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6 Costs, Revenue and Cashflow

Annual income twenty pounds, annual expenditure nineteen nineteen six, result happiness.
Annual income twenty pounds, annual expenditure twenty pounds ought and six, result misery

(Mr Micawber in *David Copperfield*)

6.1 CASHFLOW AND THE ART OF SURVIVAL

The impact of financial pressures on shipowners' decisions

In this chapter we look at shipping economics from the perspective of the individual shipping company. Every company faces the challenge of navigating its way through the succession of booms, recessions and depressions which characterize the shipping market. During prosperous periods when funds flood in, it must meet the challenge of investing wisely for future growth and a commercial return on capital. The seeds of future problems are often sown under the heady influence of market sentiment at the peak of a cycle. In recessions the challenge is to keep control of the business when the market is trying to force surplus capacity out of the system by squeezing cashflow and take advantage of the opportunities. During these periods the shipping market is like a marathon race in which only a limited number of entrants are allowed to finish. The race has no fixed length, it goes on lap after lap until enough competitors drop out from exhaustion, leaving the surviving runners to pick up the prizes.

In the last resort what sorts out the winners from the losers is financial performance. The risks faced by shipping companies are illustrated by a ship sale decision reported in *Lloyd's List* during the 1980s recession (Figure 6.1). This was at a time when the freight market was very depressed, and the article reviews the considerations that entered into the decision by a shipping company to sell a VLCC from its fleet. Although this recession occurred many years ago, the circumstances are timeless and illustrate the issues facing shipping company management during depressions. The company was losing money – $14.5 million in the previous year – and the ship was laid up and generating a negative cashflow. For several years the company had accepted this drain

Lofs is poised to sell 'London Pride'

By Tony Gray, Business Editor

1 FLEET pruning looks set to continue at London & Overseas Freighters, the UK tanker owner which suffered a loss of £14.5 million last year.

After yesterday's annual meeting Lofs managing director Mr. Miles Kulundis disclosed that the group was actively considering the sale of the VLCC *London Pride*.

2 This 12-year old 259,182-tonnes deadweight tanker is the group's largest and oldest vessel, and has been a drain on the group's financial performance.

For some years, Lofs harboured the belief that it would be able to cash in on the *London Pride's* earning potential once the market picked up. But, the depression in the tanker market has persisted, and the heavily over tonnaged VLCC size range has been the worst affected.

A hint that the *London Pride's* future in the Lofs fleet was in doubt came in the recent annual report.

3 The chairman's statement disclosed the group's disenchantment with the vessel: "Our VLCC *London Pride*, is still laid-up and, with the benefit of hindsight, it is evident that our hopes for the future of the VLCC were ill-founded."

4 The *London Pride* has, in fact, been laid-up since December 1981. As she is turbine-powered, it seems likely that the vessel will be scrapped if Lofs proceeds with a sale. In current market conditions, a 5 demolition sale may bring in around £4m for Lofs.

6 A sale for further trading could involve an additional $0.5m. Whatever the price achieved, it is likely to be below the 7 sterling book value – of £3.56m at Mar 31 1983 – and a loss being carried into the current year's accounts.

However, the sale would have a 8 beneficial impact on the group's cash flow.

The departure of the *London Pride* would leave Lofs with a fleet comprising five tankers: the two 61,000-tonnes general purpose tankers *London Spirit* and *London Glory*: and the three 138,000-tonners – one of which is jointly owned – *London Glory*, *London Enterprise*, and *Overseas Argonaut*.

Lofs hopes that this will remain its core fleet for the anticipated recovery in freight rates later this year and next as oil re-9 stocking takes effect. The group placed all its eggs in one basket through the sale earlier this year of its dry bulk fleet to the Onassis group for $20.55m.

Lofs is not alone in discerning a more imminent recovery in the tanker market rather than for bulk carriers. Some fear the dry bulk market could be facing problems of a similar scale to those that have plagued tanker owners for so long.

It is vital for Lofs, after many years of losses and strain on the company's cash resources, that the tanker market does improve this winter.

Lofs has a versatile fleet that should be able to capitalise quickly on a rise in freight rates. A phase of oil re-stocking is expected to particularly benefit medium-sized tankers, and the group's 61,000 and 138,000-tonne vessels fit the bill.

Figure 6.1
Newspaper report illustrating the commercial influences on a scrapping decision
Source: *Lloyd's List*, July 1983
Notes: Influence on scrapping decision: 1 financial performance of the owner, 2 age and size of vessel, 3 market expectations, 4 operating costs (turbines use a lot of fuel), 5 scrap prices, 6 state of second-hand market, 7 book value of vessel in relation to its scrap or resale price, 8 cashflow of company, 9 management policies and attitudes

on its cashflow, in the hope that the market would improve, but the board had now decided that 'with the benefit of hindsight it is evident that our hopes for the future of the VLCC were ill-founded' and had decided to sell the vessel. Its sale would mean writing off as a loss the remainder of its book value not covered by the selling price, so the company would have to announce a large loss, but the proceeds from the sale would improve the cashflow.

Since the vessel was turbine powered and had been laid up for several years it was considered likely that at prevailing market prices the vessel would be sold for scrapping. In the final paragraph the article discusses a further significant decision by the group to sell its dry bulk fleet and concentrate entirely on the tanker market – a strategic decision to sacrifice one part of the business to provide cash to allow the remainder to continue, based on a belief that the prospects for the tanker market were better than those for the dry cargo market.

On the basis of this example, the challenge is to create sufficient financial strength when times are good to avoid unwelcome decisions such as selling ships for scrap when times are bad. It is the company with a weak cashflow and no reserves that gets pushed out during depressions and the company with a strong cashflow that buys the ships cheap and survives to make profits in the next shipping boom. It is not therefore the ship, the administration, or the method of financing that determines success or failure, but the way in which these are blended to combine profitability with a cashflow sufficiently robust to survive the depressions that lie in wait to trap unwary investors.

6.2 FINANCIAL PERFORMANCE AND INVESTMENT STRATEGY

If financial performance is the key to survival in the shipping market, then how is it achieved? The three key variables with which shipowners have to work are:

- the revenue received from chartering/operating the ship;
- the cost of running the ship;
- the method of financing the business.

The relationship between these cashflow items is shown diagrammatically in Figure 6.2. Revenue, represented by the box on the left, is received from trading the ship. Although shipowners do not generally control the price they receive per tonne of cargo, there are various ways of squeezing more revenue out of the ship. Increasing cargo capacity to achieve economies of scale is one solution. A few thousand tonnes of extra revenue-earning capacity can make all the difference. Increased productivity by operational planning, reducing backhauls, minimizing time off hire, improved deadweight tonnage utilization and cutting cargo-handling time are other possibilities. From the revenue earned by the ship must be deducted running costs and capital payments shown by the boxes in the centre of Figure 6.2. The costs include operating, voyage and cargo–handling costs, while capital repayments cover interest and periodic maintenance of the ship. What is left after these charges may be subject to taxes, though few shipowners are subject to this particular cost. The residual is paid out in dividends or retained within the business.

