An Econometric Analysis of the Decision to Flag Out

Final Report

Angela S. Bergantino
and
Peter B. Marlow

SIRC, Cardiff.

Table of contents:

EXECUTIVE SUMMARY

The aim of this study is not to take part in a debate concerning the advantages and disadvantages of flags of convenience (FoCs), but to study the determinants of the mobility between the different types of register.

This study set out to analyse the decision-making process of shipowners when choosing flags of registration for their vessels. The research was three-fold in its intent:

       (i) to identify relevant factors by means of a literature review

       (ii) to build an econometric model of the decision-making process

       (iii) to perform international comparisons based on this model

and required the devising of a questionnaire to collect the empirical data relevant to such decisions.

The initial intention of performing international comparisons proved to be too optimistic in the time available and will be addressed in the future. However the data collected for the UK were more than sufficient to allow the econometric model to be built and tested and the results presented in this report stem from this model.

The methodology used in this paper has been dictated by the fact that we are dealing with a binary choice: either the vessel does or does not fly its national flag. Using a binary choice model we can determine the probability of the outcome of the shipowner's flag decision depending on a set of variables. In recent years logistic (logit) regression has been suggested as an appropriate analytical technique for the multivariate modelling of categorical dependent variables and we have used a binary logit model.

Having chosen the technique and determined the relevant variables from the literature review the appropriate data were then collected by means of a questionnaire. The authors conducted numerous interviews with different UK shipping companies to obtain qualitative background information, to discuss the nature of the questions and to clarify any problems of interpretation. Pilot interviews took place to test the validity and comprehensibility of the questionnaire and then the final version was either left

with the companies or mailed/faxed to them later. The questionnaire thus provided information of both a qualitative and a quantitative nature.

From these data it was possible to analyse the general cargo and tanker sectors of the UK fleet and different versions of the model have been applied to the data. The results show that the choice of flag may be affected by many factors (see Section V) but that the most significant single factor is that of crew costs. Various components of these costs have been examined separately and it is clear that the national insurance costs affect the choice of flag. The results suggest that a reduction in the national insurance costs would lead to an increased probability of the vessel being registered under the national flag.

Furthermore this study has confirmed the importance and relevance of factors such as the age of the vessel, the trade on which it is engaged, national insurance costs, and training costs, to the decision to flag out.

1. Abstract

The aim of this paper is to analyse the decision-making process of shipowners when adopting flags of registration. More specifically, it is interested in examining the relative importance of the factors related to an individual company's decision to flag out. In this study the flagging out decision is viewed as similar to any other strategic decision by a profit maximising firm (shipping company) and therefore those variables which influence the attractiveness, for a given firm, of taking the flagging out decision are analysed. Comparisons of the relative importance of the various factors are performed and an in depth analysis of the main ones is undertaken.

I. Introduction

Since its first significant appearance in the fifties, flagging out - the change of a vessel's registry from a national flag to a flag of convenience - has been the focus of a strong debate in international shipping quarters. This now widespread phenomenon, afflicting the merchant fleet of the vast majority of the traditional maritime nations, has attracted a great deal of attention for a variety of reasons. First, open registry fleets have expanded at a faster rate than any other fleet in the world. Second, it has been felt that the expansion of the open registry has limited the growth of the fleets of other countries and has caused the decline of the fleets of the traditional maritime countries with all the related consequences on the defence of the countries, the balance of payments and the disappearance of national trained crews. Finally, the occurrence in recent years of several alarming incidents involving environmental disasters has (rightly or wrongly) increased public awareness of this problem.

From the late 1960s a number of studies have been conducted on the flagging out phenomenon. However, with a few exceptions, most existing works, whilst providing useful insights and interesting information on the issue, are either out of date or are consultancy reports which, completed with the aim of presenting the case of a particular interest group, are of dubious objectivity. An in depth review of the literature has pointed to a general lack of theoretical background and empirical analysis in a great many of the previous studies[1] due mostly to the difficulties of obtaining the necessary data. Hence,

---

[1] The studies by Tolofari, Button and Pitfield(1986), Tolofari(1989), Metaxas and Doganis(1976), Metaxas(1985) and Yannopoulos(1988) can be considered exceptions since they offer a detailed analysis of the flagging out phenomenon accompanied by empirical findings.

there exists the necessity to give a quantitative contribution to the flagging out issue in the most objective way possible.

In the light of this, this paper seeks to explain and evaluate flagging out, inserting the problem into a more general theoretical framework and using recent data. **The aim of this paper is not to take part in the debate of the advantages and disadvantages of FoCs, but to study the determinants of the mobility between the two types of registry,** in order to establish the factors which influence the relative decline of the merchant fleets of traditional maritime regimes. Subsequently, the consequences of flagging out may be assessed and policy responses to the problems created by their growth will be reviewed.

The final intention is to focus on five European countries chosen for the particular characteristics of their maritime policies and the situation of their fleet. The empirical part of the study is to be based on the UK, Italy, Norway, Greece and the Netherlands. However, despite the best efforts of the researchers and the cooperation of the national shipowners' associations in Italy, Norway and the Netherlands, it has not yet been possible in the time available to obtain sufficient data to allow the international comparisons to be made. Hence the empirical part of this analysis will focus on the reasons for the choice of flag for UK owned vessels greater than 500grt in size.

The authors are very grateful for the assistance of the national shipowners' associations mentioned above and also to the UK Chamber of Shipping for their support and advice. It is obvious that a certain amount of secrecy is present in the industry but not all companies react to questions in the same manner - some are much more forthcoming than others. We are grateful for the assistance, in terms of time and information, given to us by UK companies and shipowners since without the involvement of the industry such studies have little or no validity. International comparisons would add considerable value to this work and it is hoped that these will be possible in future.

II. Flags of convenience - their definition and extent

Flags of Convenience otherwise called Flags of necessity, Free flags, Flags of opportunity, Facilitating flags, Shadow flags, Cheap flags, Flags of accommodation, and so on have, through the years, been defined in several ways often depending on the aim of the definition and the ideas behind the study. However, it must be recognised that as the Rochdale report points out "it is not easy to provide a definition of FoCs which effectively encompasses their significance and characteristics"[2].

One of the first definitions of FoC was given by the OECD in 1958: "The flags of such countries as Panama, Liberia, Honduras, and Costa Rica whose laws allow - and indeed make it easy for - ships owned by foreign nationals or companies to fly these flags. This is in contrast to the practice in maritime countries where the right to fly the national flag is subject to stringent conditions and involves far reaching obligations".

The more recently debated United Nations Convention on the Conditions for Registration of Ships(1986), for the first time defines the principles to be followed when granting nationality to a ship. The existence of a genuine link between a vessel and its country of registry must be verified on the bases of the following characteristics:
-the merchant fleet contributes to the national economy of the country,
-revenues and expenditure of shipping, as well as purchases and sale of vessels, are treated in the national balance-of payments accounts;
-the employment of nationals on vessels;
-the beneficial ownership of the vessel.

However, this definition still does not allow the clear identification of FoCs. Even the Rochdale Report(1970) does not give a precise definition of flags of convenience but instead gives a list of criteria which should lead to the classification of these. It defines

---

[2]Committee of Inquiry into Shipping The Rochdale Report(1970) Cmnd.4337 HMSO London

nationals;

◊ access to the registry is easy. A ship may usually be registered at a consul's office abroad. Equally important, transfer from the registry at the owner's option is not restricted;

◊ taxes on the income from the ships are not levied locally or are low. A registration fee and an annual fee, based on tonnage are normally the only charge made. A guarantee or acceptable understanding regarding future freedom from taxation may also be given;

◊ the country of registry is a small power with no national requirement under any foreseeable circumstances for all the shipping registered, but receipts from very small charges on large tonnage may produce a substantial effect on its national income and balance of payments;

◊ manning of ships by non nationals is freely permitted, and

◊ the country of registry has neither the power nor the administrative machinery effectively to impose any government or international regulations, nor has the country the wish or the power to control the companies themselves.

The Report continues that although one or more of the above features may be found in the policies of many maritime countries, it is only when all of these features exist that a country is characterised as being an FoC. This affirmation causes the definition to be very difficult to apply in practice since, while the above features are all present in some FoCs, this is not universally the case. Furthermore, changes in the rules of registration for some of the traditional Open Registry countries (i.e. Liberia) have revealed the need for revision of the last two points of the above definition.

For research purposes most studies of the field have tried to find a more functional definition. For example, according to Boczek(1962) a FoC can be defined as: "the flag of any country allowing the registration of foreign-owned and foreign controlled vessels under conditions which, for whatever reasons, are convenient and opportune for the persons who are registering the vessels". Doganis and Metaxas(1975) identify as FoC: "the national flags of those states with whom shipowners register their vessels in order to avoid the fiscal obligations and the conditions and the terms of employment of factors of

production, that would have been applicable if their ships were registered in their own countries". Finally, Bergstrand(1983) adopts the following definition: **"A flag of convenience is a flag of a state whose government sees registration not as a procedure necessary in order to impose sovereignty and hence control over its shipping but as a service which can be sold to foreign shipowners wishing to escape the fiscal or other consequences of registration under their own flags".**
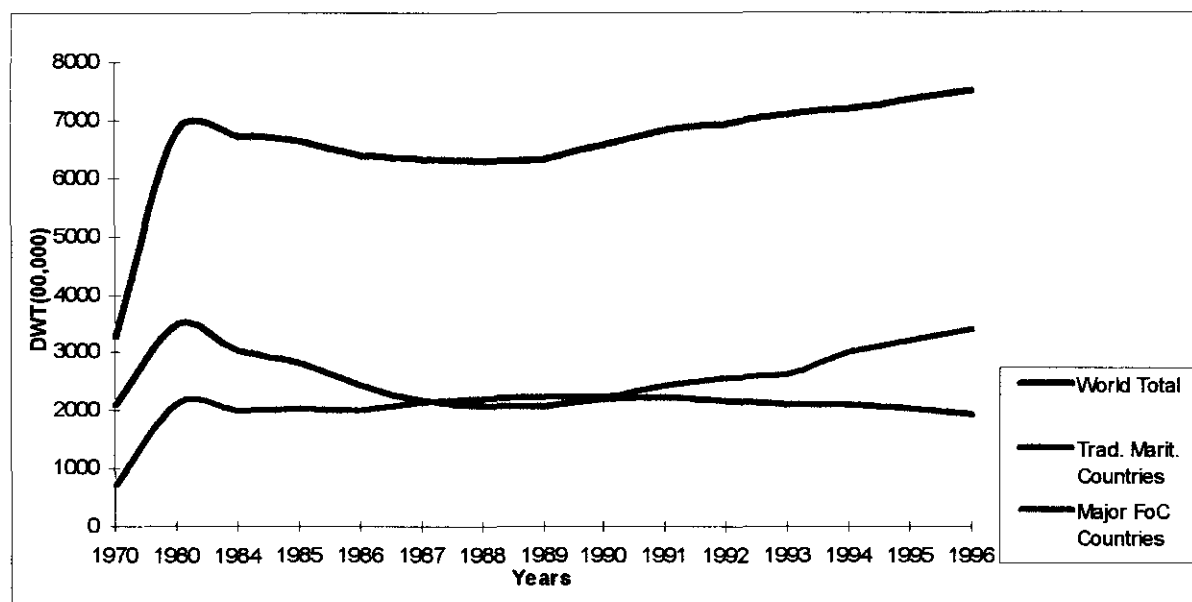
Given the nature of this study, where the main concern is that of modelling the shipowner's behaviour and identifying the factors which appear to be relevant in his decisions, we will adopt a definition of FoC which reflects the matters that most concern the shipowners such as: costs, accessibility of the register and standards enforced by the state of registry. Therefore, an FoC should be identified as a flag which allows:

1. lower crewing costs/manning requirements, since registration under a flag of convenience generally means:
   - unrestricted choice of crew in the international market;
   - not being subject to onerous national wage scales;
   - more relaxed manning rules
2. lower operating costs generated by "lighter" maintenance programmes and less stringent enforcement of safety standards imposed by the register;
3. less regulatory control and avoidance of bureaucracy;
4. the probable avoidance of tax;
5. anonymity;
6. easy accessibility/exit to/from the registry.

The use of flags of convenience can be traced back to the adoption of the Spanish flag by English merchants in order to avoid Spanish monopoly restrictions on trade with the West Indies[3]. However, their widespread use is a 20th century phenomenon started in the years of the American prohibition laws. Nowadays, even though traditional maritime countries continue to dominate the ownership of world shipping, the extent of flagging out to Open Registries is such that they account for a greater proportion of the total world fleet than the traditional maritime countries themselves. The share of world tonnage registered in the major Open Registries has risen from about 4% in 1950 to almost 43% in 1996.

---

[3]Boczek (1962).

Figure 1: Composition of the world fleet by type of registry

DWT(00,000)

8000
7000
6000
5000
4000
3000
2000
1000
0

1970 1980 1984 1985 1986 1987 1988 1989 1990 1991 1992 1993 1994 1995 1996
Years

World Total

Trad. Marit. Countries

Major FoC Countries

Source: Review of Maritime Transport, Unctad.

As is shown in the above figure, the Open Registry fleet, had their sharpest increase in the 1970s rising from representing 21.6% of the world fleet to represent 31.1% in 1980. Their increase has continued through the '80s and in 1988 the fleet of the major Open Registry countries surpassed that of the traditional maritime countries. The difference between the two does not appear to be diminishing.

Within the Open Registry fleet Liberia, Panama, Cyprus, the Bahamas and Bermuda represent the majority of the FoC tonnage and account for about 90% of the total fleet. However, a number of new registries are rapidly entering the market. These new Open Registries facilities are generally supplied by small states attracted not only by the receipts in foreign currency earnings and source of public revenue, but also by the perceived increase in their degree of political influence. Some examples are: Vanuatu, Gibraltar, Cayman Islands, Malta, Isle of Man, Kerguelen Islands, and Madeira Islands; and many more. Moreover, since 1987, a new category of registries have emerged, the so called international registries. The latter have been established as a more or less successful attempt to avoid *en masse* flagging out from the related national registry.

Some of these recent "entries" are[4]: Norwegian International Register (NIS), Danish International Register (DIS), German International Register (GIS), and the Luxembourg International Register (LIR).

Flagging out activity is increasing and EU flagged fleets have declined substantially over the last decade (more than a 30% decrease in total dwt between 1985 and 1996). Most European owned fleets have flagged out to a variety of Open Registries but there are patterns of preference e.g. UK owners often use the Bahamian flag while Greek owners prefer the flags of Cyprus or Malta. Two of the major traditional open registries (Liberia and Panama) are losing share to four relative newcomers (Cyprus, Malta, Antigua and Bahamas). It is possible to discern patterns of correlation between vessel types and particular registries.[5]

Furthermore the composition of the Open Registry fleet is undergoing some relevant changes. While the tanker and bulk fleet traditionally have been, and still are, the core of the FoC fleets recently there have been signs indicating that container shipping operators are also transferring to them.
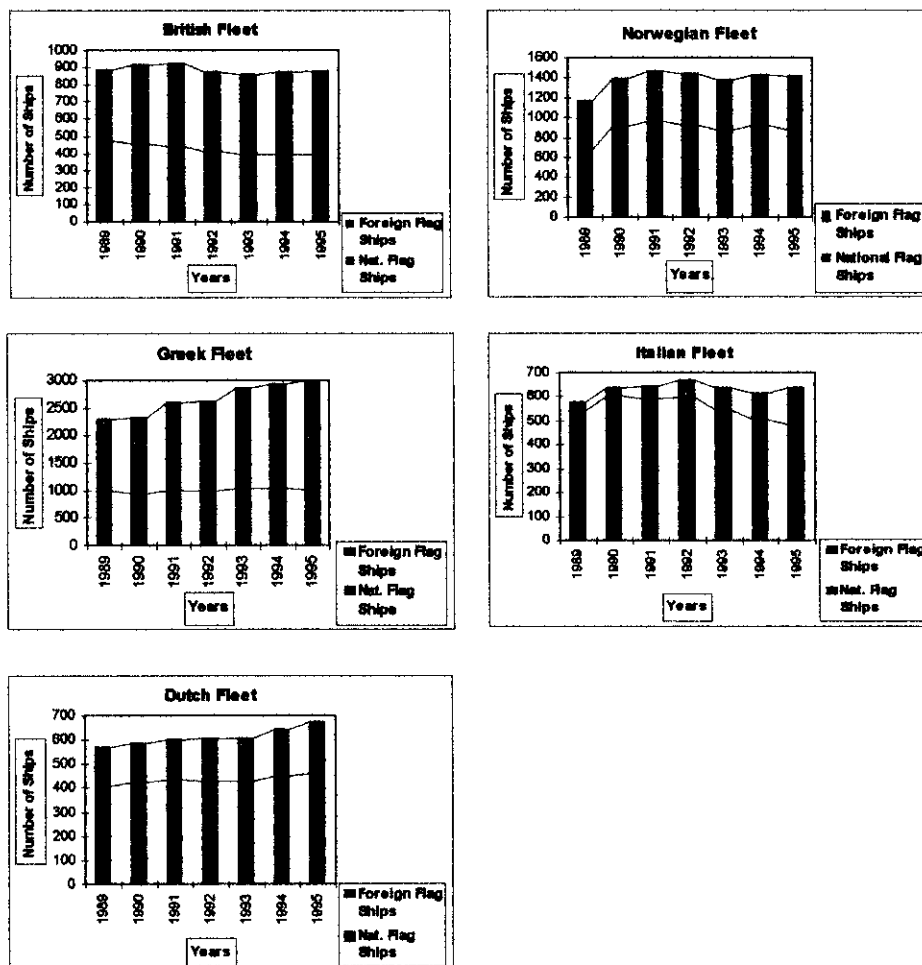
A consideration of the geographical areas of the research confirms that, while the percentage of tonnage owned by the EU countries under flag of convenience is below the world average, it varies considerably among member States. In particular, for the five countries chosen it should be noted that Greece and Norway have the most relevant presence, in comparison to the UK, Italy and the Netherlands, in four of the five major Open Registry fleets cited above. The only exception is the Bermudan fleet where the UK owns a higher percentage than Greece or Norway.

