123.82
1966	76.67	50.53	50.53	129.66
1967	78.58	55.42	55.42	136.07
1968	85.24	61.35	61.35	117.28
1969	88.54	68.71	68.71	127.71
1970	84.15	80.14	80.14	84.89
1971	93.42	92.85	92.85	94.11
1972	100.00	100.00	100.00	100.00
1973	120.16	109.70	109.70	116.55
1974	189.29	136.45	136.45	173.15
1975	190.41	158.82	158.82	197.45
1976	205.54	172.62	172.62	215.60
1977	221.59	180.50	180.50	225.75
1978	240.66	196.78	196.78	248.50
1979	290.86	218.90	218.90	276.50
1980	335.97	241.00	241.00	332.70
1981	382.09	262.03	262.03	365.10
1982	410.35	297.29	297.29	391.46
1983	457.02	331.96	331.96	466.00
1984	670.08	525.04	525.04	735.59
1985	732.33	671.36	671.36	779.23
1986	759.42	712.23	712.23	799.55
1987	837.86	751.43	751.43	875.70
1988	911.31	819.06	819.06	919.49
1989	1,059.66			
1990	1,215.08			
1991	1,446.52			

* Construction Price Index

Sources *NEDA Statistical Yearbooks* 1985-1992. National Economic and Development Authority.
Tariff Commission-PIDS Staff Paper Series No.86