As we shall see, the way shipping companies manage these cost and revenue variables significantly influences the financial performance of the business. More specifically:

- The choice of ship influences the running cost. Day-to-day cash costs are higher for old ships with ageing machinery requiring constant maintenance; a rusty hull requiring regular steel replacement; and high fuel consumption. Modern vessels with fewer crew, more reliable fuel-efficient machinery and negligible maintenance cost less to run.
- Running a successful shipping operation is not just a matter of costs. It also involves squeezing as much revenue as possible out of the ship. Revenue may be steady on a long-time charter or irregular on the spot market. It may be increased

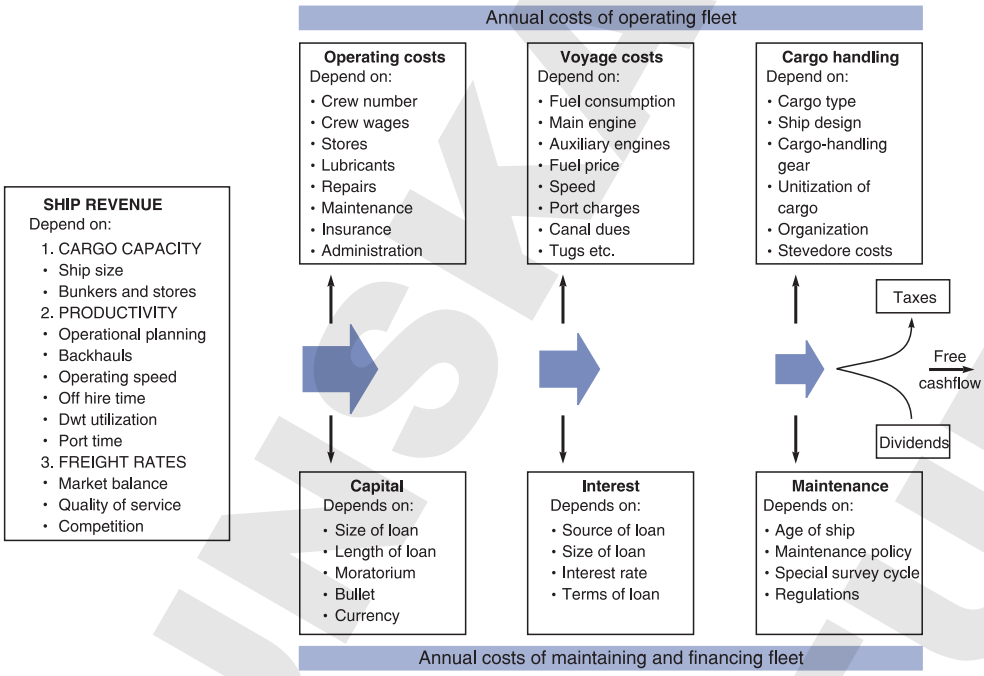

Figure 6.2
Shipping cashflow model, showing the revenue, operating and capital payments

by careful management, clever chartering and flexible ship design to minimize time in ballast and ensure that the vessel is earning revenue for a high proportion of its time at sea.

- Financing strategy is crucial. If the vessel is financed with debt, the company is committed to a schedule of capital repayments, regardless of market conditions. If the ship is financed from the owners' cash reserves or outside equity finance there are no fixed payments to capital. In practice if a shipping company has only limited equity capital, the choice is often between an old ship with high running costs but no debt and a new ship with low running costs and a mortgage.

The trade-off between new and old tonnage, single-purpose or sophisticated multi-purpose tonnage, and debt or equity financing offers an enormous range of possible ship investment strategies. Each shipping company makes its own choice, giving it a distinctive style of operation which soon becomes well known in the shipping market. However, once a fleet has been purchased and financed, many of these parameters are fixed and the options open to shipowners become more restricted.

The result can be a striking difference between the culture and approach of shipping companies. For example, some companies specialize in operating older tonnage with low debt and high equity. The low fixed capital cost makes it possible to lay the ships up during depressions with minimum cashflow and earn good profits during booms, often by the sale

of the ship itself. However, the company must have the 'hands on' skills to manage old ships and deal with the problems of maintenance and reliability which an old fleet is likely to encounter. Other companies specialize in modern, highly sophisticated ships, which give the maximum revenue-earning potential through their high flexibility and ability to carry special cargoes. This strategy is capital-intensive and often involves a high degree of debt financing, with the result that the ships have to be operated continuously throughout depressions. Getting value for the investment involves strong management skills to build client relationships, careful quality management and often a corporate structure. This approach focuses on minimizing unit costs on a continuous basis, whereas the other is more concerned with cost minimization. Both carry cargo in ships, but they are worlds apart.

The classification of costs

If we start with the basics, the cost of running a shipping company depends on a combination of three factors. First, the ship sets the broad framework of costs through its fuel consumption, the number of crew required to operate it, and its physical condition, which dictates the requirement for repairs and maintenance. Second, the costs of bought-in items, particularly bunkers, consumables, crew wages, ship repair costs and interest rates, are subject to economic trends outside the shipowner's control. Third, costs depend on how efficiently the owner manages the company, including the administrative overheads and operational efficiency.

Unfortunately the shipping industry has no internationally accepted standard cost classification, which often leads to confusion over terminology. The approach used in the present volume is to classify costs into five categories:

- Operating costs, which constitute the expenses involved in the day-to-day running of the ship – essentially those costs such as crew, stores and maintenance that will be incurred whatever trade the ship is engaged in.
- Periodic maintenance costs are incurred when the ship is dry-docked for major repairs, usually at the time of its special survey. In older ships this may involve considerable expenditure, and it is not generally treated as a part of operating expenses. Under international accounting standards an assessment must be made of the total periodic cost over the maintenance cycle and this is capitalized and amortized. The costs when actually incurred are treated as cash items separately from operating costs.
- Voyage costs are variable costs associated with a specific voyage and include such items as fuel, port charges and canal dues.
- Capital costs depend on the way the ship has been financed. They may take the form of dividends to equity, which are discretionary, or interest and capital payments on debt finance, which are not.
- Cargo-handling costs represent the expense of loading, stowing and discharging cargo. They are particularly important in the liner trades.

By analysing these different categories of costs we can develop a more thorough understanding of the market economics discussed in Chapter 5. In particular they

provide an important insight into the shape of the short-run supply curve and decision process which drives the adjustment of supply and demand described in Figure 4.15. There are two central cost-related principles which we must explore, first the relationship between cost and age, and second the relationship between cost and size.