The development of the above five national fleets is depicted in graphs showing the changes in their size over the last seven years.

---

[4]These registers are defined as "new" when compared to the "Traditional Open Registries" because they have assumed a significant role only after the 1980s.
[5] Structure and Organisation of Maritime Transport. Final Report to Directorate General for Transport (DGVII) Mercer Management Consulting and Lloyds Maritime Information Services July 1995

Figure 2: Selected Countries

British Fleet
Number of Ships
1000 900 800 700 600 500 400 300 200 100 0
1989 1990 1991 1992 1993 1994 1995
Years
■ Foreign Flag Ships
■ Nat. Flag Ships

Norwegian Fleet
Number of Ships
1600 1400 1200 1000 800 600 400 200 0
1989 1990 1991 1992 1993 1994 1995
Years
■ Foreign Flag Ships
■ National Flag Ships

Greek Fleet
Number of Ships
3000 2500 2000 1500 1000 500 0
1989 1990 1991 1992 1993 1994 1995
Years
■ Foreign Flag Ships
■ Nat. Flag Ships

Italian Fleet
Number of Ships
700 600 500 400 300 200 100 0
1989 1990 1991 1992 1993 1994 1995
Years
■ Foreign Flag Ships
■ Nat. Flag Ships

Dutch Fleet
Number of Ships
700 600 500 400 300 200 100 0
1989 1990 1991 1992 1993 1994 1995
Years
■ Foreign Flag Ships
■ Nat. Flag Ships

Source: Review of Maritime Transport, Unctad

From the above it appears that the negative growth trend detected in the magnitude of the total fleet of the Traditional maritime countries in the past fifteen years is reflected, with varying degrees of intensity, in the trend exhibited by the size of the fleets of most of these countries. In fact, except for the Netherlands and perhaps Norway, the national fleets of the UK, Italy and to a lesser extent (recently) Greece all show a generally decreasing pattern.

In order to gain a fuller understanding of both the changes and trends in the size of the national fleets and of the connection between these changes and the policies adopted by the individual national governments, it is essential to appreciate the national shipping

legislation of each country. *Appendix 1* contains a brief description of the shipping regime in each country.

Having defined what is meant by the term "flag of convenience" and seen how the practice has affected the shipping sectors of different countries we now turn our attention to a consideration of the factors influencing the decision of which flag to choose.

III. The focus of this study.

The aim of this study is to model the determinants of the choice of flag decision by placing the decision within the basic economic framework of the theory of the firm and, hence, to provide economic explanations for the practice of flagging out adopted by shipping companies facing a competitive international shipping environment. The motivation for transferring a ship from one registry to another is no different in principle from the motivation behind any other strategic decision on the part of a profit maximising firm. The basic principles of the theory of the firm can be applied to the economics of this behaviour.

Shipping companies are assumed to be profit maximisers which strive to reach their objective by seeking the production input combination which allows them to minimise costs. However, their choice of factors of production is constrained by their operating environment. Institutional factors and the characteristics of the market in which they operate condition their ability to make independent decisions. The selection of factors, their quantities, their costs and quality appear to be regulated in most of the so called developed countries.

However, the existence of FoCs creates a sort of dualism in the international maritime transport sector splitting the industry in two segments distinguished by operating characteristics peculiar to the two different scenarios and by lower break-even points. The shipowner like any other entrepreneur must chose the optimum amount of inputs to obtain the desired service output and strives to have the freedom to do so.

Flagging out is primarily caused by the desire to minimise costs under a relatively lower cost regime and it is estimated that crew cost differences between selected EU flags and lower-cost open registry vessels range from +22% to +333%[6]. However, as we shall see, a number of other factors in addition to crew costs can be considered as influencing the shipowners' choice: labour quality, management costs, tax liabilities, and degree of

---

[6] Structure and Organisation of Maritime Transport. July 1995. ibid.

control are just a few of the items which characterise the different regimes and which influence the decisions.

From a detailed literature review, combined with the analysis of the outcome of a number of interviews carried out with shipowners, a list of variables which are considered influential in the decision making process of the shipowner has been produced. With the evolving of the practice of flagging out the reasons, for registering a ship under the flag of a country other than that of the owner, have varied. Their ranking has often changed and today, even though the practice still retains most of the same motivations, the primary reason for flagging out is unanimously accepted as being the need to reduce overall costs.

In particular, operating costs[7], one of the three main categories which form the total cost of shipping, are identified as the ones where significant savings would be achieved by registering the ship in an Open Register. It is in the manning costs area where flagging out policies allow degrees of freedom to be obtained from the constraints of Union agreements and national manning regulations. Hence, according to the vast majority of authors[8], shipowners, Shipowners Associations[9] and Trade Union representatives, the main reason for flagging out is to reduce manning costs.

It has been stated by many authors that the adoption of an FoC can lead to savings in the following categories of crew related costs:

-direct and indirect wages[10];

-stores[11];

-maintenance[12].

---

[7]Operating costs comprise all the costs and expenses incurred in the day to day operation of the vessel at sea and in port. These costs are associated with manning, maintaining, supplying and insuring a vessel.

[8]Metaxas and Doganis(1976), Economist Intelligent Unit(1979), Unctad(1981), MERC(1985), Metaxas(1985), Tolofari, Button and Pitfield(1986), Dorey(1988), Lusted(1988), McCuskey(1988), Tolofari(1989), Asteris(1993), Vogel(1993), Policy Research Corporation(1994) and Lee Tae-Woo(1996) to cite only some.

[9]Italian, British and Norwegian Shipowners' Associations.

[10]The above category of costs consists of: basic pay, bonuses, leave overtime, pensions, social security, subsistence, uniforms, and so on.

[11]Included in this category are: bedding, linen, laundry and furnishing costs.

[12]i.e. dry-docking repairs

We share the belief that crew costs can be considered as the main financial reason behind the shipowner's decision to flag out. The cost of manning a ship can be considered the easiest variable to influence when compared to other ship costs which appear to be mostly fixed internationally, especially in the short run. Moreover, flagging out satisfies the shipowners' attempt to lower operating outlay and to bypass rigid labour market regulations.

However, stores costs are not as relevant to the total manning costs as the other two categories. Furthermore, the adoption of an FoC does not necessarily imply a decrease in this category of cost. As for the maintenance costs it is argued that while some crews can carry out certain tasks within the vessel, thereby eliminating the use of shore labour, others cannot and the lack of such maintenance and the subsequent neglect may lead to major damage claims and therefore higher insurance costs. Operating efficiency could, therefore, depend on the quality of the crew; this potentially relevant element is very difficult to quantify taking account of the different nationalities and training levels of the crews employed. Since it would be unwise to make any generalisations on either FoC or Traditional maritime country crews this element will be discussed only in a qualitative manner.

Manning costs have two components which are considered of equal importance: the direct and the indirect wage. The basic wage depends on the standard of living in the country of origin of the seaman, on the current exchange rate of the seaman's currency against the US dollar[13], and on international regulation[14] and ITF policies[15] framed to

---

[13]According to Wallem(1988) a significant factor affecting direct wages is exchange rates. These, even though outside the shipowner's control, have a significant impact on his decision when comparing manning costs options. Given the link between the United States' currency and the seafarer 's currency the exchange rates have a significant impact both on the costs to the shipowners and on the earnings of the crew. The MERC report shares the same views.

[14]See ILO and IMO Regulations.

avoid the exploitation of the FoC crews. Indirect wage costs are those which do not represent immediate payment to the employed and are set independently by single national governments with regard to national seafarers (i.e. national insurance payment, leave entitlement, pensions, training, employment taxes, medical expenses, and so on). Therefore, the indirect wage is the element of the manning costs where different national policies could have a strong impact on the shipowners' decisions regarding flag.

By adopting a flag of convenience the shipowner gains the ability to offer contracts with gross salaries, transferring the responsibility for pensions provision, social security costs and coverage of medical expenses to the employee. At the same time employment conditions such as lengths of duty and leave could be re-negotiated on an individual basis.

The influence of the fiscal regime on the decision-making process is rather more controversial. Some authors[16] consider tax reasons as one of the main factors behind the decision to flag out, which they regard as a device to avoid taxes and other fiscal obligations in their own countries and to gain greater flexibility of investment by being allowed to contract newbuildings wherever and whenever they choose[17].The fact that, under existing laws in most open registry countries, no income taxes are levied on the company through which vessels are registered[18] seems initially to support their view, leading to the generic classification of open registries as tax havens which attract shipowners who wish to avoid paying national taxes. However, other authors do not

---

[15]The ITF in its task to defend the interests of the seafarers has drawn up crew agreements either in international format - Standard Collective Agreement - or in special national format - Total Crew Cost agreements - which define terms and conditions of employment for FoC crews. Among its various activities it has also set a number of rules for the issuing of the "Blue Certificate" (necessary to avoid possible interference with the trading of the vessel to the shipowner or charterer) and has drawn a list of FoC countries. For more details the reader is recommended to read the ITF Bulletins from various years referenced in the bibliography.

[16]See: Metaxas and Doganis(1976), Unctad(1981), Metaxas(1985), MERC(1985), Asteris(1993), Vogel(1993), Policy Research Corporation(1994).

[17]Drewry(1980).

[18]According to Ready(1994), in most Open Registry countries if over 50% of the equity is owned by non-nationals and if corporate income is derived from sources other than the country of registry no income taxes are levied.

share their opinion[19].

The latter group of authors argue that tax advantages offered by Open Registry countries amount to no more than the sum of the "fiscal incentives" granted to those shipowners in their national country. They state that, since most of the traditional maritime countries offer various forms of tax deferrals, concessions or subsidies, the Open Registries do not offer particular advantage in this respect and, therefore, tax reasons cannot be considered a fundamental factor contributing to the flagging out decision. Shipowners and Shipowners' organisations[20] agree stating that since they pay taxes according to the regime applicable in the country of ownership and not according to the flag state, the fiscal regime does not influence their decision.

However, it seems peculiar that while, until a few years ago, the need to enjoy fiscal advantages was considered by the literature to be a substantial factor in the decision either to flag out or remain flagged in, now this is no longer the case. An interpretation is that the importance of this motivation has been diminished since the Traditional Maritime countries have had a chance to respond to the competition set up by the FoC countries.

The Governments of most of the traditional maritime countries have modified their policies to move them closer to the situation created by the legislation of the Open Registry countries. The FoC legislation is used as a benchmark against which to measure the effects of Traditional maritime nations' policies. Since tax regimes and maritime subsidies play a crucial role in the competitive position of a shipowner we feel that, when deciding on flag, the shipowner will evaluate the net impact of subsidies and tax allowances, of corporation/capital gains tax, of personal income tax, and of any other cost or benefit he could incur or receive by remaining under his national flag, when offset against the tonnage taxes and annual registration fees of Open Registry countries, allowing for the facts that profits will still be taxed if/when repatriated.

---

[19]Namely EIU(1979), Drewry(1980), Tolofari(1989) and others.
[20]Of this opinion are: the British and Norwegian Shipowners Association(1996) and a number of shipowners of different nationalities.

This relationship can be expressed in the form of a trade-off equation in which the fiscal incentive to flag out is measured by the difference between the discounted value of tax payments and grants/subsidies (A) over the life (n) of the vessel and the present value of tonnage taxes and registration fees (B). We can write:

$$A = \sum_{i=1}^{n} \text{Tax} \left[(1+r_p)(1+r_d)\right]^{-i} + \text{Grant} \left[(1+r_p)(1+r_d)\right]^{-g\_lag}$$

$$B = RF + \sum_{i=1}^{n} TT \left[(1+r_p)(1+r_d)\right]^{-i}$$

where:

Tax	=	effective rate of corporate taxation
r_p	=	annual rate of inflation
r_d	=	annual rate of discount
Grant	=	level of grant
g_lag	=	lag in receipt of grant
RF	=	Initial Registration Fee
TT	=	Annual Tonnage Tax

The influence of the existing legal regime is considered by some[21] a relevant subjective factor in the decision to flag out and depending on the particular national situation it may have either a positive or negative effect on the shipowner's decision. Since legal regulations dictate the eligibility of domestic and foreign shipowners to receive maritime subsidies, and influence crew costs (via manning levels and crew nationalities), and capital costs (via safety legislation), the ways in which different countries connect flag and ownership will influence differently the final flagging out decision.

Another common factor found in the literature is the greater flexibility and freedom from unnecessary bureaucratic controls that registration in an Open registry allows. This factor has been cited often but with different views. On some occasions the shipowners are accused of wanting to flag out in order to enjoy a regime of immunity from national and international regulations[22], while at other times it is said that they need the greater

---

[21]MERC(1985)
[22]See Metaxas and Doganis(1976), Unctad(1981), Metaxas(1985), Vogel(1993).

freedom and flexibility offered by Open registries[23]. Whatever the reason, it is clear that the absence of the ability or inclination to subject the operating arrangements of vessels to the tight and onerous controls associated with traditional flag states is a major reason for some shipowners to flag out.

The last two factors mentioned, together with the confidentiality of the beneficial ownership allowed by the Open Registers' legislation, appear to have a common purpose i.e. the need for shipowners to achieve a reduction of state interference. For the purposes of analysis this paper has grouped them into a single variable defined as "control". However, it is doubtful that it will be possible to quantify effectively this broad category in any empirical study.

A group of factors that might influence the shipowner's decision, but which have been partly ignored by the existing literature, are the characteristics of the shipping companies and of the ships. It is observed that only some companies of the same nationality decide to flag out, and that the decision to flag out might concern either the entire or only part of the fleet of the same shipping company. In particular, with regard to the characteristics of the ship, factors such as: age, size, type of trade, type of vessel, or geographical area of operation, might influence the flagging out decision. From the preceding analysis it has been seen that while, until a few years ago, flagging out seemed to be relegated to sectors with low freight rates (i.e. bulk carriers) and low quality standards[24], this seems to be no longer the case. Containers are beginning to form a significant and growing proportion of the FoC fleets, augmenting the need to understand the motivations at the basis of the decision making process. Furthermore, while recognising that a ship is a very mobile asset, it is possible that its area of trade, when identifiable, may have a bearing on the flag chosen[25].

---

[23]Of this view: EIU(1979), Drewry(1980), Lusted(1988), Tolofari(1989), Ready(1994), Tae-Woo Lee(1996) and others.

[24]Recently the factor "quality" has been assuming increasing importance in the studies concerning the flagging out phenomena. In particular, the study by Cullinane K. and M. Robertshaw(1996) has shown the importance of qualitative factors alongside the widely recognised economic factors.

[25] It is widely recognised that some ports(i.e. Australian and Scandinavian in particular) are more likely to place strong emphasis on the control of the living, operating, and safety conditions on board the vessels berthed.

A controversial issue which is worth mentioning, given the wide references to it found during the literature survey, is that of insurance costs[26]. While some authors maintain that consideration about variations in the cost of insuring a vessel would enter the shipowner's decision process most disagree stating that, since the main factors influencing the underwriter's decision is the shipowner's performance record, the insurance premium is in no way influenced by the flagging decision. After discussion with experts in this field the latter view has been accepted; obviously calling for an exception if, by flagging out, safety performance declines. Finally, of some importance is the issue of the shipowner considering, among the benefits of flying an FoC, that of obtaining greater flexibility in the routing of the vessel .

In order to assist the reader in summarising the various factors listed and to acknowledge the differing importance assigned to them by the existing literature, table 1 details the various contributions:

---

[26] In particular: Metaxas and Doganis(1976), Metaxas(1985) and Chapman(1988).

Table 1

Variables	EIU (1979)	Metaxas & Doganis (1976)	Metaxas (1985)	Goss (1985)	Drewry (1980)	Unctad (1981)	MERC (1985)	B.M.L. (1985)	Tolofari, Button & Pitfield (1986)
Crew costs	*	*	*	*	*	*	*	*	*
Other costs		*	*		*		*		
Productivity of labour	*	*			*				
Manning rules	*		*			*			
Higher profitability	*	*	*		*			*	*
Fiscal reasons			*		*	*	*	*	*
Control	*	*	*		*	*	*	*	*
Economical and Political situation			*		*			*	
Attitude of financial institutions			*		*				

Variables	H.o.C. (A)(1987)	H.o.C (B)(1989)	M.C.F. (A)(1986)	M.C.F. (B)(1988)	Yannopoulos (1988)	McCuskey (1988)	Lusted (1988)	Tolofari (1989)	Vogel R. (1993)
Crew costs	*	*	*	*	*	*	*	*	*
Other costs	*	*			*		*		
Productivity of labour					*		*		
Manning rules	*	*			*	*	*		
Higher profitability		*	*	*			*	*	
Fiscal reasons	*	*						*	*
Control	*	*			*		*	*	*
Economical and Political situation	*	*	*				*		
Attitude of financial institutions									

Variables	Sletmo & Holste (1993)	P.R.C. (1994)	Ready (1994)	Pettit (1996)	Tae-Woo Lee(1996)	OECD (1996)	Norwegian Shipowner Ass. (1996)	Italian Shipowner Ass. (1996)	Cullinane & Robertshaw (1996)
Crew costs			*		*	*	*	*	*
Other costs			*		*	*	*	*	*
Productivity of labour									
Manning rules			*		*	*	*		*
Higher profitability	*		*			*			
Fiscal reasons		*	*	*	*		*	*	*
Control			*		*	*	*	*	*
Economical and Political situation	*		*				*		
Attitude of financial institutions			*		*		*		

IV. Methodology

The methodology used in this paper has been dictated by the fact that **we are dealing with a binary choice: either the vessel does or does not fly its national flag.** Using a binary choice model we can determine the probability of the outcome of the shipowner's flag decision depending on a set of variables. The model postulates that the probability that a ship will be flagged out is a function of observable factors both internal and external to the firm and a random element resulting from unobservable or unmeasurable characteristics. In recent years logistic (logit) regression has been suggested as an appropriate analytical technique to use for the multivariate modelling of categorical dependent variables and we intend to use the binary logit model.

Logit analysis will allow the sign and marginal effect on the conditional probability of the event occurring due to a change in any of the explanatory variables to be determined and further it will allow comparisons to be made of the relative importance of the explanatory variables in determining the likelihood of flagging out. Furthermore by evaluating the logit probability function for a ship using its measured attributes, and comparing the output to similar calculations for other ships, a ranking can be found as to the relative probability of being flagged out under different circumstances.

(i) The Model

As for any discrete choice model the specification of the model itself relies on the latent variable approach, where it is assumed that there is some underlying (and unobserved) response variable y^*, where $y^* \in (-\infty, +\infty)$. Whilst we do not observe y^* directly, we do observe a binary outcome y such that:

$$y = 1 \quad \text{if } y^* > 0$$
$$y = 0 \quad \text{if } y^* \leq 0$$

Defining the latent variable equation in linear form:

$$y^* = x'\beta + u$$

where u represents an (unobservable) stochastic component.

We now have that:

$$E(y \mid x) = Pr(y = 1 \mid x) = Pr(y^* > 0 \mid x) = Pr(u > -x\beta) = 1 - F(-x\beta)$$

where $F(.)$ represents the cumulative distribution function of u. By specifying the appropriate distribution function for u, (i.e. logistic distribution), we can derive the Logit model. In this case,

$$P(y = 1 \mid x; \beta) = \frac{\exp(-x'\beta)}{1 + \exp(-x'\beta)} = \frac{1}{1 + \exp(x'\beta)}$$

The latent variable approach to binary choice model specification can be derived from an economic model of behaviour. Consider an individual, i, who is faced with a choice problem and who is hypothesised to behave so as to maximise his utility in choosing between two alternatives. In this case:

Alternative 1: having the vessel fly the national flag
Alternative 2: having the vessel fly a foreign flag

In this context we are interested in the set of factors affecting the occurrence or non-occurrence of the event. What we have at our disposal is information about the attributes of each alternative, characteristics specific to the individual economic agent exercising the choice, and the outcome of their choices.

In this particular case we can let y represent the choice of flag:
y = 1 if the vessel is flagged out,
y = 0 otherwise.

The two outcomes, vessel being flagged out or not flagged out, can be described by the following state-specific utilities (i.e. the utility that the shipowner perceives from flagging out or staying with the national flag in terms of, eg. cost savings):

$$U^*_1 = x'\beta_1 + u_1 \qquad\qquad (1a)$$

$$U^*_0 = x'\beta_0 + u_0 \qquad\qquad (1b)$$

where x is a common set of control variables, and β_0 and β_1 are vectors of unknown parameters and u_0 and u_1 represent unobservable (state-specific) taste/preference components. Under this characterisation, an individual will choose to flag out if $U^*_1 > U^*_0$, such that:

$$y = 1 \text{ if } U^*_1 - U^*_0 > 0$$

$$y = 0 \text{ if } U^*_1 - U^*_0 \leq 0$$

or, given the parametrisations (1a) and (1b):

$$y = 1 \text{ if } x'(\beta_1-\beta_0) + (u_1 - u_0) > 0$$

$$y = 0 \text{ if } x'(\beta_1-\beta_0) + (u_1 - u_0) \leq 0$$

Clearly we cannot identify both sets of parameters β_0 and β_1, however, we can identify the difference $\beta = (\beta_1 - \beta_0)$ and implicitly parametrise the choice model as:

$$y = 1 \text{ if } y^* > 0$$

$$y = 0 \text{ if } y^* \leq 0$$

where $y^* = (U^*_1 - U^*_0) = x'(\beta_1-\beta_0) + (u_1 - u_0) = x'\beta + u$

and $\quad u = (u_1 - u_0)$

We have assumed the underlying function to be a utility function measuring the utility of the shipowner deriving from the cost savings caused by his decision. Assuming that the shipowner is a rational economic agent, and therefore profit maximiser, he would be

expected to maximise revenues, R, while minimising his costs, C. Therefore it can be assumed that his utility, U, can be described as:

$U = R - C$

In this case the underlying function will be:

$U^* = U_1 - U_0$

Where: $U_1 = R_1 - C_1$, and

$U_0 = R_0 - C_0$

Therefore:

$U^* = (R_1 - C_1) - (R_0 - C_0)$

Since in the shipping market the rates are determined at international level and we are analysing only a small proportion of the world fleet, we can assume that the freight rates are given. Therefore, R_1 and R_0 can be considered equal, i.e. $R_1 = R_0$, from which:

$U^* = C_0 - C_1$

The only relevant information is that relative to the cost function. If C_0 and C_1 represent the costs for the national flagged ships and the costs for the foreign flagged ships respectively, we have:

$C_0 = f$ (Crew related costs(per category), Other running costs(per category), Capital costs(partial))

$C_1 = f$ (Crew related costs(per category), Other running costs(per category), Capital costs(partial))

Data on the above listed factors have been derived from the information we collected via the questionnaire. The data concern both types of fleet, flagged out and non flagged out and we can therefore create the following variables:

- Crew cost related information:

C_m = Manning related costs NAT(per cat.) - Manning related costs FOC(per cat.)

- Other running costs information:

O_c = Other running costs NAT(per cat.) - Other running costs FOC (per cat.)

Therefore a first statement of the relevant function is:

$$U^* = \alpha C_m + \beta O_c$$

This function can be interpreted as follows: the utility of taking the decision to flag out is a function of the cost saving obtained by taking the decision.

However, there are additional factors that, independent of cost saving considerations, can be assumed to influence the shipowner's decision to flag out and should be included in the model, eg. characteristics of the company, characteristics of the trade, characteristics of the vessel, etc. These factors might indirectly influence the ability or possibility of the shipowner to change flag. Therefore, the utility of the ith shipowner is also a function of the above variables. We have:

$$U_i^* = \alpha_i C_m + \beta_i O_c + \gamma_i \text{Other characteristics}$$

Furthermore, since unobservable or unmeasurable characteristics might be part of the decision process connected to flagging out, the complete function to be estimated should be:

$$U^* = k + \alpha_i C_m + \beta_i O_c + \gamma_i \text{Other characteristics} + u_i$$

where $u_i = (u_{i1} - u_{i0})$ and k is a constant.

Our model postulates that the probability that a ship will be flagged out is a function of observable factors both internal or external to the firm and a random element resulting from either qualitative(unmeasurable) or non observable factors.

In order econometrically to infer the parameters from the data set at our disposal we will use the Maximum Likelihood Estimation Procedure under which the Maximum Likelihood estimates are obtained by iterative Techniques[27]. The estimated coefficients do not provide explicit insights as to the magnitude of the effect of the specific variable on the probability of the event occurring but only on the sign, or direction, of the effect[28].

In order to calculate the marginal effect on the conditional probability of the event occurring of a unit change in the jth explanatory variable xj we have to perform further calculations. These calculations involve taking the derivative of the Logistic function with respect to the variable for which we want to calculate the marginal impact. In detail:

$$\frac{\partial P(y = 1 | x_i)}{\partial x_{ij}} = \frac{\exp(-x'\beta)}{[1 + \exp(-x'\beta)]^2} \beta_j$$

For logit models as for standard OLS models statistical inference can be carried out using standard inferential techniques. In particular for testing that a coefficient is significantly different from zero the Wald Statistic, which has a χ^2 distribution, can be used.

In order to asses the accuracy with which a binary choice model approximates the observed data, a number of measures are available which follow the principle of the more familiar R^2 in standard Least Square regression. The measure we adopt is based on a ratio of Likelihood from the full model and from a restricted model estimated on the intercept alone. This is the McFadden pseudo R^2. If we let $L(\hat{\beta})$ and L(0) represent, respectively, the vector of likelihoods for the full model and the restricted model estimated on the intercept alone the formulation is as follows:

$$R^2_{MF} = 1 - \frac{L(\hat{\beta})}{L(0)}$$

---

[27] For further details see Maddala(1986).

[28] This is because the Logit function is monotonically increasing in its arguments and therefore if the parameter β_j associated with the jth explanatory variable is positive, then the general conditional probability will increase with an increase in x_j. The contrary is valid if the coefficient of xj is negative.

To test the joint significance of the slope parameters in the model (known as the F-test in OLS analysis) we use the χ^2 test statistic. This is:

$$-2 \ln \frac{L(\hat{\beta})}{L(0)} = 2\ (L(\hat{\beta}) - L(0)) \sim \chi_r^2$$

where r = number of restrictions imposed[29].

---

[29] To test the joint significance of all the slope parameters we impose (m - 1) in a m parameter model and estimate this as the restricted model.

V. The Empirical Survey

(i) Data collection

The previous section detailed the data requirements necessary to satisfy the Logit formulation. Having chosen the technique and decided on the relevant variables it was then essential to collect the appropriate data; this was achieved by means of a questionnaire. The authors conducted numerous interviews with different UK shipping companies to obtain qualitative background information, to discuss the nature of the questions and to clarify any problems of interpretation. Pilot interviews took place to test the validity and comprehensibility of the questionnaire and then the final version was either left with the companies or mailed/faxed to them later. Follow-up telephone conversations clarified any subsequent difficulties which respondents had and we are grateful to all of them for their cooperation. Data were required on all the factors discussed in Section III of this report and the questionnaire was designed to effect this. A copy of the questionnaire (and the accompanying letter) is given in *Appendix 2* and it requires both qualitative and quantitative responses.

The questionnaire was devised during late 1996 and early 1997 and the survey was conducted between February and May 1997. The company data collected relate to the fiscal year 1995/96. The questionnaire was divided into two parts. Part I relates to the shipping company or shipping division while Part II relates to the individual vessels of the fleet.

In keeping with the original intention of this study the questionnaire was translated into Italian and copies, together with an accompanying letter in an appropriate language, were sent to the shipowners' associations of Italy, Norway, and the Netherlands. The latter two countries received English language versions of the questionnaire. The authors also discussed their research with the Greek Shipowners' Association in London where it became clear that the Greek shipowners were unlikely to participate in this study. Subsequently Greece was excluded from the research. Unfortunately the response rate in the other countries has not been good and we suspect that shipping companies are

inundated with questionnaires and, hence, reluctant to complete them. Therefore we are unable to include international comparisons in this report.

However the UK position is different because the authors have been involved in a programme of meetings and interviews with shipping companies and the personal approach has been productive. The response rate within the UK is considered good and stems from the time devoted to personal interviews. The data we have received currently refers to 186 ships or about 38% of the population. The sample is distributed as follows:

Table 2: Sample covered

Ship Type	GBI Flag			FOC Flag		
	Total	Sample	Percentage	Total	Sample	Percentage
Bulk Cargo	12	0	0.0%	43	20	46.5%
Container	23	0	0.0%	54	29	53.7%
Tanker	68	24	35.3%	87	38	43.7%
Gen. Cargo	59	34	57.6%	111	37	33.3%
Spec. Cargo	5	0	0.0%	30	4	13.3%
Totals	167	58	34.7%	325	128	39.4%

	Total UK owned	Total sampled	Percentage
Response rate	492	186	37.8%

As can be seen the distribution per type of ship and per group of flag - national (GBI) or foreign (FOC) - is, in some cases, not representative of the true population. In particular, the samples for Bulk cargo, Specialised cargo and Container ships are not representative of the national flag fleet and this will create difficulties for the estimation of the model for these specific categories. In fact in order for the model to yield significant results, the sample observations must have the following characteristics:

1) be a significant sample of the total population (for a closed response questionnaire about 30%[30])

2) be a true sample of the population (the true proportion of types of vessels and types of flags should be reflected in the sample). For instance if, for a specific category of vessels, the sample is composed only of foreign flagged vessels then the estimated coefficient and overall result of the estimation will be biased toward the flagging out decision and the results will be misleading.

---

[30] Oppenheim(1983).

Data in the other categories however are representative and more appropriate for estimation and the overall response rate is well above the minimum required.

The study is concerned with the reasons for choosing a flag/flagging out and the responses from the industry indicate that both qualitative and quantitative (commercial) factors play their part in decision making. The quantitative data will be analysed in Section VI using the Logit model described in Section IV but, based on the qualitative responses, some preliminary observations may be made.

(ii)Preliminary observations

Flag selection is a high level decision usually made, on a vessel by vessel basis, at the time of vessel acquisition and is generally based on experience. During the interviews it became clear that different companies perceived different factors as being important to their decision on flag. Some companies stated that, having flagged out previously, they would now prefer to flag back in but were prevented from doing so by the high cost of compliance to meet the requirements of the flag. A flag might be chosen for political reasons, to ensure a supply of skilled labour, for public relations reasons, for historical reasons, because of directives from financial institutions, or for reasons related to the trade routes of the vessel or to its characteristics.

Those companies which had chosen **not to use the national flag** gave crew costs as the most common reason for their decision. Other factors which had influenced them were: to escape bureaucratic control, high costs of compliance with standards of the national flag, the unavailability of skilled labour (the need to ensure a supply of same), and fiscal reasons. The following figures provide an indication of the influence of individual factors on this decision.