Ship age and the supply price of freight

Within a fleet of similar sized ships, it is usual to find that the old ships have a different cost structure from the new ones. Indeed, this relationship between cost and age is one of the central issues in shipping market economics, since it defines the slope of the short-run supply curve shown in Figure 4.12 in Chapter 4. As the ship ages its capital cost reduces, but its operating and voyage costs increase relative to newer ships which are more efficient due to a combination of technical improvement since the ship was built (e.g. more efficient engines) and the effect of ageing.

An illustration of the way the cost profile changes with age is provided by the comparison of the annual costs of three Capesize bulk carriers, one 5-years-old, one 10 years and one 20 years, shown in Figure 6.3. All three ships are trading under the Liberian flag using the same crewing arrangements and charging capital at 8% per annum. The overall cost per day works out at about the same for the 5-year-old and 10-year-old ships but on these assumptions the 20-year-old ship is about 13% cheaper. However, the structure of costs of the new and old ships is quite different. If we consider only the direct cash costs and exclude capital costs and periodic maintenance, the modern ship is much cheaper to run, with operating expenses of only 18% compared with 31% for the old ship and bunkers 40% compared with 33% for the modern ship. This differential is due to the old ship's higher operating costs, larger crew, more routine maintenance and lower fuel efficiency (remember the owner trading spot gets paid per tonne of cargo, so fuel is an out-of-pocket expense). However, when we look at capital the position is very different, accounting for 47% of the cost of the modern ship but only 11% of the cost of the old ship. The obvious conclusion is that owners of new and old ships are in very different businesses.

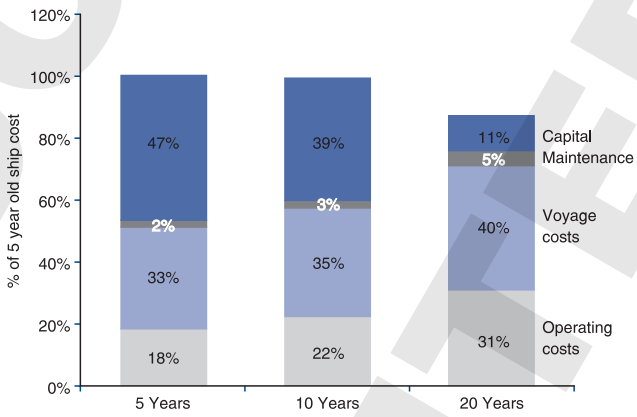

Figure 6.3
Capesize bulk carrier cost and age
Source: Clarkson Research Studies, Capesize Quality Survey (1993)

This cost differential plays an important part in the cashflow 'race'. If we ignore capital costs and periodic maintenance, the modern vessel can survive at freights which are way below the lay-up point for older ships. It is this differential which determines the slope of the supply curve. Because spot earnings have to cover operating and fuel costs, for any given spot rate the old ship generates less cash than the

new ship. If gross earnings for a Capesize (i.e. before bunker costs) fall to the operating costs of the 20-year-old ship for any length of time, the owner of the 20-year-old ship, will probably lay it up, since revenue does not cover operating and voyage costs, but the modern ship with its lower operating expenses will be able to go on trading. Will the old ship come out of lay-up? This is where periodic maintenance costs come into play. Although these costs can be postponed, they cannot be deferred indefinitely. In this example, when the fourth special survey arrives at about 20 years, the ship faces a bill for, say, $2.2 million. This must be paid if the ship is to continue trading, so the owner must decide whether the repair is worthwhile. If he is pessimistic about the future and he expects more bills to follow, he may decide to sell for scrap. This is how the scrapping mechanism works. But if the market is strong he may decide to patch it up for a couple more voyages. For example, if he can convince himself that the rates will be $6,000 per day above operating costs for a year, that would pay the repair cost in full. So by adjusting rates the market can adjust the flow of ships leaving the market in response to the balance of supply and demand, and it relies on the astuteness of owners in estimating what will happen next to fine-tune this process. It is a very efficient system for squeezing the maximum economic value out of the ships, though in the end it is not a mechanical relationship, it depends on what owners and their financiers decide to do.

It is not just old ships that are on trial during recessions. Capital costs cannot just be written out of the picture. Ships financed with bank loans have a fixed cashflow which may exceed operating costs by a considerable margin. In these circumstances it is the owner of the modern ship who is on trial. If the freight is not enough to cover financing costs and the owner defaults, the bank may enforce its mortgage rights, seize the ship and sell it to cover the outstanding debt. In this way the market filters out the substandard owners as well as the substandard ships.

Unit costs and economies of scale

Another economic relationship which dominates shipping economics and complicates life for shipping economists is the relationship between cost and ship size, usually referred to as economies of scale. Shipping is about moving cargo, so the economic focus of the business is unit cost, the cost per ton, per TEU or per cubic metre. That is where we will start. We define the annual cost per deadweight tonne of a ship as the sum of operating costs, voyage costs, cargo-handling costs and capital costs incurred in a year divided by the deadweight of the ship:

$$C_{tm} = \frac{OC_{tm} + PM_{tm} + VC_{tm} + CHC_{tm} + K_{tm}}{DWT_{tm}} \tag{6.1}$$

where C is the cost per dwt (or other capacity measurement e.g. M3) per annum, OC the operating cost per annum, PM the periodic maintenance per annum, VC the voyage costs per annum, CHC the cargo-handling costs per annum, K the

capital cost per annum, *DWT* the ship deadweight, *t* is the year, and *m* stands for the *m*th ship.

This relationship is particularly important because operating, voyage and capital costs do not increase in proportion to the deadweight of the vessel, so using a bigger ship reduces the unit freight cost. For example, a VLCC of 280,000 dwt requires the same number of crew as a 29,000 dwt products tanker, and uses only a quarter as much fuel per deadweight tonne. Similarly, for dry bulk carriers in 2005 the annual cost for a 170,000 dwt Capesize bulker was about $74 per cargo tonne compared with $191 per cargo tonne for a 30,000 dwt vessel, as can be seen in Table 6.1. Capital, operating expenses and bunker costs all contributed to this. Provided the cargo volume and port facilities are available, the owner of a large ship has a substantial cost advantage, and can generate a positive cashflow at rates that are uneconomic for smaller ships. In this example, a hire of $44 per dwt per annum would cover a Capesize's operating and bunker expenses, but would only pay operating expenses for a 30,000 dwt bulk carrier, with nothing left for bunkers.

This explains why cargo ships tend to get bigger. In 1870 brokers talked about a 'handy' (i.e. flexible) vessel of 2,000 tons, but 130 years later a Handy vessel was approaching 50,000 tons. Since ships have grown steadily bigger over the years, in practice age/cost differentials and economies of scale have worked together. The penalty of size is the loss of flexibility, which impacts on the revenue side of the equation by limiting the ports that can be entered and making it more difficult to reduce ballast time by obtaining backhaul cargoes. Investors in the next generation of bigger ships always face the risk that they have overstepped the mark.