Figure 3: Reasons given for choice of flag (flagged out vessels).
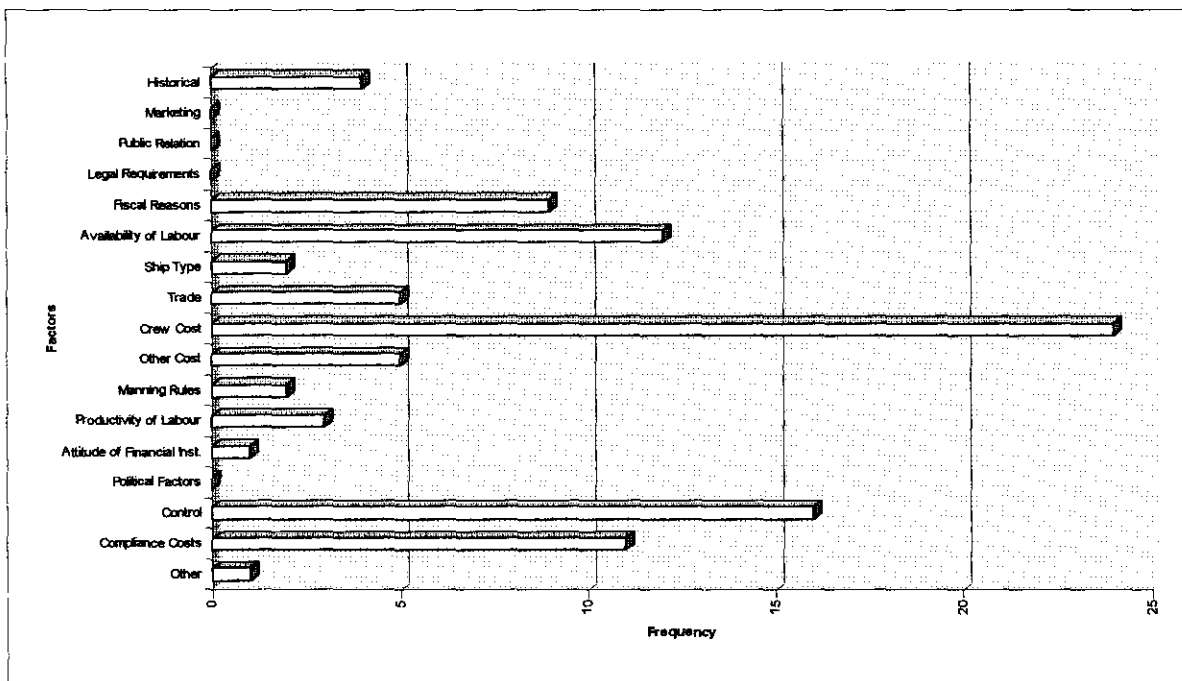
Figure 4: Relative importance of factors affecting the use of foreign flag.
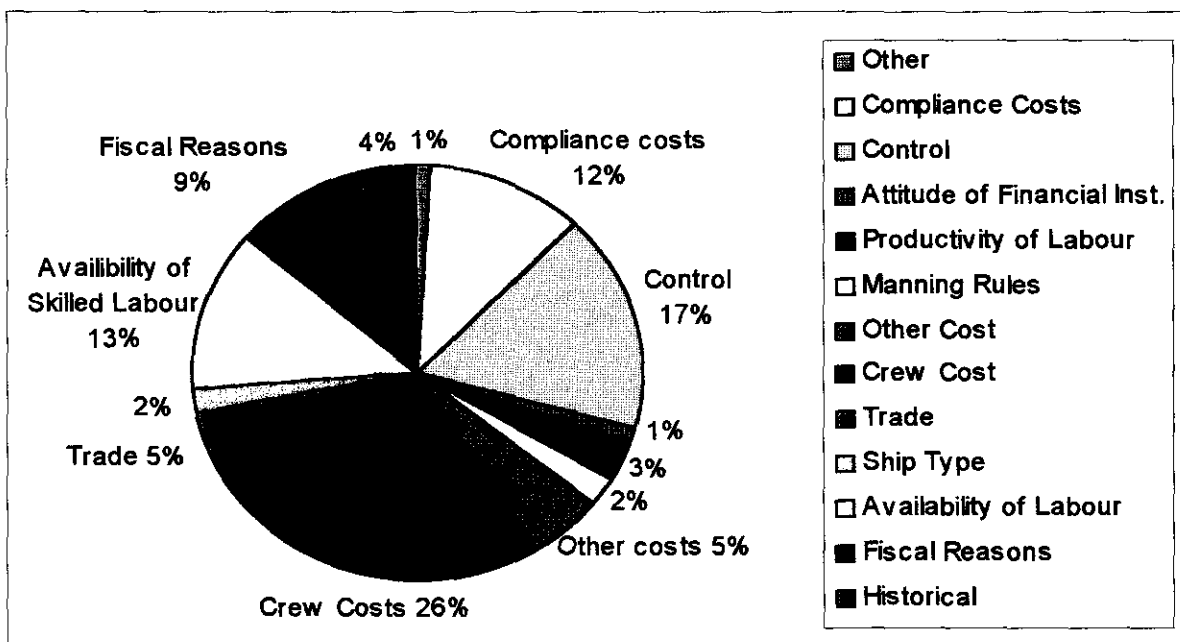
Those companies which had chosen **to use the national flag** stated that their decision was affected *inter alia* by: the type of ship, the trade routes, public relations reasons,

marketing considerations, and historical reasons. The following figures depict the situation for the national flag vessels.

Figure 5: Reasons given for choice of flag (national flag vessels).
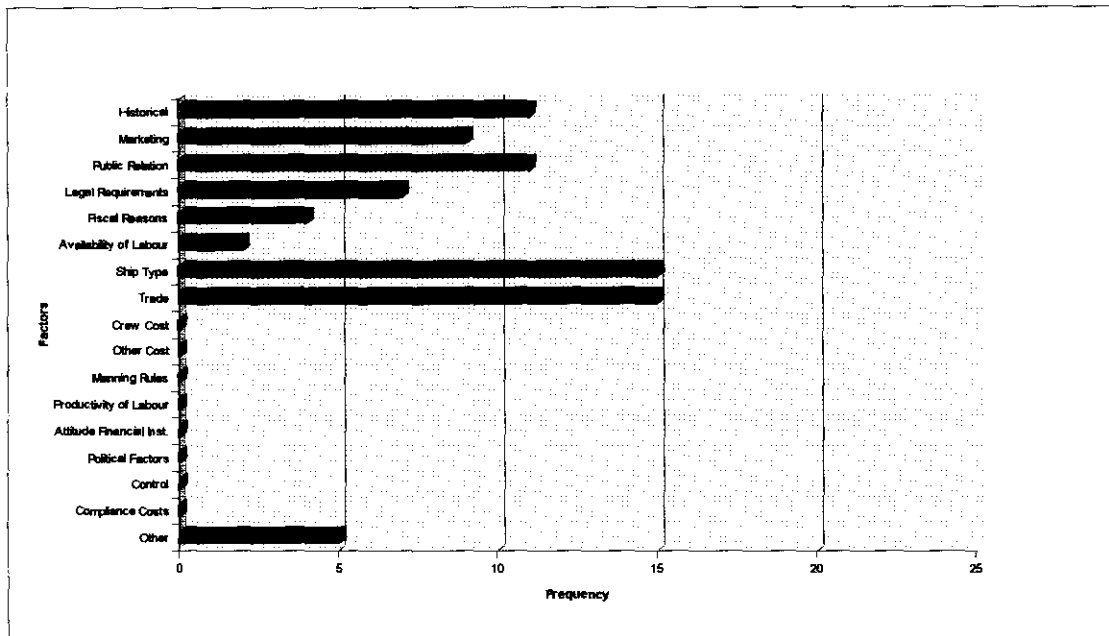
Figure 6: Relative importance of factors affecting the use of national flag
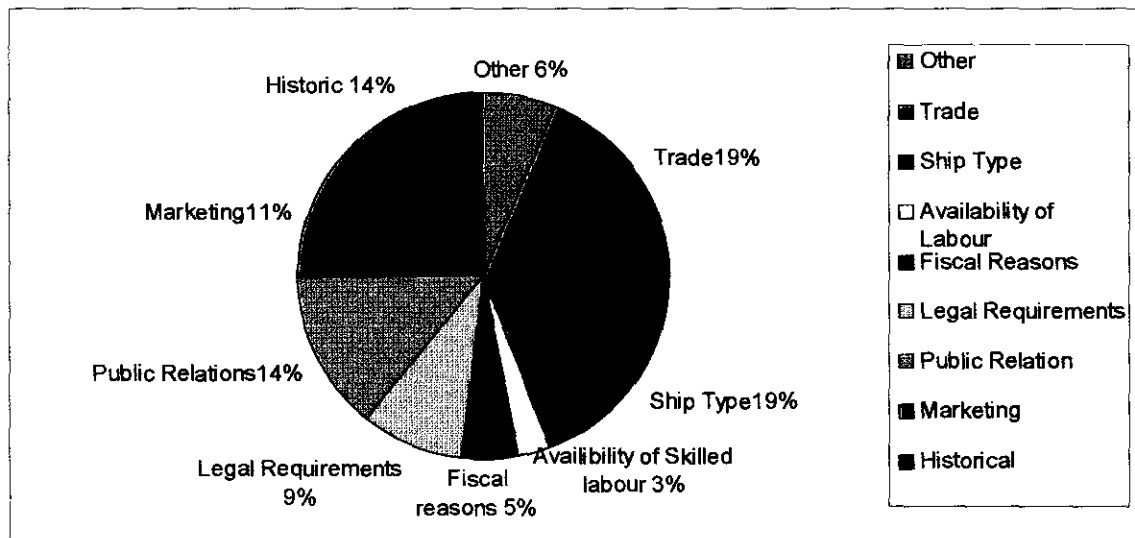
From the profiles shown overleaf(Figures 7 and 8) it is clear that no one reason acts in isolation and that the decision on choice of flag is a subtle amalgam of factors.

For companies choosing the foreign flag:

Figure 7: Companies' responses.
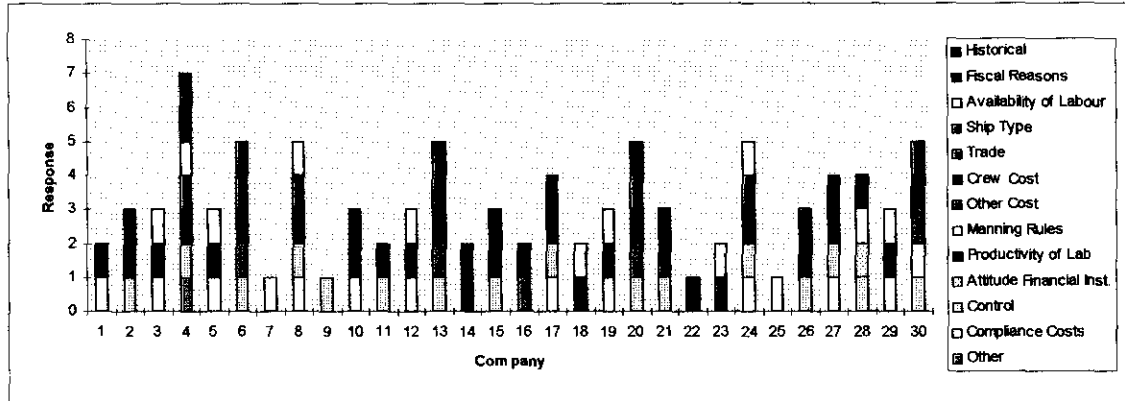
For companies choosing the national flag:

Figure 8: Companies' responses.
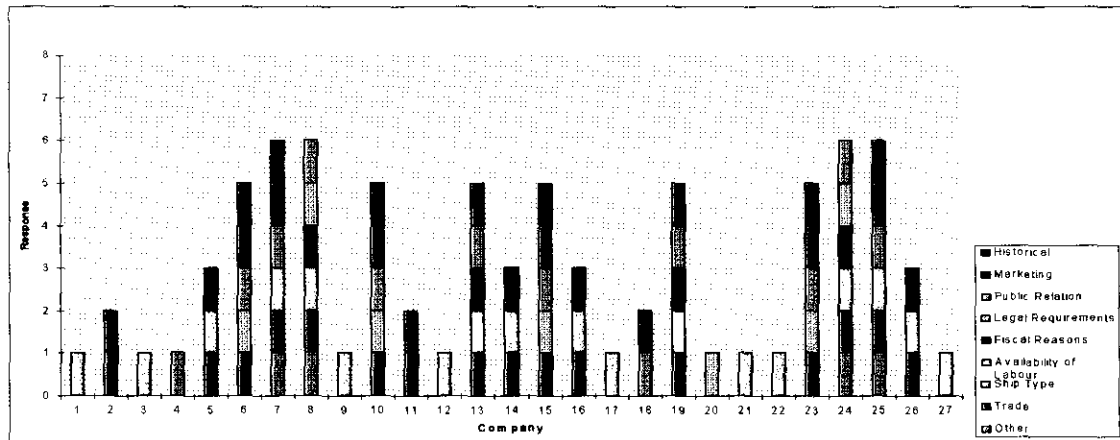
Figures 9 and 10 below show that most of the companies (65%) which responded were in the No Tax category with the majority (60%) expecting to remain there for the next five years. A company will be in this position if it has accumulated tax allowances from earlier years to the extent that it is now in a position where it is unlikely to be required to pay tax for the indefinite future. Under such circumstances the fiscal factors affecting the decision on flag are mitigated as the company is unable to make immediate use of any favourable changes which might occur. Furthermore, management costs appear not to be affected (or if so only slightly) by the choice of flag.

Figure 9: Tax Position

New Entrant
0%

Full Tax
Position
35%

No Tax
Position
65%

■ Full Tax Position
▓ No Tax Position
□ New Entrant
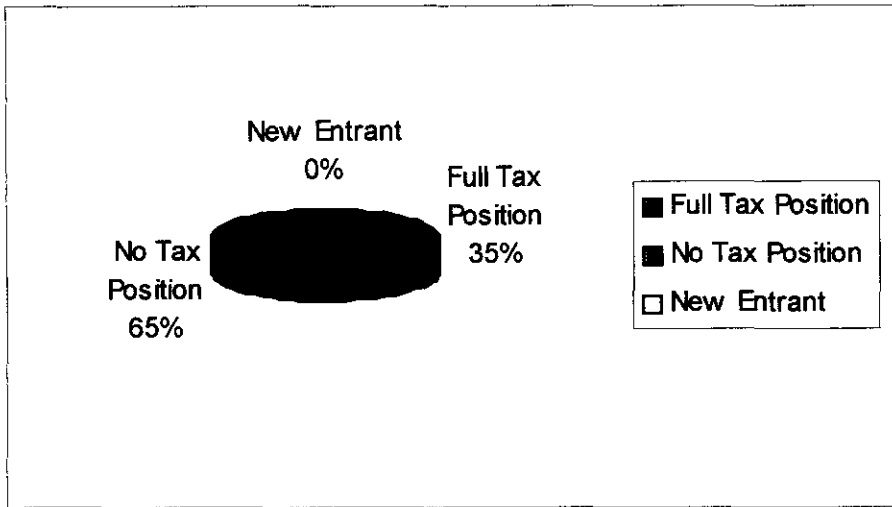
Figure 10: Expected Changes in the Tax Position in the next 5 years

Change Tax Position
40%

No Change
60%

▓ Change Tax Position
■ No Change
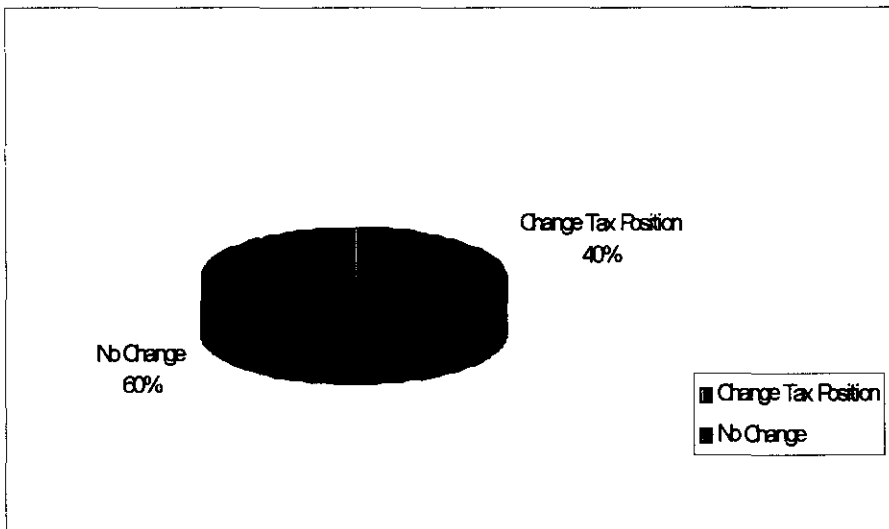
VI. Econometric Analysis

Preliminary data analysis

The data used to estimate the logit model have been extracted from the responses collected via the questionnaire presented in *Appendix 2*. The UK sample consists of 186 ships connected with 51 companies. In our estimation we consider the type of flag (divided into two categories, national and foreign) as the dependent variable and attempt to estimate the influence and the magnitude of a number of factors listed previously on the choice of the ship's flag.

The total fleet is distributed between the two categories as follows, 35% national and 65% foreign. Since the response to the questionnaire was unbalanced among the different categories of vessels and of flag as shown in table 2 in section V, we have had to limit our analysis to a subsection of the sampled population and we have analysed the data for two categories of ships: tankers and general cargo.

The sample therefore consists of 71 general cargo ships and 62 tankers. The flag distribution is as follows: 39% of tankers and 52% of general cargo vessels are registered in the UK. The remaining ships are under foreign flag.

The explanatory variables have been chosen with a view to modelling the decision of the shipowners and to take account of the ship specific characteristics. These have been selected in order to describe the probable effect of a series of factors on the shipowner's decision.

In order to account for the type of ship, a dummy variable has been created using general cargo as the base group. The type of trade has also been considered with the creation of a dummy for short/deep sea trade and, in this case the base group is the short sea shipping type of trade. Dummies concerning the geographical area of trade were created but proved to be not significant for the specific sample and were therefore excluded from the analysis.

Other characteristics of the ships were included through the following variables: GRT, age, crew number, days of operation in a year(calculated from the information on downtime) and the current valuation of the vessel. A dummy variable was also created to distinguish ships acquired within the last five years from those purchased previously.

The variables concerning information on costs were derived from the survey data. In order to account for the effect of size and crew number on the absolute value of the costs connected with running the ships we have divided the variables either by GRT or by crew number depending on which is more appropriate in each case. The criteria followed has been to divide variables representing crew related costs by crew number in order to obtain a "per crew member" figure and divide the variables representing other operating costs by GRT.

In order to comply with the theoretical requirements of the logit model and its implicit utility function we have had to calculate variables representing differences in expenditure rather than expenditure in absolute terms. This has been necessary also for the purpose of interpreting the estimated results as will be seen later.

To obtain a more detailed insight into the specific factors influencing the overall decision we have created variables representing the separate components of these total costs, where this was possible from the data provided in the questionnaire. The variables concerning crew costs created for this purpose are: difference in basic salary, difference in national insurance cost, differences in pension cost, difference in crew related other costs (calculated by adding up the expenses related to leave pay, overtime, and other costs) differences in training cost and difference in travelling costs.

Concerning costs related to other running expenses we have: difference in repairs and maintenance costs, difference in docking and surveys costs, difference in stores and provisions costs, and difference in port and fuel costs.

Additionally, at an aggregated level the following variables have been created: total crew costs difference, and total other operating costs difference. However in the following

analysis we have had to use a partial figure for total other operating costs. Missing values for the variable related to fuel and port charges, and its close relationship with the type of trade the ship is employed on, coupled with the fact that some of the data related to docking costs includes specific expenses carried out on a regular basis (and which some respondents have not averaged over the docking cycles as required) have lead us to exclude these two cost components from the calculation of the variable related to the difference in total other operating costs.

We also have a variable representing the difference in the overall running costs of operating the vessel as measured by the total figure given by the company itself, in order to consider the costs not explicitly mentioned as specific categories in the questionnaire.

Variables related to the cost of insurance were included to test previous theories and widespread beliefs related to flagging out[31]. Again, the variables were divided by the size of the ship in order to take account of the influence of the size of the vessel on the calculations related to the insurance premia. The variables were calculated for three types of insurance: Hull and Machinery, Protection and Indemnity and for Self insurance. Again, the variable related to total insurance costs was created as the difference between the sum of all the costs related to insurance per GRT according to the different categories of flag. Finally, a variable relating to the difference in registration related costs (initial and annual costs of registration) has been created. A list of all these variables and their nomenclature is given in Table 3.

---

[31] For example to test the validity nowadays of the study by Metaxas and Doganis(1976)

Table 3: Description of variables

Variable	Calculation	Contents
DepVbl	Dependent Variable (1 = Flagged out, 0 = otherwise)	Ship Flagged out/Flagged in
TypeDum	Type dummy (1 = Tanker, 0 = otherwise)	Ship type (Tanker/General Cargo)
TradeDum	Trade dummy (1 = Deep Sea Trade, 0 = otherwise)	Type of Trade (Deep/Short Sea)
GeoDum	Geographical dummies (Not relevant)	Area of Trade
GRT	GRT	Size of the ship
AGE	Age	Age of the ship
Cr_Num	Crew Number	Crew size
Op_Days	Days of Operation	Days of Operation
YearDum	Purchase Dummy (1 = within 5 years, 0 = otherwise)	Ship purchased within 5 years
*d_*Basic	Basic Salary for seafarers on National Flag Ship - Basic Salary for seafarers on Foreign Flag Ships	Difference in basic salary per crew member'
*d_*NI	NI for seafarers on National Flag Ship - NI for seafarers on Foreign Flag Ships	Difference in Nat. Insurance payments per crew member'
*d_*Pens	Pension for seafarers on National Flag Ship - Pension for seafarers on Foreign Flag Ships	Difference in Pensions payments per crew member'
*d_*OtCr	Other Crew costs for seafarers on National Flag Ship - Other Crew Costs for seafarers on Foreign Flag Ships	Difference in Other Crew related costs per crew member'
*d_*Train	Training Costs for seafarers on National Flag Ship - Training Costs for seafarers on Foreign Flag Ships	Difference Training costs per crew member'
*d_*Trav	Travelling Costs for seafarers on National Flag Ship - Travelling for seafarers on Foreign Flag Ships	Difference in Travelling costs per crew member'
*d_*Rep	Repairs and Maintenance costs on National Flag Ship - Repairs and Maintenance on Foreign Flag Ships	Difference in Repairs and Maintenance costs per GRT''
*d_*Dock	Docking and Survey costs on National Flag Ship - Docking and Survey costs on Foreign Flag Ships	Difference in Docking and Survey costs per GRT''
*d_*Stores	Stores and Provision costs on National Flag Ship -	Difference in Stores and Provision

	Stores and Provision costs on Foreign Flag Ships	costs per GRT"
*d*_Fuel	Fuel and Port Charges on National Flag Ship - Fuel and Port Charges on Foreign Flag Ships	Difference in Fuel and Port Charges per GRT"
d_TCrew	Total Crew costs for seafarers on National Flag Ship - Total Crew costs for seafarers on Foreign Flag Ships	Difference in Total Crew costs per crew member'
*d*_TOper	Total Operating costs on National Flag Ship - Total Operating costs on Foreign Flag Ships	Difference in Total Operating costs per GRT"
*d*_TRunn	Total Running costs on National Flag Ship - Total Running cost on Foreign Flag Ships	Difference in Total Running costs per GRT"
*d*_H&M	H&M costs on National Flag Ship - H&M costs on Foreign Flag Ships	Difference in H&M Insurance cost per GRT"
*d*_P&I	P&I costs on National Flag Ship - P&I costs on Foreign Flag Ships	Difference in P&I Insurance cost per GRT"
*d*_Self	Self Insurance costs on National Flag Ship - Self Insurance costs on Foreign Flag Ships	Difference in Self Insurance cost per GRT"
*d*_Ins	Total Insurance cost on National Flag Ship - Total Insurance cost on Foreign Flag Ships	Difference in Total Insurance costs per GRT"
*d*_Reg	Registration costs on National Flag Ship - Registration costs on Foreign Flag Ships	Difference in Registration costs per GRT"

' The variable has been divided by 100
" The variable has been divided by 1000

For a preliminary analysis of the data we can define the principal average characteristics of the two types of vessels in this survey. From the sample we have that 61% of the tankers are flagged out as opposed to 48% of the general cargo vessels. The average ship size for tankers is 31228GRT (and 55932DWT) and the average age is 11.95 years; while for general cargo vessels we find that the average size is 2255 GRT (and 3280 DWT) and the average age is 12.69 years. For tankers there is strong relationship between the flag of the ship and the type of trade since 61% of the sampled ships are employed in deep sea trade (95% of the flagged out fleet) while this is not the case for the general cargo fleet where only 7% of the fleet is employed in deep-sea shipping and all these vessels are flagged out.

Tankers have an average crew on board of 15 members compared to 7 for the general cargo ships. This is to be expected given the reported average size difference. Also the value of the vessel varies significantly between the two types of ships. In order to make the figures comparable we have calculated the average value per GRT which is £1001 for tankers and £1062 for general cargo vessels. We also know that 42% of the tankers and 37% of the general cargo ships have been purchased within the last 5 years and these figures represent 31% and 19% respectively of the flagged out tankers and general cargo ships.

On average tankers operate for 362.58 days per annum (the flagged out fleet has 359.73 operative days) while general cargo ships have 359.41 operational days on average (the vessels under foreign flag have 355.89 operative days) a difference of 3 days.

The absolute costs associated with tankers are higher than those associated with general cargo vessels. The crew costs for tankers is on average £44,585 where the basic salary is £20,381, the national insurance and other social costs are £875, the pension related costs per crew member are £452 and cost related to overtime, leave and various allowances is £5,172. Training and travelling account respectively for £455 and £2457. Whereas, on average, the crew cost for general cargo is £20,527 where the basic salary is £17,179, the national insurance and social cost is £673, the cost related to pensions is £415 and the cost related to overtime, leave and various allowances is £1803. For general cargo ships crew training expense is £201 and travelling expense is £743.

For tankers total operating costs per GRT are £176 which become £43 if docking, surveys, fuel and port related costs are excluded. The insurance cost is £28 per GRT and the total average registration expenses amount to £0.42 per GRT (or £2693 per vessel). Finally, the total running cost per GRT for a tanker independent of flag is £194. Whereas for general cargo ships the total operating cost per GRT is £292 which becomes £59 if we consider the partial value for the reasons stated above. The insurance cost is £33 per GRT and the total registration expenses amount to £0.35 per GRT (or

£661 per vessel on average). Furthermore for general cargo vessels the total running costs amount to £350 per GRT.

While the crew costs for tankers are generally higher than those for general cargo ships the same cannot be said for operating costs. Average running costs show that tankers are proportionately cheaper to run (cost per GRT) than general cargo ships. However, this result has to be considered alongside the possible effect of economies of scale in running costs stemming from the difference in average and absolute sizes of the two types of fleet. In absolute terms the total average running costs for the two types of vessels is: £1,287,150 for tankers and £471,880 for general cargo.

In the comparison between vessel types we cannot abstract from considerations relating to the differential in costs connected with the vessel's flag. From the preliminary data analysis we can see that the costs connected with flagged out vessels are generally significantly lower than the costs associated with nationally flagged vessels and that the responses received show interesting insights into some of the preconceived ideas related to flagging out and shipowners' behaviour.

In particular we see that for national flag tankers total crew cost per seafarer is £37623 and for foreign flagged tankers it is £34,780. The total operating costs (corrected for fuel, port and docking costs) are £63 for national flag and £42 for foreign flag. Insurance costs per GRT are £12 for foreign flag and £24 for national flag. We have an interesting result for training expenses in that national flagged vessels have an average cost related to training per seafarer of £239 while the equivalent cost for foreign flagged ships is £357.

For general cargo vessels the average crew costs amount to £20,867 and £20,214 for national flagged and foreign flagged vessels respectively. The operating costs are of the order of £65 and £54, and the insurance costs are £23 and £15 per GRT respectively for national flagged and foreign flagged vessels. For general cargo ships the difference in cost related to training is in favour of nationally flagged vessels since they have an expenditure of £294 as opposed to £116 for foreign flagged general cargo ships.

In some cases it is difficult to predict the sign of the coefficient of the variables we have created but, for others, the expected sign is either dictated by the existing literature or by *a priori* beliefs based on the experience acquired while dealing with the representatives from the sector. The expected signs of the variables are as follows.

We expect the type dummy to be significant since shipowners have generally stated that ship type is an important factor in their decision to flag out or maintain the national flag, also the dummy related to the type of trade is assumed to be highly significant and in particular to have a positive coefficient since, generally, a higher percentage of ships employed in deep sea trades are flagged out. However this distinction is only true for tankers since for general cargo ships the type of trade does not appear to affect significantly the choice of flag.

In general we expect bigger and older ships to be flagged out and the coefficients of GRT and AGE should therefore have a positive sign. In contrast, the variable measuring the difference in basic salary costs should have a negative sign which may, at first sight, appear strange since it is often stated that vessels flag out to take advantage of lower crew costs. However this statement refers to total employment cost and it must be remembered that the general practice for owners of flagged out vessels is to pay their crews consolidated wages which are likely to include higher basic wages to compensate for the absence of pension and national insurance costs. As indicated earlier the average value for this variable is negative implying that the difference actually signifies not a saving but a higher expense on the part of flagged out tonnage in relation to basic salary payments. It follows that we would expect the coefficient of the variables connected to National Insurance, Pensions payments and other crew related costs (leave pay, overtime, and other allowances) to be positively related to the probability of the ship being flagged out.

One criticism sometimes levelled at flag of convenience operators is that they might use lower standard and badly trained (cheaper) crews; therefore it should follow, if this were

the case, that the coefficient of the Training Cost variable should be positive suggesting that as the difference in training costs rises flagging out is more likely. The main factor which would influence travelling costs is the type of trade of the ship, if the vessel is employed in deep sea trade it is more likely to have higher crew travelling expenses. Therefore, we would expect the coefficient for this variable to be strongly related to the type of trade and only coincidentally with the nationality of the ship's flag.

According to most literature the coefficient of the variable for the difference in Repairs and Maintenance costs is expected to be positively related with the probability of the ship being flagged out, since flagged out vessels are accused of being less likely to indulge in regular maintenance. However, it should be considered that a positive coefficient could also imply a more efficient crew and less repair work to be done. The variable related to docking and surveys is not very significant since its definition has not been consistent among the respondents and the figures differ widely. The same can be said for Fuel and Port charges since this value has often been omitted from the responses. For both these coefficient there is no strong *a priori* expectation since both factors should be independent of flag and be related to the type of trade and conditions of the vessels. Equally there is no strong *a priori* belief about Stores and Provisions costs.

The coefficients related to total crew costs, total running costs and total operating costs should be positive for the reasons given above. Previous studies suggest that the coefficient of the variable 'difference in total insurance cost' should have a positive coefficient and we will test this hypothesis. However, it is likely that insurance costs are generally independent of the flag and, as reported previously, are a function of the record of the shipowner. Finally, we expect the registration cost variable to be inversely related to the likelihood of the ship being flagged out since national flag vessels usually have zero registration costs.

VII. Empirical results

Having identified, constructed and explained the variables to include in our model we proceed to identify the effects and magnitude of these on the probability of the ship being flagged out. The function we need to estimate therefore will be:

Prob of being flagged out = f(ship characteristics, ship differences in costs)

The use of a non linear function such as described in section IV requires that maximum likelihood estimation of the function be performed using iterative techniques. To estimate the parameters we use first the data set as a whole differentiating between the two types of vessels via an intercept dummy; in the second and third stages of the analysis we divide the data set and analyse separately the factors affecting the decision of the shipowners for the different types of ships. Each stage will consider three different model formulations. For each of the estimated models the χ^2 is highly significant.

Whole Sample

Variables	Model 1		Model 2		Model 3		Model 4	
K	NEG***	-	NEG***	-	NEG***	-	NEG***	-
TypeDum	NEG***	Y	NEG*	Y	NEG**	Y	NEG***	Y
Age	POS**	Y	POS**	Y	POS*	Y	POS***	Y
TradeDum	POS***	Y	POS**	Y	POS***	Y	POS***	Y
*d*_Basic	-		NEG**	Y	-		-	
*d*_NI	-		POS***	Y	-		-	
*d*_Train	-		POS*	Y	-		-	
*d*_Rep	-		-		POS**	Y	-	
*d*_TIns	-		-		POS**	Ø	-	
*d*_TCrew	-		-		-		NEG**	N
*d*_TOper	-		-		-		POS**	Y

POS, NEG = indicates the sign of the estimated coefficient
*, **, *** = levels of significance, respectively 10%, 5%, 1%
Y = the sign of the coefficient agrees with *a priori* expectations, Ø = no strong *a priori* expectations,
N = the sign of the coefficient does not agree with *a priori* expectations,
# = The variable could not be included since the maximum number of iterations was exceeded

The total sample

Characteristics related to ship type are likely to affect the probability of the event occurring. In order to identify those to be included we estimate the first regression including only variables relating to general factors without including cost variables.