Table 6.1 Economies of scale in bulk shipping (including bunkers)

	Assumptions			Unit Costs ($/dwt p.a.)				
Cargo capacity dwt	Investment $m[a]	Bunker cons tons/day	Operating $m p.a.	Operating cost	Bunker costs[b]	Capital cost[c]	Total cost $/dwt p.a.	Memo[d] daily cost $000/day
30,000	26	21	1.2	40.6	56.7	93.5	191	11,494
47,000	31	24	1.4	30.3	41.4	71.4	143	13,657
68,000	36	30	1.8	26.0	35.7	58.2	120	16,360
170,000	59	50	2.0	12.0	23.8	38.2	74	24,374
Memo: cost of 170,000 dwt ship as % 30,000 dwt ship								
567%	231%	238%	168%	30%	42%	41%	39%	

Source: various

[a]Cost of newbuilding in December 2005

[b]December 2005, assuming 270 days at sea per annum at 14 knots and bunkers at $300/tonne

[c]Capital costs at 5% depreciation plus interest at 6% p.a. over 365 days

[d]Time-charter rates are used for the economy of scale calculations

The history of freight cycles is an economic struggle between the big modern ships and earlier generations of smaller ships with outdated technology. Usually the combination of small size, which reduces revenue, and increasing maintenance cost makes the ship uneconomic when it reaches 20 or 25 years old, forcing it from the market. However, when the size of ships stops growing, as happened in the tanker market during the 1980s and 1990s, the economic advantage of the modern ships becomes less clearly defined, extending the economic life of ships.[1]

6.3 THE COST OF RUNNING SHIPS

The costs discussed in the previous section illustrate the general principles involved, but in practice all costs are variable, depending on external developments such as changes in oil prices and the way the ship's owner manages and finances the business. To understand ship investment economics we must look in much greater detail at the structure of costs. Figure 6.4 summarizes the key points we will consider. Each box in the diagram lists a major cost category, the variables which determine its value, and the percentage cost for a 10-year-old ship. In the remainder of this section we examine how the four main cost groups – operating costs (14%), periodic maintenance (4%), voyage costs (40%) and capital costs (42%) – are built up to determine an overall financial performance of the ship. Taken together these costs determine the cost of sea transport and they are extremely volatile, as is evident from the trends in fuel, capital and other costs shown in Figure 6.5. Between 1965 and 2007 the ship cost

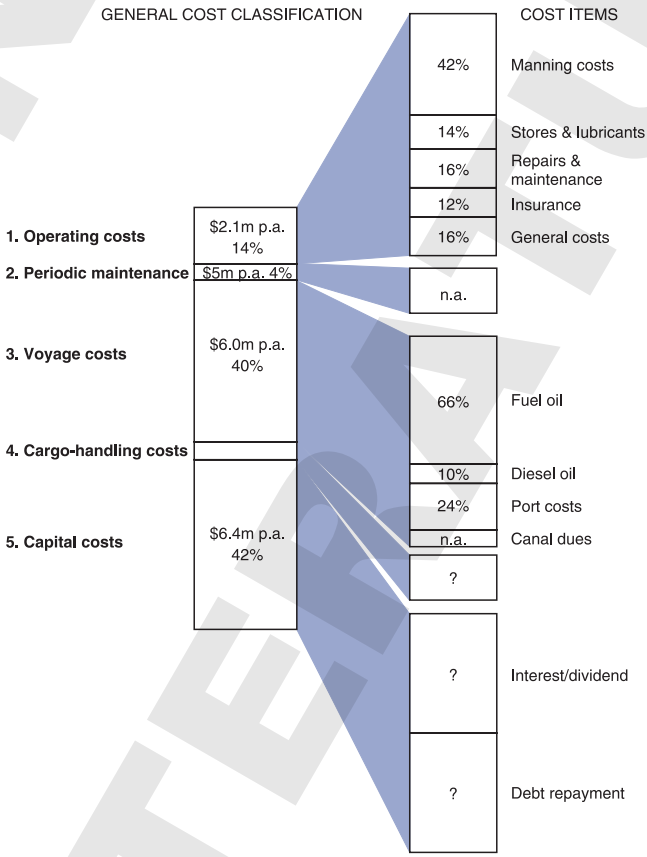

Figure 6.4
Analysis of the major costs of running a bulk carrier
Source: Compiled by Martin Stopford from various sources
Note: This analysis is for a 10-year-old Capesize bulk carrier under the Liberian flag at 2005 prices. Relative costs depend on many factors that change over time, so this is just a rough guide.

index increased by 5.5% per year, compared with 4.6% for the US consumer price index. However, the ship cost index was far more volatile, driven by the wild swings in fuel and capital costs which together account for close to two–thirds of the total.

Operating costs

Operating costs, the first item in Figure 6.4, are the ongoing expenses connected with the day-to-day running of the vessel (excluding fuel, which is included in voyage costs), together with an allowance for day-to-day repairs and maintenance (but not major dry dockings, which are dealt with separately). They account for about 14% of total costs. The principal components of operating costs are:

$$OC_{tm} = M_{tm} + ST_{tm} + MN_{tm} + I_{tm} + AD_{tm} \qquad (6.2)$$

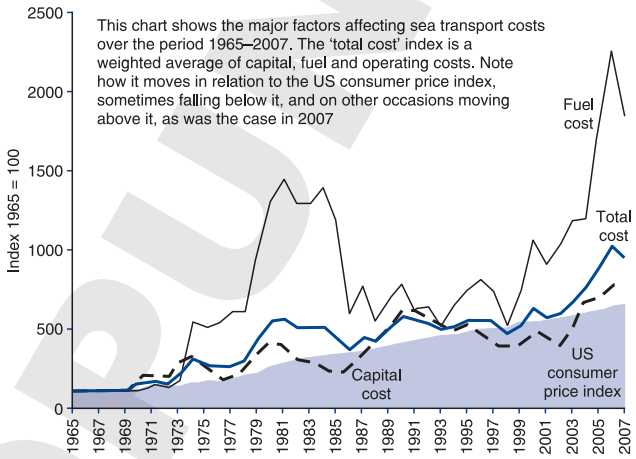

Figure 6.5
Inflation in shipping costs, 1965–2007
Source: Fuel costs based on marine bunker price 380 cSt, Rotterdam; capital costs based on Aframax tanker newbuilding price (in $); other costs based on US consumer price index

where M is manning cost, ST represents stores, MN is routine repair and maintenance, I is insurance and AD administration.

An example of the operating cost structure of a Capesize bulk carrier is shown in Table 6.2, subdivided into these categories. In summary, the operating cost structure depends on the size and nationality of the crew, maintenance policy and the age and insured value of the ship, and the administrative efficiency of the owner. Table 6.2 shows the relative importance of each of these components in operating costs and compares them for ships of three different ages, 5, 10 and 20 years.