We have:

Prob FO = -2.17* - 2.27** TypeDum + 0.15*** Age + 5.76*** TradeDum   [1]**
$\quad\quad$ (0.65)   (0.05) $\quad\quad$ (1.16) $\quad\quad$ (1.16)

Regression [1] was also estimated using the variable related to the current value of the vessel and the crew size, however the coefficient of the two variables did not significantly differ from zero. The GRT variable connected with was also included in the previous estimation in the place of the TradeDum (as the two are highly related). However, even though it appeared statistically significant at the 5% level it was decided not to include it in model [1] since this factor is expected to be strongly related to other independent variables included in the later steps of this analysis. The variable TradeDum was preferred because it implicitly allows for the vessel size to be taken into account since, in general, ships employed in short sea shipping are smaller than ships employed in deep sea navigation.

From the analysis of the signs of the estimated coefficients we can see that while the current value of the vessel does not appear to have a significant effect on the likelihood of the vessels being flagged out and the crew size factor might be picked up by another variable, the type of ship appears to have a significant impact. In particular, tankers are less likely to be flagged out compared to general cargo vessels but the likelihood of their being placed under a foreign flag is positively influenced by both age and area of trade. In fact, the older the ship the more likely it is to be flagged out and the tankers employed in deep sea navigation should, as expected, be more likely to be flagged out.

For the purposes of exploring the data available we also included in another regression a dummy allowing for years since purchase. The estimated value of the coefficient of this

variable was negative which indicated that ships, in this case tankers, of recent acquisition are more likely to be placed under national flag.

From the estimated regression it appears that the hypothesis of a positive correlation between age of the vessel and flag cannot be rejected. It also agrees with common sense that the vessels employed in deep sea shipping are more likely to be registered in foreign registers. The fact that the dummy related to ship type is significantly different from zero at the 5% level reinforces the conclusion reached in the previous section concerning the qualitative investigation of the factors influencing the decision to flag out, namely that the type of ship rates quite highly among them.

In order to determine whether the predictor set is "globally" significant we have performed the model chi-square test. This is highly significant and therefore we can accept that our variables are globally significant. In order to check for the predictive efficacy of the model we will use the pseudo R^2. and the calculated value for this statistic is 0.36. This figure indicates the relative improvement in the likelihood of observing the sample data under the hypothesised model compared with the model containing the intercept alone. This figure is not very high but this is not surprising since we have estimated a very parsimonious model.

The estimated coefficients of the variables included in a logit model allow the sign of the effects of the various factors on the probability of the event occurring to be determined directly but do not provide explicit insights as to the magnitude of the effect; further calculations are needed for this. These will be performed later in the section and only for the final model in order to calculate the predicted conditional probabilities.

Having included variables related to generic factors we then concentrate on the variables connected with the cost factors. In order to do this we attempted to estimate a complete model including the majority of the variables connected with both crew and operating costs. However this approach was not successful since some variables are highly correlated with each other and the matrix could not be inverted.

We have therefore proceeded in steps. First we have decided to control for the effect of variables connected with crew costs and have therefore estimated equation [2] below:

$$\textbf{Prob FO} = \textbf{- 4.34}^{**} - \textbf{2.37}^{*} \textbf{ TypeDum} + \textbf{0.20}^{**} \textbf{ Age} + \textbf{4.30}^{***} \textbf{ TradeDum}$$

(1.30) (1.36)   (0.09)   (1.64)   [2]

$$\textbf{- 0.43}^{***} \textbf{ \textit{d}\_Basic} + \textbf{3.83}^{***} \textbf{ \textit{d}\_NI} + \textbf{ + 2.51}^{*} \textbf{ \textit{d}\_Train}$$

(0.15)   (1.14)   (1.46)

Model [2] represents the effect of crew related costs on the likelihood of the ship being flagged out or not. The variables introduced in the regression are only a few of the variables into which we had divided the total crew costs. However, we were unable to run the regression including all of them simultaneously since we encounter problems of multicollinearity of the data. For instance, difference in pension related costs and other crew related costs such as costs connected with leave, overtime, and other allowances had to be excluded because their presence would not allow the matrix to invert.

The coefficients of model [2] are all significantly different from zero if we consider a 10% level of significance. However, most variables, as the asterisks show are significant also at the 1% level.

From the analysis of the coefficients we can see that, as before, tankers are less likely to be flagged out but this possibility increases when we consider older tankers and tankers employed in deep sea shipping. This model also shows that the difference in basic salary is inversely related to the likelihood of the ship being flagged out. What this actually implies is that an increase in the differences in basic salary decreases the probability that the ship is flagged out. This, even if it initially appears to be counter intuitive seems on a deeper analysis to be logical since flags of convenience crews generally receive a "consolidated" wage which includes sums toward pension provision and other allowances. The average basic salary of seafarers employed on the sampled ships is higher than that of seafarers employed on national flagged vessels. This argument is strengthened by the positive relationship which is revealed between the variable d_NI and the likelihood of the ship being flagged out. In this case as the difference in National Insurance related costs increases, the probability of the ship being flagged out also

increases. The obvious corollary to this is that a decrease in the difference in these costs would increase the probability of the ship being under national flag. Another interesting result is yielded by the sign of the coefficient for difference in training costs. The positive relationship implies that as the difference in costs increases, the probability of a ship being flagged out also increases.

The predicted power of model [2] is improved significantly and now the pseudo R^2 value is 0.73. The insertion of additional variables connected with crew costs improves significantly the predictive efficiency of the model.

Having estimated the expected effect of crew cost savings on the shipowners' decision to flag out we turn to the analysis of the factors connected to the other operating costs. Again we have encountered problems in the estimation of the model with the entire set of cost variables hence we have opted for testing specific variables for which there were *a priori* beliefs about the possible outcomes or on which hypotheses had been put forward in previous literature. Model [3] is as follows:

$$\text{Prob FO} = -2.53^{**} - 1.52^{**} \text{ TypeDum} + 0.13 \text{ Age}^{**} + 4.60^{**} \text{ TradeDUM} +$$
$$(0.06)(1.24)(0.06)(1.24)\textbf{[3]}$$
$$7.76^{**} \, d\_\text{Rep} + 8.29^{**} \, d\_\text{Ins}$$
$$(2.60)(3.42)$$

The above regression shows that all of the three new variables included in the model are significant at the 5% level except for TypeDum which is significant at the 10% level. The signs of the coefficients of the base variables are all maintained. The coefficients of the new variables both have positive signs. This implies that there is a positive relationship between these and the probability of the event occurring, hence we can expect that an increase in savings related to repairs and insurance costs would increase the probability that the vessel would be flagged out.

Model [3] shows an improvement in its predictive power with respect to model [1] since the pseudo R^2 is 0.48. We can therefore say that model [3] approximates the observed data slightly better than model [1], however, model [2] containing variables relating to

crew costs is the one that shows the best approximation having a predictive efficiency of 0.73. This is consistent with the descriptive part of the data analysis where factors related to crew costs rank highly on the list of factors influencing the shipowners' decisions.

The last model we have estimated is model [4] below which models the likely impact of variables related to total crew cost and to other operating costs.

$$\text{Prob of FO} = -2.17^{***} - 2.27^{***} \text{ TypeDum} + 0.15^{***} \text{ Age} + 5.76^{***} \text{ TradeDum}$$
$$\begin{array}{cccc} (0.75) & (0.75) & (0.05) & (1.16) \end{array} \quad [4]$$
$$- 0.28^{**} \, d\_\text{TCrew} + 5.30^{**} \, d\_\text{TOper}$$
$$\begin{array}{cc} (0.07) & (1.63) \end{array}$$

The predictive power of the above model is relatively low with a pseudo R^2 of 0.45. Both additional variables are significant at the 5% level, and while crew related costs are inversely related to the likelihood of the event occurring, the variable related to other costs appears to be positively related to it. This can be interpreted by stating that an increase in the savings related to crew costs will decrease the likelihood of the event occurring, in other words of the ship being flagged out! On the other hand, an increase in the savings related to other operating costs will increase the likelihood that the event will occur and therefore that the ship will be flagged out. It was not possible to apply this model to the different sub-sectors of the sample.

General cargo vessels.

General Cargo

Variables	Model 1		Model 2		Model 3	
K	NEG***	-	NEG**	-	NEG*	-
TypeDum	Not Applicable					
Age	POS***	Y	POS**	Y	POS	Y
TradeDum	POS	Y	#		#	
d_Basic	-		NEG**	Y	-	
d_NI	-		POS***	Y	-	
d_Train	-		NEG	N	-	
d_Rep	-		-		POS	Y
d_TIns	-		-		POS**	∅
d_TCrew	-		-		-	
d_TOper	-		-		-	

For the general cargo ships the estimated regression for model [1a] is:

Prob FO =   -3.89* + 0.31***Age + 6.98 TradeDUM   [1a]**
             (1.06)   (0.08)   (24.92)

In this model the distinction between general cargo vessels employed in deep or short sea shipping does not appear to be significant which is not an unexpected result since the proportion of deep sea vessels in our sample is very limited. However the age factor is highly significant and has a positive effect on the likelihood of the ship being flagged out: therefore an older general cargo ship is more likely to be flagged out than a younger one.

The predictive power of this basic model is however relatively low with a pseudo R^2 value of only 0.30. Again with the basic version of the model this would be expected since the explanatory factors are very limited.

Model [2a] for general cargo ships, and including again the variables related to crew costs, shows a slightly better fit:

Prob FO =   - 10.10 + 0.68**Age - 0.42** d_Basic + 4.13*** d_NI**

$$\text{(1.30)} \quad \text{(3.77)} \quad \text{(0.14)} \quad \quad \text{(0.13)} \quad \quad \quad \text{[2a]}$$
$$- 0.32 \, d\_\text{Train}$$
$$\text{(1.59)}$$

Model [2a] does not contain the variable relating to the type of trade since its coefficient, and therefore its impact, was shown to be not significantly different from zero. The other variables are comparable with the ones in model [2]. The results appear to be consistent with those of the regression estimated on the entire sample except for the difference in training costs which, in this case, has a negative coefficient but is not a significant variable.

The coefficient of $d\_$Basic is negative, as in eq. [2] implying an inverse relationship of the effect of this variable on the likelihood of the event occurring, while an increase in the $d\_$NI variable would lead to an increase in the likelihood that the ship will be flagged out.

This model fits the data better than model [1a] as is to be expected given the increase in the number of explanatory variables included and given that crew costs rank highly in the shipowners' perceptions. It has a pseudo R^2 value of 0.72.

The estimated values for model [3a] are as follows:

$$\textbf{Prob FO =} \quad \textbf{- 9.70}^* + \textbf{0.58 Age} + \textbf{0.16} \, d\_\textbf{Rep} + \textbf{0.61}^{**} \, d\_\textbf{Ins} \quad \quad \textbf{[3a]}$$
$$\text{(5.00)} \quad \text{(0.37)} \quad \quad \text{(0.13)} \quad \quad \text{(0.20)}$$

The coefficients of $d\_$Rep and $d\_$Ins are both positive which implies that an increase in the difference in repairs and insurance related costs are likely to increase the likelihood that a ship will be flagged out. This is interesting as it is counter intuitive to some of the concerns relating to the efficiency and productivity of foreign crews and their level of concern for the vessels' standards. However, in interpreting this result, it must be considered that the coefficient for the difference in costs related to Repairs and Maintenance is not significantly different from zero. The results for difference in Insurance costs also lead to an interesting interpretation as it appears that an increase in

the difference in insurance costs, *(an increase in savings on average given that the mean is positive)* will increase the probability that the vessel will be flagged out.

From the data provided by the industry insurance costs tend to be lower on average for flagged out vessels and, given the above mentioned evidence on the purely shipowner's record related criteria for determining the insurance premia, the theory of Metaxas and Doganis concerning the safety issues related to FOC vessels can be refuted. It must however be kept in mind that the sample might be biased in the sense that the shipowners who have replied to the questionnaire might be the more established ones who have a better record and who perhaps are more likely to reply to questionnaires. Overall, the predictive accuracy of this model is high, in fact the value for the pseudo R^2 is 0.81.

Having analysed the relationships for the general cargo sector we now conclude by analysing the relationship for the tanker market and drawing some comparisons.

Tankers

Tankers

Variables	Model 1		Model 2		Model 3	
K	NEG**	-	NEG*	-	NEG*	-
TypeDum	Not Applicable					
Age	POS	Y	POS	Y	POS	Y
TradeDum	POS***	Y	POS***	Y	POS**	Y
*d*_Basic		-	NEG	Y		-
*d*_NI		-	#			-
*d*_Train		-	POS	Y		-
*d*_Rep		-		-	POS*	Y
*d*_TIns		-		-	NEG*	∅
*d*_TCrew		-		-		-
*d*_TOper		-		-		-

The application of these models to the tanker data yields the following results:

52

Prob FO =   - 3.80 + 0.07 Age + 6.10*** TradeDUM**   **[1b]**
                (1.68)   (0.08)   (1.46)

From this equation it follows that, for tankers, the type of trade cannot be rejected as a factor having a significant impact on the probability of flagging out. The age variable however appears to have no significant influence. The coefficient for the latter is positive indicating that, as expected, deep sea going tankers are more likely to be flagged out as opposed to short sea shipping ones. The coefficient for age, even though not significant, also has the expected sign. The predictive power of model [1b] is relatively high with the pseudo R^2 value of 0.66 which is quite remarkable given the limited number of explanatory factors.

In model [2b] we consider the variables related to crew costs, however we find that the ones related to basic salary and national insurance are highly correlated and the matrix cannot be inverted if both are included in the model. We opted for basic salary but also tested the model using the variable relevant to the difference in national insurance costs.

Prob FO =   - 3.55* + 0.06 Age + 6.44*TradeDum - 0.13 _d__Basic**
                (1.30) (0.09)   (1.77)   (0.10)   **[2b]**
                + 0.04 _d__Train
                (1.23)

We have not included in this model the variable relating to the age of the vessel since its coefficient was shown to be not significantly different from zero in equation [1b]. Of the variables included in the regression only the trade type dummy is significant. This suggests that the other variables do not affect significantly the probability that a tanker will be flagged out and may, perhaps, be explained by the sophisticated and specialised nature of such vessels. However the coefficients show that increases in difference in basic salary and in training costs would lead to a lower probability that the ship will be flagged out. The same regression was estimated substituting differences in national insurance for the variable related to basic salary. The coefficient for national insurance was found to be significant at the 5% level and to have a positive coefficient. As was the case for general cargo vessels an increase in the d_NI variable would lead to an increase in the likelihood that a deep-sea going tanker will be flagged out. Also in this other estimated

regression the coefficient of changes in training-related costs is still not significantly different from zero. The model fits the data better than model [1b] having an R^2 value of 0.67.

In order to examine the effects of other operating costs on the likelihood that a vessel will be flagged out we have estimated model [3b].

Prob FO =   **- 11.23* + 0.35 Age + 12.44** Trade_Dum + 12.94* d_Rep**
         (6.41)   (0.23)   (5.76)   (7.07)   **[3b]**
         -17.66** d_Ins
         (8.94)

Neither the difference in insurance costs nor the difference in repair and maintenance costs can be rejected as factors influencing the shipowner's decision. This implies that the decision concerning the flag of tankers will be influenced by these and that therefore while an increase in the difference in repairs and maintenance costs will influence positively the likelihood of the vessel being flagged out, an increase in the difference in insurance costs will have a negative effect on it.

The predictive accuracy of this model is relatively high as the pseudo R^2 is 0.71. A comparison of the values of the pseudo R^2 shows that model [3b], which contains factors related to other operating costs, explains slightly better the probability of the vessel being flagged out.

Concluding remarks.

The analysis suggests that model [2] is the most suitable of the four models applied but, clearly, it is not complete. While it contains variables accounting for the influence of vessel type, age, trade, basic costs, national insurance and training costs it does not include those related to the costs of insurance and repairs as contained in model [3]. It has been possible to combine models [2] and [3] and to apply the extended model [5] to the whole data set. The resulting equation is:

$$\text{Prob FO} = \begin{array}{l} - 4.79^{**} + 0.24^{**}\text{Age} - 2.94^{*}\text{TypeDum} + 4.48^{**}\text{TradeDum} \\ \quad(1.51)\quad(0.10)\qquad(1.55)\qquad\qquad(1.71) \\ - 0.66^{**}\ d\_\text{Basic} + 4.81^{**}d\_\text{NI} + 4.40^{**}d\_\text{Train} + 11.55\ d\_\text{Rep} \\ \quad(0.26)\qquad\qquad(1.74)\qquad(2.09)\qquad\qquad(8.25) \end{array} \qquad [5]$$

In this equation all the variables but one are significant and every coefficient has the expected sign confirming the *a priori* expectations. In other words the likelihood of flagging out is positively affected by age, trade, national insurance charges, training costs and repairs, and is negatively affected by differences in basic wages. In this equation we have not included the variable related to insurance costs since it may be argued that insurance costs largely depend on the reputation and record of the company and not on the flag of the vessel.