CREW COSTS

Crew costs include all direct and indirect charges incurred by the crewing of the vessel, including basic salaries and wages, social insurance, pensions, victuals and repatriation expenses. The level of manning costs for a particular ship is determined by two factors, the size of the crew and the employment policies adopted by the owner and the ship's flag state. Manning costs may account for up to half of operating costs, depending on the size of the ship.

Table 6.2 Operating costs of Capesize bulk carriers by age ($000 per annum)

Age of ship	5 Years	10 Years	20 Years	% Total Average
Crew cost				
Crew wages	544	639	688	30%
Travel, insurance etc	73	82	85	4%
Victualling	46	54	64	3%
Total	743	871	956	41%
%	32%	31%	26%	
Stores & Consumables				
General stores	129	144	129	6%
Lubricants	148	148	219	8%
Total	277	292	348	15%
%	12%	11%	9%	
Maintenance & Repairs				
Maintenance	90	169	10	4%
Spares	74	169	181	7%
Total	164	338	393	14%
%	9%	15%	13%	
Insurance				
Hull & machinery & war risks	133	148	303	9%
P&I	63	94	120	4%
Total	196	243	423	14%
%	32%	32%	44%	
General Costs				
Registration Costs	17	17	17	1%
Management Fees	255	223	255	12%
Sundries	57	57	57	3%
Total	330	298	330	15%
%	14%	11%	9%	
Total per annum	1,710	2,041	2,450	100%
Daily Costs (365 days)	4,685	5,591	6,712	100%

Source: Ten-year old ship, Moore Stephens, V Ships; 5- and 20-year-old ship costs estimated from various sources

The minimum number of crew on a merchant ship is usually set by the regulations of the flag state. However, it also depends on commercial factors such as the degree of automation of mechanical operations, particularly the engine room, catering and cargo handling; the skill of the crew; and the amount of on-board maintenance undertaken. Automation and reliable monitoring systems have played an important part in reducing crew numbers.[2] It is now common practice for the engine room to be unmanned at night, and various other systems have been introduced such as remote control ballast, single-man bunkering, rationalized catering and improved communications which remove the need for a radio officer. As a result crew numbers declined from about 40–50 in the early 1950s to an average of 28 in the early 1980s. Current levels of technology on modern ships allow a basic crew of 17 in a deep-sea vessel, while experimental vessels have been operated with a crew of 10. Under some flags manning scales govern the

numbers of personnel required on the various types and sizes of vessels, and any reductions must be agreed between the shipowners' organization and the seamen's unions.

An idea of the basic manning cost in 2005 is provided in Table 6.2. The figure for annual crew wages of $544,000 for a 5-year-old ship covers direct wages and employment-related costs. An additional $119,000 per annum is required to cover travel; manning and support; medical insurance and victualling; and the basic management costs that apply to crewing – crew selection, rotation, making travel arrangements, purchase of victuals and ship supplies. In total these add 16% to the crew cost for a 5-year-old ship.

Table 6.3 Crew costs on 160,000 dwt bulk carrier, 2007 ($ per month)

Rank	Note	Basic	Consolidated Allowances	Bonus (officers)	Provident Fund[b]	Totals[c] 2007	Totals[c] 1993	% ch
Master	India	1,967	3,933	300	35	6,235	3,644	171%
Chief officer[a]		1,294	3,206	200	35	4,735	3,025	157%
2nd officer		1,077	1,773	—	35	2,885	2,338	123%
3rd officer		1,030	1,320	—	35	2,385	1,650	145%
Radio officer			radio officer no longer required in 2007				1,650	0%
Chief engineer		1,760	3,990	300	35	6,085	3,575	170%
1st asst engr	2nd eng.	1,294	3,206	200	35	4,735	3,025	157%
2nd asst engr	3rd eng.	1,077	1,773	—	35	2,885	2,338	123%
Bosun	Philippines	670	649	—	182	1,501	1,521	99%
5AB		558	542	—	171	6,353	6,479	98%
3 oiler		558	542	—	171	3,812	3,888	98%
Cook/std	chief cook	670	649	—	182	1,501	1,596	94%
Std	2nd cook	558	542	—	171	1,271	1,296	98%
Messman		426	378	—	158	962	1,071	90%
Total crew number modern ship: 20						45,344	37,094	122%
Additional crew for 10-year-old ship								
3rd asst engr	India	1,030	1,320	—	35	2,385	1,650	145%
Electrician	Elec. off.	1,077	1,823	—	35	2,935	2,338	126%
AB	Philippines	558	542	—	171	1,271	1,296	98%
1 oiler		558	542	—	171	1,271	1,296	98%
Total crew number 10-year-old ship: 24						53,205	43,673	122%
Additional crew for 20-year-old ship								
2 ordinary seamen	Philippines	426	378	—	158	1,925	2,142	90%
1 oiler		558	542	—	171	1,271	1,071	119%
1 messman		426	378	—	158	962	1,071	90%
Total crew number 20-year-old ship: 28						57,362	47,956	120%
			Annual crew cost for 20-year-old ship			688,344	575,475	120%

Notes

[a]Senior Officer based on 5 yr senority & Junior Officers 3 yrs seniority.

[b]Includes social costs

[c]1993 data from Stopford (1997, Table 5.3)

Source: V Ships

A more detailed breakdown of the crewing arrangements of three Capesize bulk carriers, one 5 years old, one 10 years old and one 20 years old, is provided in Table 6.3. The modern vessel has a crew of, comprising the master, four officers, three engineers, a bosun, eight seamen and three catering staff. The 10-year-old ship, where the maintenance workload is beginning to increase, might require a crew of 24, while a 20-year-old ship might have a crew of 28. The extra crew includes an additional engineer, an electrician, four seamen and one messman. They are needed to handle the repair and maintenance workload which is a continuous cycle on an old ship and can be carried out more cheaply at sea while the ship continues to trade. The total annual cost is $688,344 per year for the 20-year-old ship, a 20% increase on the costs in 1993.

The wages paid to the crews of merchant ships have always been controversial. The International Transport Workers' Federation (ITF) lays down minimum basic monthly rates of pay for all ranks, as well as paid leave, as part of its world-wide and Far East wage scale, but these are not universally accepted. There are, in fact, wide disparities in the rates of pay received by crews of different nationalities. The nationality of the crew is often governed by national statute of the country of registration and under some flags shipowners are prevented from employing non-nationals on their vessels. The cost per crew member may be 50% higher for a vessel registered under a European flag than for a comparable vessel 'flagged out' to one of the countries of open registration such as Liberia, Panama and Singapore, where employment regulations are less stringent. As the practice of flagging out became more widely accepted the cost differentials narrowed and quality became as much an issue as cost.

These costs are certainly not standards. Shipowners have far more opportunity than land-based businesses to determine manning costs by operating under a flag that allows the use of a low-wage crew and by shopping around the world for the cheapest crews available. Exchange rates will be an important factor here if wages are paid in a currency other than the one in which revenue is earned. Although shipping is a dollar-based business, shipping companies typically find themselves handling cashflows in many different currencies.