The results of model [5] indicate that a vessel of average age with average values of basic salary, National Insurance payments, training costs and insurance payments is almost certainly going to be flagged out if it is a tanker ship operating in deep sea trade or a general cargo ship operating in deep sea trades. It is also highly likely that a foreign flag will be adopted by a tanker operating in a short sea trade. Finally for a general cargo ship trading on short sea trades the probability that it will be flagged out is relatively lower. The following table gives some examples:

Table 4: Estimated probability of flagging out

Assumed values for independent variables	Estimated Probability
Deep Sea Vessels, All other variables to their average	99%
Short Sea Vessels, All other variables to their average	91%
Tanker, Deep sea, All other variables to their average	98%
Tanker Short sea, All other variables to their average	52%
General Cargo, Deep sea, All other variables to their average	99%
General Cargo, Short sea, All other variables to their average	95%

These probabilities must be considered as being purely illustrative at the moment but are presented, based on the one set of data for the UK, to indicate that the model will permit such statistics to be calculated. Greater credence may be placed on subsequent calculations based on more varied samples containing data on a wider range of ship types and for a greater number of countries.

VIII. Conclusion.

This study set out to analyse the decision-making process of shipowners when choosing flags of registration for their vessels. The research was three-fold in its intent:

(i) to identify relevant factors by means of a literature review

(ii) to build an econometric model of the decision-making process

(iii) to perform international comparisons based on this model

and required the devising of a questionnaire to collect the empirical data relevant to such decisions.

The project has been successful in so far as the literature review has been completed and the relevant variables identified; the questionnaire has been designed, piloted, discussed with the industry and used for data collection in the United Kingdom. The initial intention of performing international comparisons proved to be too optimistic in the time available and needs to be addressed in the future. However the data collected for the UK were more than sufficient to allow the econometric model to be built and tested and the results presented in this report stem from this model.

The most interesting points to emerge from the study can be summarised in the following statements:

1. The literature review produced a list of factors commonly believed to affect the choice of flag but it provided little agreement among the experts on the sign and on the magnitude of the effects of the various factors. Moreover this lack of agreement had not lead to any previous systematic empirical study designed to verify the putative effects.

2. While it is widely recognised that the flagging out phenomenon is primarily fuelled by the desire of the shipowner to minimise both costs and restrictions on his operating freedom, this research has pointed out a multitude of other factors which may have a role to play in the decision making process.

3. However the most significant single factor is that of crew costs. Various components of these have been examined and it is clear that, for UK owners, the National

Insurance costs affect the choice of flag. The results show that a reduction in NI costs would lead to an increased probability of the vessel being registered under the national flag.

4. The analysis of the regimes and conditions experienced by shipowners in the different EU countries indicated the need to study the flagging out phenomenon, not on a global basis, but in relation to individual countries. This report fulfils a necessary first step by analysing some sectors of the UK shipping industry.

5. This study has confirmed the importance and relevance of factors, such as the age of the vessel, the trade on which it is engaged, national insurance costs, and training costs, to the decision to flag out. It has suggested that basic wage costs may have a negative influence on the decision but that it is the total employment costs which matter. The effect of fiscal factors in this context is less clear to us and we remain to be convinced of their relevance and significance.

6. The next stage must be to extend this analysis to other sectors of the UK shipping industry and then to the shipping industries of other countries.

Bibliography:

1. Asteris M., 1991, "British Merchant Shipping: Market forces and the Defence of the Realm", Royal Bank of Scotland Review, No. 171, Sept., pp.32-46.

2. Asteris M., 1993, "Flagging out UK shipping: Causes and Consequences", Transport Management, Sept/Oct., pp.19-21.

3. Asteris M., 1993, " Merchant Shipping: The fourth Arm defence?", RUSI Journal, vol.138, No. 2. pp.66-72.

4. Bergstrand, 1983, Buy the Flag: developments in the open registry debate, London, Polytechnic of Central London, Transport Study Group, p.4.

5. Bockzek, B.A., 1962, Flags of Convenience - An International Legal Study, Harvard University Press, USA.

6. BMCF, 1987, Why the Ships went, LLP, London.

7. BMCF, 1988, Why the Ships went(Supplement), LLP, London.

8. BML, 1984, An Examination of the Decline of the British Merchant Fleet since 1975, London.

9. Chapman, 1988, The direct implications of flagging out. Which register? Which Flag...now?, conference papers, LLP, New York.

10. Committee of Inquiry into Shipping, 1970, The Rochdale Report, Cmmd 4337, HMSO, London.

11. Cullinane K. and M. Robertshaw, 1996, Maritime Policy and Management, vol. 23, (4), 321-336.

12. Donaldson, Report of Lord Donaldson's inquiry into the Prevention of Pollution from Merchant Shipping: Safer Ships, Cleaner Seas, HMSO, London.

13. Dorey J., 1988, How do the costs with each of the flagging options compare. Which register? Which Flag?, Conference, London, LLP.

14. Drewry, 1979, World shipping under flags of convenience, Drewry report, London.

15. Drewry, 1980, Performance of "Open Registry" Bulk Fleets, Drewry report, London.

16. Egijan, 1990, Flag of Convenience or Open Registration of Ships, Maritime Policy Journal, vol.14, n. 2.

17. Eyre, J.L., 1989, A ship's flag - Who cares?, Maritime Policy and Management, 16, (3), 179-187.

18. EU, 1996, Shaping Europe's Maritime Future: A Contribution to the Competitiveness of the Maritime Industries, Luxembourg.

19. Finlay P(ed.), 1991, The changing maritime environment, Surrey

20. General Council of British Shipping, 1989, A level Playing field for British Shipping, London.

21. Giziakis, K., 1982, Economic aspects of Marine Navigational Casualties, The Journal of Navigation, vol. 35, pp.466-478.

22. HoC, 1987, Decline in the UK-Registered Merchant Fleet, HMSO, London.

23. HoC, 1989, 9th Report from the Defence Committee: The availability of Merchant Shipping for Defence purposes, HMSO, London.

24. HoC(b), 1989, Decline in the UK-Registered Merchant Fleet, HMSO, London.

25. Hinz, C., 1991, Keeping shipping competitive, Shipping policy, Seatrade, German shipping Report.

26. ISF, 1988, Guide to International Ship Registers.

27. ISF, 1990, The ISF guide to international maritime labour.

28. ITF, 1993, FoC - the ITF's campaign, London, ITF.

29. ITF, 1991/3, ITF seafarers bulletin, No. 6-8, London, ITF.

30. ITF, 1991, Flags of convenience - The ITF's campaign, London, ITF

31. Jessen, B., 1987, Registration of Ship and Port State control as a means of Shipping policy, World Maritime University, Malmo.

32. Loree, P.J., 1981, Open Registries - Suppress or Support. The Changing Maritime environment.

33. Maddala G. S., 1986, Limited-Dependent Variable and Qualitative Variables in Econometrics, Cambridge University Press, Cambridge.

34. Maddala G. S, 1988, Introduction to Econometrics, Macmillian Publishing Co, New York.

35. McConville J., 1995, UK seafarers: Their employment potential, London Guildhall University, London.

36. Mercer Management Consulting and Lloyds Maritime Information services, 1995, Structure and Organisation of Maritime Transport: Final Report to Directorate General for Transport (DGVII).

37. Metaxas, 1974, Some thoughts on Flag of Convenience shipping, Maritime Policy and Management, Jan pp.162-77.

38. Metaxas B.N. and Doganis(1976), The impact of Flags of Convenience, PCL, London.

39. Metaxas B.N., 1985, Flag of convenience: A Study of Internationalisation, Aldershot, Gower.

40. Moreby, D., 1990, The UK Shipping Industry Critical level Study, British Maritime Charitable Foundation.

41. Moreby, D., 1985, Crew costs, Maritime policy and management, 12, (1), pp.55-60.

42. NUMAST, 1993, Time to Act.

43. NUMAST, 1993, Evidence submitted to the Donaldson Report.

44. NUMAST, 1992, In time of war.

45. NUMAST, 1992, Only Human? the human element in safe shipping.

46. OECD, 1996, Competitive Advantages obtained by some Shipowners as a results of Non-Observance of Applicable International Rule and Standards, Paris.

47. Oppenheim A. N., 1983, Questionnaire design and attitude measurement, Heinemann, London

48. Peters, J.H., 1993, The international Ocean Transport Industry in Crisis: Assessing Reasons and Outlook, Policy Research Working Papers.

49. PRC, 1994, The Future of the Dutch Shipping Sector: Economic Impact Study and Policy Analysis, Delft University Press.

50. Ready, N.P., 1994, Ship Registration, LLP, London.

51. Sisto L. and G. Valenti, 1995, L'internazionalizzazione della flotta mercantile italiana. La Bareboat Charter Registration, Editoriale Scientifica, Napoli.

52. Sletmo GK and Holste S., 1993, "Shipping and the competitive advantages of nations: the role of international shipping registers", Maritime Policy and Management, vol. 20, No. 3, pp.243-255.

53. Stopford, M., 1988, Maritime Economics, Unwin Hyman, London.

54. Sturmey, S.G., 1983, Open Registry Controversy and the Development Issue, Bremen.

55. Teltsch G., 1982/1983, "Shipping Aid policy in Britain, France , Germany, Denmark and Greece" Sapanut Journal (Israel), vol. 12, Nos. 2-3, Autumn-Winter, pp.10-17.

56. Tolofari SR, Button K.J. and Pitfield DE., 1986, "Shipping costs and the controversy over open registry", Journal of Industrial Economics, vol. 19, no.4, June, pp 409-427.

57. Tolofari, S.R., 1989, Open registry Shipping. A comparative Study of Costs and Freight Rates, Gordon and Breach Science Publishers, London.

58. Unctad, 1977, Economic consequences of the Existence or Lack of a genuine link between vessels and Unctad, 1979, Legal mechanisms for regulating the operations of Open Registry fleets, TD/B/C.4/ac. 1/6, United Nations, New York.

59. Unctad, 1979, The repercussions of phasing out open registries, TD/B/C.4/ac. 1/5, United Nations, New York.

60. Unctad, 1981, Open Registry Fleets, TD/B/C.4/220, United Nations, New York.

61. Unctad, 1981, Action on the Question of Open Registry, TD/B/c.4/220, United Nations, New York.

62. Unctad, 1987, Beneficial Ownership of Open Registry Fleets, TD/222 Supp.1.

63. Unctad, 1990, UN convention on conditions for registration of ships, Vol. 1, Final act - TD/RS/Conf/25, United Nations, New York.

64. Unctad, Review of Maritime transport (1986-1994), United Nations, New York.

65. Vogel R., 1993, "Flag States and New Registries", The marine Environment and sustainable development: Law, Policy and Science, Couper A. and Gould E. (eds.), pp411-433.

66. Yannopoulos G.N., 1988, The Economics of flagging-out", Journal of Transport Economics and Policy, vol.22 No.2, May, pp.197-207.

67. Whitworth, J., 1988, The registration options - Cause and Consequences. Which register? Which Flag?, Conference, London, LLP.

APPENDICES

APPENDIX 1

The shipping regime in each country

(i) Greece

Among the five countries of this study, Greece offers the most favourable shipping environment. Greek shipowners are not only free to chose among Open Registers but in Greece corporation tax is not applicable to the shipping sector. The latter has been substituted by the "tonnage tax". Greek shipowners have to pay annual lump sum fees which vary in relation to the size and age of the vessel. This system is very advantageous for high rate of return operators since it implies a lower percentage tax burden.

Greek shipowners are allowed tonnage tax reduction for the first six years of activity of a ship built and registered in Greece and cargo ships running a regular scheduled service between Greek and foreign ports or solely between foreign ports. Also passenger liners are eligible for tax reduction. Their tax liability is reduced by 50%. Furthermore, withdrawals of income from the shipping business are not subject to income tax. Finally, cabotage trade will, until 1999 be reserved to Greek flagged vessels only.

The Greek system is also very favourable toward the shipping business with regards to the manning costs. Both employers and seafarers are subject to reduced rates of social security contributions. Moreover, Greek officers are allowed a lower rate of income tax, they are subject to a flat rate of 5.5% instead of normal rates of 12% to 63%. Ratings, instead, have a full income tax exemption.

From the above and from the analysis of the development in the dimension of the national fleet, it can be stated that the Greek national flag is competitive with the flag of Open Registers and Greece is a very effective base for low tax shipping operations.

(ii) Norway

Norway is the sole country among the ones investigated which has an official International Register, the NIS. Its shipping legislation has recently undergone a number of changes. Previous to 1996, Norway imposed a Corporation tax at a rate of 28%. Now, profits earned by shipowning activities, which are subsequently reinvested, will be subject to a flat rate tonnage tax per 1,000 net tonne per ship per day while, vessels under 1,000 net tonnes will be exempt and will therefore pay no tonnage tax at all. Net financial profits, however, are taxed at the current rate of 28% and owners will pay 28% tax on dividends. To take part in the tonnage tax system a company must be a limited company and have no activities other than shipping and chartering vessels.

The capital allowance is 20% reducing balance for ships while the rate varies for other types of fixed assets. Gains over the tax depreciated value of vessels must be transferred to a special separate account and 20% of this amount must be included in the annual tax computation either as a loss or a gain.

Norwegian shipowning companies face the same taxation liabilities as they would in the Norwegian Ordinary Ship register. Their major source of cost saving comes from the removal of the requirement to employ Norwegian seaman, except for the master.

Up to the 1st of January 1996, Norwegian registered ships (cargo and tugs) qualified for a crew allowance in the form of a fixed amount toward manning costs. The current crew allowance scheme substitutes this fixed annual sum with a pay back to shipowners as a percentage of the employment cost. This percentage is fixed as 20% of total wages. The above provision is extended to include Second Register shipowners.

(iii) UK

The underlying philosophy of the current UK shipping policy is that of non governmental intervention. The tax regime is essentially the same as for all other industries. At present the basic rate of corporation tax is 33%. However, companies whose profits do not exceed £300.000 are charged tax at the lower rate of 23% (the small business rate) with effect from 1 April 1997. Marginal relief[32] for the main rate is given for companies whose profit lies between £300,000 and £1,500,000.

Depreciation is allowed in the form of a writing down allowance of 25% per annum on a reducing balance basis. It is allowed on both new and second hand ships. Capital allowances are related to the ownership and not to the registration. Capital expenditure on ships qualifies for capital allowances. Capital gains are taxed and no tax free reserves are allowed, however, the "roll over relief" has a similar effect. The relief, introduced in 1993, allows the company balancing charge to be deferred and set against the cost of new shipping acquired by the company. Trading losses can be carried forward indefinitely against profits from the same trade and can be carried back up to three years.

The basic principle of the British fiscal regime is that any company in the country (resident company) is liable for tax on its world-wide income and it appears that, in the UK, income becomes taxable if repatriated. UK owned multinational groups may in practice by means of companies in low tax countries avoid tax in the UK by transferring profits to a company with a tax loss. These circumstances make the UK frequently used as a base for foreign business operators, however, certain measures must be observed in order to avoid the UK applications of the "underlying realities rule".

The employment costs of UK seafarers compared to foreign seafarers is high. The total employment package includes a range of costs over and above the basic salary. Leave entitlement, victualling, air passage home for leave, social security payments, pensions and training. The sole policies directed to relieve the manning costs to the shipowners have been the Government Assistance for Training(GAFT) scheme introduced in 1988 and updated in 1995, intended to encourage   the re-establishment of training

---

[32]Corporation charge may be reduced by 9/400 of the difference between £1.500.000 on the company's profit.

programmes by giving grants to the companies to assist in their training costs, Crew Relief scheme also introduced in 1988 and updated in 1995, and the 1991 Employment Income Tax exemption for seafarers not resident in the UK for more than 183 days. The former provides government assistance with crew travel costs outside the Limited European Trading Area in the amount of 20% of the Standard Economy Class single fares. The latter does not have a direct effect on the shipowners' costs. During 1995 more flexible regulations concerning manning rules were introduced governing the nationality of senior officers (The restriction on nationality now applies only to the master of the so defined "strategic ships[33]"), but no major adjustments have been made by the government on the National Insurance Contributions except for a 0.5% reduction for seafarers employed on ships sailing outside Europe.