STORES AND CONSUMABLES

Another significant cost of operating a vessel, accounting for about 15% of operating costs, is expenditure on consumable supplies. These fall into two categories, as listed in Table 6.2: General stores including cabin stores and the various domestic items used on board ship; and lubricating oil which is a major cost (most modern vessels have diesel engines and may consume several hundred litres of lube oil a day while at sea).

REPAIRS AND MAINTENANCE

Routine maintenance, which accounts for 14% of operating costs, covers the routine repairs needed to maintain the vessel to the standard required by company policy, its classification society and the charterers of the vessel who choose to

inspect it (it does not include periodic dry docking which is not generally considered an operating expense and is dealt with under 'periodic maintenance' below). Broadly speaking, maintenance covers the cost of routine maintenance, including breakdowns and spares:

- *Routine maintenance*. Includes maintaining the main engine and auxiliary equipment, painting the superstructure and carrying out steel renewal in those holds and cargo tanks which can be safely accessed while the ship is at sea. As with any capital equipment, the maintenance costs of merchant ships tend to increase with age.
- *Breakdowns*. Mechanical failure may result in additional costs outside those covered by routine maintenance. Work of this type is often taken by ship repair yards on 'open order' and is therefore likely to be expensive. Additional costs are incurred owing to loss of trading time.
- *Spares*. Replacement parts for the engine, auxiliaries and other on-board machinery.

The typical maintenance costs for a Capesize bulk carrier listed in Table 6.2 cover visits to repair yards, plus the cost of riding crews and work carried out on board. All items of maintenance costs increase substantially with age, and a 20-year-old vessel may incur twice the costs of a more modern one. Expenditure on spare parts and replacement equipment is also likely to increase with age.

INSURANCE

Typically insurance accounts for 14% of operating costs, though this is a cost item which is likely to vary from ship to ship. Two-thirds of the cost is to insure the hull and machinery, which protects the owner of the vessel against physical loss or damage, and the other third is third party insurance, which provides cover against third party liabilities such as injury or death of crew members, passengers or third parties, pilferage or damage to cargo, collision damage, pollution and other matters that cannot be covered in the open insurance market. Additional voluntary insurance may be taken out to cover against war risks, strikes and loss of earnings.

Hull and machinery insurance is obtained from a marine insurance company or through a broker who will use a policy backed by underwriters in one of the insurance markets. Two important contributory factors in determining the level of hull and machinery insurance are the owner's claims record and the claimed value of the vessel. Ship values fluctuate with the freight market and the age and condition of the vessel.

The third party insurance required by shipowners falls under four headings: P&I cover, which is generally obtained through a club; collision liability cover; war P&I cover; and the provision of certificates of financial responsibility required to trade into the United States.

The P&I clubs, of which there are 13, are mutual insurance societies which settle third party claims for their members. They investigate claims on behalf of their shipowner members, provide advice during any negotiations or legal dispute over the claim and hold reserve funds to settle the claims on their members' behalf. This reserve

is replenished through a subscription (known as the 'call') from members which varies, depending on the level of claims settled. The subscription for an individual member depends on the company's claims record and other factors such as the intended trading area, the cargo to be carried, the flag of registry and the nationality of the crew. Since settlement takes time, there may be a supplementary call on members and members changing clubs generally pay a 'release call' to settle their outstanding liabilities with the old club and an 'advance call' to the new club.

Because of the potential size of third party claims, the P&I clubs reinsure their exposure to very large claims. In 2005 individual clubs had a maximum liability exposure of $5 million. A pool of clubs covered larger claims of $5–$20 million, and claims of $20 million to a maximum of $4.25 billion were reinsured in the insurance market. The P&I clubs also obtain credit ratings from the rating agencies, which assist in marketing their services to members. Unlike other forms of insurance, P&I cover cannot be assigned to a mortgagee, though a comfort letter may be obtained. It is also subject to retrospective cancellation, for example if the club member goes bankrupt.

GENERAL COSTS

A registration fee is paid to the flag state, the size of which depends on the flag. In Table 6.2 a fee of $17,000 per annum for a single ship is included under general costs.

Included within the annual operating budget for the ship is a charge to recover shore-based administrative and management charges, communications, owners' port charges, and miscellaneous costs. The overheads cover liaison with port agents and general supervision. The level of these charges depends on the type of operation. For a small tramping company operating two or three ships they may be minimal, whereas a large liner company will carry a substantial administrative overhead. With improved communications, many of these functions can now be undertaken by shipboard personnel in tramping companies. It is also an increasingly common practice for day-to-day management to be subcontracted to specialists for a predetermined fee.

Periodic maintenance

Periodic maintenance, the second major cost item in Figure 6.4, involves a cash payment to cover the cost of interim dry docking and special surveys. It accounts for about 4% of costs, though this depends on the age and condition of the ship. To maintain a ship in class for insurance purposes, it must undergo regular surveys with a dry docking every 2 years and a special survey every 4 years to determine its seaworthiness. At the special survey the vessel is dry-docked, all machinery is inspected and the thickness of the steel in certain areas of the hull is measured and compared with acceptable standards. These measurements become more extensive with age and all defects must be remedied before a certificate of seaworthiness is issued. In older ships these surveys often necessitate considerable expense, for example in replacing steelwork that, owing to corrosion, no longer meets the required thickness standards. In addition, dry docking allows marine growth, which reduces the operating efficiency of the hull, to be removed.

Table 6.4 Standard Capesize, lifetime periodic maintenance costs (1993 dollar prices)

	Age of ship 0–5	6–10	11–15	16–20	
Time out of service (days)	**20**	**23**	**40**	**40**	
Time in drydock (days)	**10**	**14**	**23**	**18**	**Total**
Cost Items (USD)					
Dry-dock charges	62,000	68,000	81,500	74,000	285,500
Port charges, tugs, agency	70,000	73,300	92,000	92,000	327,300
General services	80,000	92,000	160,000	160,000	492,000
Hull blast, clean & painting	102,800	128,800	183,600	99,000	514,200
All dry-dock paint	164,100	175,500	207,000	194,100	740,700
All steel replacement	70,000	350,000	1,190,000	840,000	2,450,000
Cargo spaces	22,200	64,200	126,000	150,000	362,400
Ballast spaces	36,400	23,200	26,000	47,400	133,000
Hatch covers & deck fittings	28,000	56,320	60,560	60,560	205,440
Main engine and propulsion	46,000	42,000	48,000	48,000	184,000
Auxiliaries	27,000	34,000	134,000	44,000	239,000
Piping & valves	18,000	37,000	50,000	34,000	139,000
Navigation & communications	9,000	11,000	11,000	11,000	42,000
Accommodation	6,000	8,000	7,000	7,000	28,000
Surveys & surveyors	70,000	78,500	113,000	108,000	369,500
Miscellaneous	100,000	100,000	100,000	100,000	400,000
Spare parts & subcontractors	70,000	100,000	100,000	120,000	390,000
Owner's attendance	23,800	25,600	35,800	35,800	121,000
Estimated total	1,005,300	1,467,420	2,725,460	2,224,860	7,423,040
Averaged annual cost	201,060	293,484	545,092	444,972	
Averaged daily cost	551	804	1,493	1,219	