---

[33]The Merchant Shipping Regulation n.1427/95 defines as strategic the following: cruise ships, fishing vessels, product tankers and ro-ro ships. For further details see the regulation.

(iv) Italy

The level of income taxation for Italian companies is the highest one in Europe amounting to 53.2%. The rate of tax is calculated the following way: 37% IRPEG(Corporation tax) and 16.2% ILOR(Local taxes).

Depreciation is calculated on the straight line method with differing rates according to the types of ships. Accelerated depreciation is admitted and consists of a doubling depreciation rate for the first three years of a ship's life. Capital gains from sales of ships owned for a minimum of 3 years may be placed in a reserve and added to taxable income over 5 years, spreading the tax burden and improving the cash flow. On top of the insurance costs Italian shipowners have to add 7.5% to the premium due to taxation.

The right to fly the Italian flag is granted to ships owned by companies complying with certain specifications. A ship is considered Italian if at least 50% of it is owned by either: Italian citizens, Italian companies, foreign companies with one or more branches in Italy and whose manager is an Italian citizen, foreign companies with their principal business located in Italy or foreign individuals who have been resident in Italy for at least 5 years.

Bare-boat charter registration[34] was introduced in Italy in 1989 by law n. 234 in response to the request of private shipowners to relieve some of their costs. Bare-boat legislation originally required 50% of the crew to be Italian irrespective of their role. However a second version of the law was approved in 1992 which required only 4 officers to be nationals(1 Deck Junior Officer and 1 Engine Junior Officer have to be Italian).

In practice Italian shipowners bare-boat their ships to companies established abroad where they hold an economic participation in order to lower their crew costs[35]. Bare-boat is granted for two years with an option to prolong this period after approval of the application, however it is not granted to all units. Only ships operating in international

---

[34]A vessel bare-boat chartered to a foreign company is temporarily registered abroad and flies that country's flag. However, remains registered in a special roll of the Italian register with a temporary suspension of the right to fly the Italian flag for the time of the bare-boat contract. Bare-boat has been introduced on a reciprocal ground, therefore flagging in(Chartering-in) is allowed. The almost non-existent number of chartered in vessels stands out to show the disadvantage in terms of costs connected with registering the ship in Italy.

[35]According to Confitarma, about 1/3 of Italian shipowners operating internationally have established operating offices abroad in order to take advantage of this possibility. Bare-boat allows them to reduce their operating costs of an estimated 30%, most of which in the crew cost sector.

non-regular navigation can be granted bare-boat chartering. Neither ships deployed in cabotage nor regular lines can take benefit from it. Ships operating on conference lines are explicitly excluded and only peculiar cases can be assessed on individual basis.

The Italian code of Navigation reserves to national ships the right to perform cabotage amongst Italian ports. However, The European Union regulation n. 3577/92 provides for the cabotage reservation to be slowly dismissed starting the 1st of January 1997 with crude oil products and drinkable water carriage and disappearing completely the 1st of January 1999 with the elimination of reservation on the links between the mainland and the islands. Since the overall incidence of cabotage on the domestic freight traffic is close to 20% in terms of tonnes, it is expected that companies operating in cabotage refrain form leaving the flag.

The Italian system is very rigid with regard to the manning regulations. According to the Italian code of navigation (art. 318) seafarers on board an Italian registered ship must be either nationals or, up to a certain limit, EU nationals. In particular cases the Ministry may authorise foreign seaman to be employed up to a third of the total crew[36]. Overall at least 67% of the ratings on board must be nationals and in any case the officers must be Italian.

The manning rules specify the number and nationality of seafarers onboard Italian flagged ships. They are agreed on an individual base ship by ship between the shipowner, the Union and the authorities. The manning rules differ according to the type of ship, its characteristics, mooring possibilities, fire and safety plans, recommendations of the Classification society and on the area of trade (international or domestic trade).

Generally speaking the Italian system provides for the same remuneration to be given to foreign seamen working on the Italian territory including ships. Seafarers' remuneration are established on the basis of the National Contracts(National Collective Agreements). Until it was abolished in 1994, shipowners resident in the south of Italy could enjoy tax relief on social security. For ships on bare-boat charter abroad according to the 234/89 law, the social security system is the same for Italian seaman employed on an Italian flagged ship whereas for foreign seaman it is the same as provided in their own country.

---

[36]There are some exceptions based on the qualification of crews. Staff of the catering department can be employed without any restriction on their nationality. This provision obviously favours the cruise sector.

It must be considered however, that the relevant legislation will be subject to change in the next few months if the Italian International Register is adopted.

(v) Netherlands

The Dutch shipping policy has very recently(January 1996) undergone some major changes with the specific aim of re-attracting the flagged out tonnage. It is still too early to express a judgement on its effectiveness however, reports state the policy's successes[37].

Corporation tax in the Netherlands is 37% on taxable income up to 100,000 Gld and 35% on taxable income above 100,000 Gld. With some exceptions, losses can be carried forward 8 years or back 3 years. As for capital allowances, shipowners have a choice between straight line depreciation over 12-20 years or reducing balance at a rate of between 12%-16%. The maximum write off is 100% of the fiscal book value which is based on the purchase price of the vessel.

Construction subsidies are to be deducted from the purchase price for the calculation of the fiscal book value, as are capital gains resulting for the sale or loss of a vessel, provided that the company reinvests within 4 years in a replacement vessel.

The investment grant has been replaced in 1996 by two options:

-the normal system with accelerated depreciation (over 5 years using the straight line method, on the basis of 85% of the investment value), provided profits are earned from shipping (in sea going ships) available in any given year, or

-the application of corporate taxation to an artificially assessed level of profit calculated on the basis of a given sum per day per net tonne in the company's fleet. If a company chooses this option, it must maintain it for the next ten years.

Subsidies for shipbuilding industry have been gradually reduced since 1980. Under strict conditions, Dutch owners ordering new vessels or buying existing Dutch flag vessels not older than five years may be eligible for a premium up to 10% of the contract price or an equivalent fiscal deduction from profit before tax of 25% of the contract price.

Furthermore, there is a special legislation for holding companies which allows them to have income from a business outside the Netherlands without the need to pay tax. The chief element of these rules is that income from shipping may be kept untaxed as long as it is retained in the business and not distributed in the form of dividends from the holding company. This system has contributed to making the Netherlands very popular as a

---

[37]See Lloyd's List(July 1996).

headquarters for international groups.

Generally in the Netherlands, the non-wage cost per employee varies between 37.5% for low-income earners and about 50% for high income earners, but the percentage for seafarers is sensibly lower. From the 1st of January 1996, the shipowners are allowed to retain the full value of the income tax on the wage and the employers' social security contribution in the case of both ratings and junior officers. Also the incentive relating to middle ranking and senior officers has been increased accordingly. The actual benefit for the shipowner of this measure has been estimated to amount to about 12-15% of the manning costs.

APPENDIX   2

COVERING LETTER AND QUESTIONNAIRE

DEPARTMENT OF MARITIME STUDIES
AND INTERNATIONAL TRANSPORT

Head of Department
Professor J King BSc MSc FRICS FRIN FCIT FNI Master Mariner

UNIVERSITY OF WALES
CARDIFF

PO Box 907, Cardiff CF1 3YP
Fax (01222) 874301
Email: MASTS@cardiff.ac.uk
http://www.cf.ac.uk/uwcc/masts/

☎ (01222) 874271
(01222) 874000
University Exchange

Cardiff, March 1997

Dear Sir,

The Department of Maritime Studies and International Transport of the University of Wales - Cardiff, is undertaking a project concerning the flagging-out of ships. The aim of the project is to analyse the decision-making process of shipowners operating in different countries when considering the flag of registration of their ships. More specifically, we are interested in determining the propensity of shipowners to flag out their ships and to examine the relative importance of the factors influencing an individual company's decision to flag out.

In our study we view the Flagging Out decision as similar to any other strategic decision by a firm(shipping/management company) and therefore we consider variables which measure the attractiveness, for a given firm, of flagging out. From this approach we may be able also to quantify the effects of policy changes and thereby even influence the policy makers at all levels of government.

To obtain statistical information that will be useful in estimating the model that we have developed we are inviting a number of shipping/management companies throughout Europe to complete the attached short questionnaire. Several companies have already agreed to co-operate in this study and we hope that you will feel able to do so too. As always the quality of the analysis and the robustness of the conclusions depends on the reliability and amount of data available.

The questionnaire consists of two sections: the first concerns the shipping company while the second relates to individual vessels. The answers to the questions in section II might, in some cases, be more easily provided by a ship management company. If necessary please pass on the section II pages to the appropriate person. If we have failed to provide sufficient copies or have made errors with ship names, please make extra copies or corrections by hand. Please return completed questionnaires as soon as possible and, in any event, no later than 7th of May 1997 please.

University of Wales College of Cardiff   Aberconway Building   Colum Drive

We hope that you will be able to assist us with the data provision and we guarantee the complete confidentiality of all data - the professional integrity of the University ensures this. The writers of this letter will have sole access to the data which will not be divulged to any other external organisation. Individual data will be aggregated and used in a regression analysis from which it will be impossible to make any connections with the original source.

The study will be completely impartial and objective. Furthermore, the final report will not include any data in its raw form nor any references to specific companies. The results of the study will be published and of course made available to anybody who requests them. At the same time we wish to co-operate fully with yourselves so that the results of the analysis will be as useful as possible.

We would be very grateful for your assistance and if you are willing to take part, please fax the reply form attached as soon as possible or contact us by telephone(0044-1222-874271). We will be happy to explain in more detail our aims, objectives and methods and to clarify points in the questionnaire.

We hope that it will be possible for you to co-operate with us on this project and once again assure you of the confidentiality of any data provided. We look forward to your reply.

Yours sincerely,

Dr. Peter B. Marlow   Drs. Angela S. Bergantino
   (Senior Lecturer)   (Research Associate)

Questionnaire

The aim of this questionnaire is to obtain information relating to vessels and their choice of flag. It should be completed by the shipowning company though the answers to the questions in Section II might be more easily provided by an appropriate ship management company.

THE UNIVERSITY OF WALES - COLLEGE OF CARDIFF GUARANTEES THAT <u>ALL</u> <u>INFORMATION</u> PROVIDED WILL BE TREATED IN THE <u>STRICTEST CONFIDENCE</u>.

Section I
Information concerning the <u>Shipping Company</u> or <u>Shipping Division</u>

a) General information <u>about the company or division</u>

Name of the Company:

Person to contact and telephone number: _____

Number of ships Owned/Managed by the company:_____

Number of ships which have changed flag since 1990: _____

Number of shore-based employees:_____

Which of the listed factors have affected your decision <u>not to use</u> the national flag? (Please tick as many boxes as are relevant)			Which of the listed factors have affected your decision <u>to use the</u> national flag? (Please tick as many boxes as are relevant)
☐	Crew costs	☐	
☐	Other costs (eg. Administration, Management, etc).	☐	
☐	Productivity of labour	☐	
☐	Availability of skilled labour	☐	
☐	Minimum manning rules	☐	
☐	High compliance costs of flagging back.........	☐	
☐	Fiscal reasons (eg. Taxes or subsidies)	☐	
☐	Control (eg. bureaucratic burden, trade unions, etc).	☐	
☐	Political situation in home country	☐	
☐	Attitude of financial institutions	☐	
☐	Type of ship..	☐	
☐	Trade routes..	☐	
☐	Historical reason	☐	
☐	Public relation reasons	☐	
☐	Legal requirements(eg. Government decree).........	☐	
☐	Marketing reasons..................................	☐	
☐	Other (explain) _____	☐	

Please return this completed questionnaire to:

Drs. Angela Bergantino
Department of Maritime Studies
University of Wales, Cardiff
PO Box 907 Cardiff - CF1 3YP

Cardiff
University
of Wales

b) If you have changed the flag of any of your ships, please fill in, otherwise go to part c)

In general is there any difference in management costs* by flagging out the ships?	☐ Yes ☐ No
If yes, what is your estimate of the percentage change in these costs? (±)	_____%
If the change is negative (i.e. a saving), could you have saved the same amount by simply adopting third party manning?	☐ Yes ☐ No (Explain)_____ _____

*Management costs include: overheads, management on shore, administration.

c) Fiscal position of the Company

What was your company's turnover in 1995/96?	
Did your company make an operating profit in the last fiscal year?	☐ Yes ☐ No
Does your company operate under the UK tax regime?	☐ Yes ☐ No
Does your company attract/accumulate tax allowances at a faster rate than it earns profits?	☐ Yes ☐ No
Given the definitions below please tick the tax position which most closely corresponds to that of your company: **Full Tax:** A company will be in this tax position if it is earning sufficient profits from other sources to enable it to take full and immediate advantage of any tax allowances which may be available on the capital cost involved in the investment proposal. **No Tax:** A company will be in this position if it has accumulated tax allowances from earlier years to the extent that it is now in a position where it is unlikely to be required to pay tax for the indefinite future. **New Entrant:** A company is in this tax position if, given the tax allowances available on the capital cost involved in an investment proposal and the level of profit expected to be earned on it, it is neither earning sufficient profits from other sources nor has it accumulated tax allowances from earlier years for either of these factors to have influence at all on the present value of the investment proposal.	☐ Full tax ☐ No Tax ☐ New Entrant
Is the tax position as defined above likely to change in the next five years?	☐ Yes ☐ No
If Yes, please tick the anticipated new tax position:	☐ Full Tax ☐ No Tax ☐ New Entrant

Section II
Information concerning <u>individual vessels</u>

a) General information <u>about the ship</u>

Name of the Ship: _____ Flag of the ship _____

If the flag has been changed when did this happen? Year: _____, former flag:_____

Main Type/Area of Trade for this vessel:	☐ Short Sea Shipping ☐ Deep Sea Shipping If the vessel is deployed in Deep Sea Shipping, please specify the usual area of trade: ☐ Australia/New Zealand ☐ S. E. Asia ☐ North Europe ☐ N. America ☐ Indian Sub Continent ☐ Middle East ☐ South Europe ☐ S. America/Carib. ☐ N. Asia ☐ Africa	☐ Tramp Service ☐ Liner Service
Number of days unscheduled downtime for this vessel in 1996:		

b) Information on ship's costs

i) Insurance costs

What is the current insurance cost per year ?	
Has the insurance premium been changed since the reflagging?	☐ Yes ☐ No ☐ Not Applicable
If yes, of what magnitude and direction was the average change over the period since reflagging? (%, ±)	
What is the P&I cost per year?	
Has the P&I premium been changed since the reflagging?	☐ Yes ☐ No ☐ Not Applicable
If yes, of what magnitude and direction was the average change over the period since reflagging? (%, ±)	
Self - insurance / contingency costs used this year:	
In your opinion are the changes in insurance and P&I costs due to the change of flag?	Insurance: ☐ Yes ☐ No │ P&I: ☐ Yes ☐ No
If no, please give reasons:_____	

ii) Capital cost

What was the capital cost of this ship if purchased new or 2nd hand (US$)?	NEW:_____ 2nd Hand: _____Year of purchase _____
If the vessel is under bareboat charter please give an estimate of the equivalent annual capital cost:	
What is the current valuation of the vessel ?	

iii) Officers and Crew costs

What is the officers and crew complement ?		
What is the approximate total officers and crew cost per year ?		
of which:	Basic Salary	
	N. I. / Social Security costs	
	Pension	
	Leave Pay	
	Overtime	
	Other(e.g. Allowances, please specify)	
Training costs		
Officers and crew travel and accommodation costs		

iv) Information about other costs per year

Repairs and maintenance costs	
Dry docking/surveys' costs averaged over docking cycle	
Stores, provisions, victualling and lubricants	
Communications	
Other costs (fuel, port charges, etc.)	

Estimate the total annual running costs of this vessel:	

	Initial Fee:	Annual costs:
Registration fees and other flag costs if appropriate:		

Respondent's name: _____

Telephone number: _____

Are you completing this questionnaire in respect of a ship which you own, bareboat or manage for another company	☐ **Own** ☐ **Bareboat** ☐ **Manage** (if manage please specify for which company: _____)

Thank you for completing this questionnaire

Please return to:

Drs. Angela Bergantino
Department of Maritime Studies
University of Wales, Cardiff
PO Box 907 Cardiff - CF1 3YP

Cardiff
University
of Wales