Source: Clarkson Research, Capesize Quality Survey (1993)

Table 6.4 shows how the periodic maintenance schedule for a Capesize bulk carrier evolves as the vessel ages. The sums shown cover the cost of both the interim dry dockings and the special surveys.[3] Eighteen cost areas are covered, some of which, such as the cost of using the dry dock ($62,000) vary only slightly with age, whilst others, such as steel replacement and work on the hatch covers, increase very sharply as the ship gets older. In this example the periodic cost increases from $1 million for the two surveys in the first five years to $2.7 million in the 11–15-year period. Naturally this depends on the ship. The average daily cost increases from $551 per day to $1493 per day. Owners who operate preventive maintenance policies may incur lower costs, while for ships in poor condition the costs may be much higher.

Voyage costs

We now turn to voyage costs, the third cost item in Figure 6.4, which accounts for 40% of the total costs. These are the variable costs incurred in undertaking

a particular voyage. The main items are fuel costs, port dues, tugs, pilotage and canal charges:

$$VC_{tm} = FC_{tm} + PD_{tm} + TP_{tm} + CD_{tm} \quad (6.3)$$

where *VC* represents voyage costs, *FC* is the fuel costs for main engines and auxiliaries, *PD* port and light dues, *TP* tugs and pilotage, and *CD* is canal dues.

FUEL COSTS

Fuel oil is the single most important item in voyage costs, accounting for 47% of the total. In the early 1970s when oil prices were low, less attention was paid to fuel costs in ship design and many large vessels were fitted with turbines, since the benefits of higher power output and lower maintenance costs outweighed their high fuel consumption. However, when oil prices rose during the 1970s, the whole balance of costs changed. During the period 1970–85, fuel prices increased by 950% (Figure 6.5). Leaving aside changes in the fuel efficiency of vessels, this meant that, if fuel accounted for about 13% of total ship costs in 1970, by 1985 it had increased to 34%, more than any other individual item. As a result, resources were poured into designing more fuel-efficient ships and operating practices were adjusted, so that bunker consumption by the shipping industry fell sharply. In 1986 the price of bunkers fell and the level of interest in this aspect of ship design reduced, but in 2,000 bunker prices started to increase again (see Figure 6.5) and the importance of fuel costs increased.

The shipping industry's response to these extreme changes in bunker prices provides a good example of how the design of ships responds to changes in costs. Although shipping companies cannot control fuel prices, they have some influence on the level of fuel consumption. Like any other piece of complex machinery, the fuel a ship burns depends on its design and the care with which it is operated. To appreciate the opportunities for improving the fuel efficiency of ships it is necessary to understand how energy is used in the ship. Take, for example, a typical Panamax bulk carrier, illustrated in Figure 6.6. At a speed of 14 knots it consumes 30 tons of bunker oil and 2 tons of diesel oil in a day. Approximately 27% of this energy is lost in cooling the engine, 30% is lost as exhaust emission,

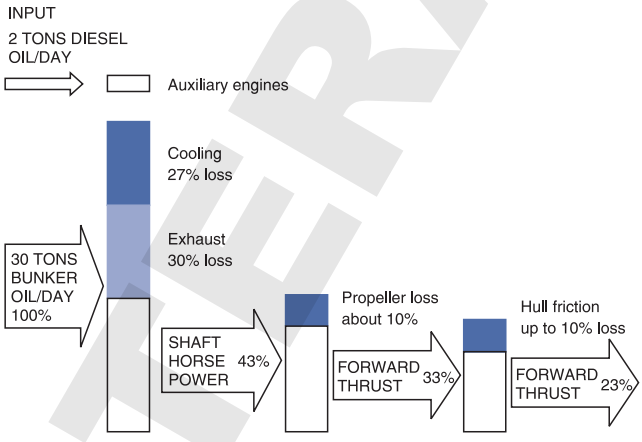

Figure 6.6
Energy losses in typical 1990s built Panamax bulk carrier, 14 knots design speed
Source: Compiled by Martin Stopford from various sources

10% is lost at the propeller, and hull friction accounts for an additional 10%. Only a residual 23% of the energy consumed is actually applied to propelling the vessel through the waves. Whilst this is a simplified view of a complex process, it identifies the areas where technical improvements can, and have, been made – the main engine, the hull and the propeller. The extent of the improvement can be judged from the fact that ships built in the 1970s typically consumed 10 tons per day more fuel than ships built in later years to achieve the same speed.

The design of the main engine is the single most important influence on fuel consumption. Following the 1973 oil price rises, and particularly since 1979, there were major improvements in the thermal efficiency of marine diesel engines. Between 1979 and 1983 the efficiency of energy conversion in slow-speed marine diesel engines improved from about 150 grams per brake horsepower per hour to around 127 grams per brake horsepower per hour. In addition to lower fuel consumption, engine operating speeds were reduced to below 100 rpm, making it possible to use more efficient large-diameter, slow-speed propellers without installing a gear box. The ability to burn low-quality fuel was also improved. In some cases the fuel savings achieved were quite spectacular. Diesel-powered 300,000 dwt VLCCs built in 2005 consumed 68 tons of bunkers a day at 15 knots, compared with fuel consumption of 130–150 tons per day by turbine-powered vessels built in the 1970s.

It is also possible to improve the fuel efficiency of a ship by fitting auxiliary equipment. One method is to install waste heat systems, which use some of the heat from the exhaust of the main engines to power a boiler that drives the auxiliary engines when the main engine is running, thus saving diesel oil. An alternative method is to use generators driven direct from the main engine while the vessel is at sea. This means that auxiliary power is obtained from the more efficient main engine rather than a small auxiliary engine burning expensive diesel fuel.

In operation, the ship's fuel consumption depends on its hull condition and the speed at which it is operated. When a ship is designed, naval architects optimize the hull and power plant to a prescribed design speed which may be, for example, 15 knots for a bulk carrier or 18 knots for a small container ship. Operation of the vessel at lower speeds results in fuel savings because of the reduced water resistance, which, according to the 'cube rule', will be approximately proportional to the cube of the proportional reduction in speed:

$$F = F^* \left(\frac{S}{S^*} \right)^a \tag{6.4}$$

where F is the actual fuel consumption (tons/day), S the actual speed, F^* the design fuel consumption, and S^* the design speed. The exponent a has a value of about 3 for diesel engines and about 2 for steam turbines. It follows from the cube rule that the level of fuel consumption is very sensitive to speed. For example, for a Panamax bulk carrier a reduction in the operating speed of 16 knots to 11 knots results in a two-thirds saving in the tonnage of fuel burnt per day, as shown in Table 6.5.

For any given speed, fuel consumption depends on hull design and hull smoothness. According to work carried out by British Maritime Technology, a reduction in hull roughness from 300 micrometres to 50 micrometers can save 13% on the fuel bill. Between dry docking, marine growth on the hull of the ship increases its water resistance, reducing the achievable speed by 2 or 3 knots in extreme cases. Even with regular dry docking, as the ship ages its hull becomes less smooth as the hull has been scraped and repainted many times. Self-polishing coatings and anti-fouling, which release a poison to kill marine growth and reduce hull fouling between dry dockings, are now widely used but are expensive to apply and have a limited life.

Table 6.5 How speed affects fuel consumption for a panamax bulk carrier

Speed knots	Main engine fuel consumption tons/day
16	44
15	36
14	30
13	24
12	19
11	14

As a result of these factors there can be a wide disparity between the fuel consumption of vessels of a similar size and speed. For example, the fuel consumption of two Panamax bulk carriers operating at the same speed could differ by 20–30% depending on age, machinery and hull condition. Obviously the cost importance of this difference in efficiency depends on the price of fuel.

PORT CHARGES

Port-related charges represent a major component in voyage costs and include various fees levied against the vessel and/or cargo for the use of the facilities and services provided by the port. Charging practices vary considerably from one area to another, but, broadly speaking, they fall into two components – port dues and service charges. Port dues are levied on the vessel for the general use of port facilities, including docking and wharfage charges, and the provision of the basic port infrastructure. The actual charges may be calculated in four different ways, based on: the volume of cargo; the weight of cargo; the gross registered tonnage of the vessel; or the net registered tonnage of the vessel. The service charge covers the various services that the vessel uses in port, including pilotage, towage and cargo handling.

The actual level of port costs depends on the pricing policy of the port authority, the size of the vessel, the time spent in port and the type of cargo loaded or discharged. For example, the typical port cost for a Panamax bulk carrier loading 70,000 tonnes of coal in Australia in 2007 and discharging in Europe would be about $147,000, roughly $2 per tonne. By convention, the allocation of port charges differs for different types of charter. Under a voyage charter, all port dues and charges related to the vessel are charged to the shipowner, while all charges on the cargo are generally paid for by the charterers, except for cargo-handling charges, which are generally agreed under the charter terms. Under a trip charter or time charter, all port charges are carried by the charterer.

CANAL DUES

The main canal dues payable are for transiting the Suez and Panama canals. The toll structure of the Suez Canal is complicated since it is based on two little-known units of measurement, the Suez Canal net ton and Special Drawing Rights (SDRs). Tariffs are calculated in terms of these. The Suez Canal net tonnage of a vessel is a measurement based on late nineteenth-century rules that were intended to represent the revenue-earning capacity of a vessel. It broadly corresponds to the cargo-carrying space below deck, though it is not directly comparable to the more normal measurement of cargo capacity (net tonnage).

The Suez Canal net tonnage of a vessel is calculated either by the classification society or by an official trade organization which issues a Suez Canal Special Tonnage Certificate. For vessels wishing to transit the canal that do not have a certificate, the calculation is provisionally done by adding together the gross and net tonnage, dividing by two and adding 10%. Tariffs are then calculated on the basis of SDRs per Suez net ton. SDRs were chosen as the currency unit in an attempt to avoid losses owing to fluctuations in exchange rates, as their value is linked to a number of major national currencies. Suez Canal toll charges per Suez net ton vary for different types and sizes of ships. For the Panama Canal a flat rate charge per Panama Canal net ton is used (see Chapter 8 for more details on the Suez and Panama canals).

Cargo-handling costs

Finally, we come to cargo–handling costs, the fourth major cost item in Figure 6.4. The cost of loading and discharging cargo represents a significant component in the total cost equation, and one to which considerable attention has been paid by shipowners, particularly in the liner business. Cargo-handling costs are given by the sum of loading costs, discharging costs and an allowance for the cost of any claims that may arise:

$$CHC_{tm} = L_{tm} + DIS_{tm} + CL_{tm} \tag{6.5}$$

where CHC is cargo-handling costs, *L* is cargo loading charges, *DIS* is cargo discharge costs, and *CL* is cargo claims.

The level of these costs may be reduced by investment in improved ship design – to facilitate rapid cargo handling, along with advanced shipboard cargo-handling gear. For example, a forest products carrier with open holds and four cranes per hold can achieve faster and more economical cargo handling than a conventional bulk carrier relying on shore-based cranes.

6.4 THE CAPITAL COST OF THE SHIP

The fifth component in the cost equation for our ‘typical’ ship in Figure 6.4 is its capital cost. This accounts for 42% of total costs, but in economic terms it has a very

different character from the other costs. Operating and fuel costs are necessities without which the ship cannot trade. Crew and bunker suppliers are generally the first creditors to be paid off in a financial crisis, because without them the ship is marooned. In contrast, once a ship is built, its capital costs are obligations which have no direct effect on its physical operation. That is why the costs are not specified in Figure 6.4. In practice these obligations take three forms as far as the shipping company's cashflow is concerned. First, there is the initial purchase and the obligation to pay the shipyard; second, there are the periodic cash payments to banks or equity investors who put up the capital to purchase the vessel; and third, cash received from the sale of the vessel. How these obligations appear in the cashflow is not determined by the ship's trading activities – as, for example, fuel costs are – they are the result of financing decisions made by the ship's owner, and there are many ways this can be handled as we will see in Chapter 7 which discusses financing ships and shipping companies.

The distinction between profit and cash

Before discussing this process in detail we need to be clear about the distinction between cash and profit. Profit is a concept used by accountants and investment analysts to measure the financial return from a business. It is calculated by taking the total revenue earned by the business during an accounting period (e.g. a year) and deducting the costs which the accounting authorities consider were incurred in generating that revenue. The cashflow of a company, in contrast, represents the difference between cash payments and receipts in the accounting period. In surviving shipping recessions cash is what matters, while for companies with equity investors, providing a commercial return on assets is equally important. The main reason why cashflow differs from profit in a particular year is that some costs are not paid in cash at the time when the accountant considers them to have been incurred. In shipping the best example is the timing of payment for the ship. The cash transaction takes place when the ship is built and each year the ship grows older and loses a proportion of its value.

To give investors a fair account of whether the business is making money, accountants have developed procedures for reporting large capital items in the profit and loss account. When a capital item is purchased, its full cost does not appear in the profit and loss account. If it did, shipping companies would report a massive loss whenever they bought a new ship. Instead the cost of the ship is recorded in the company's balance sheet as a 'fixed asset' and each year a percentage of its value (e.g. 5%) is charged as a cost in the profit and loss account to reflect the loss of value during the accounting period. This charge is known as *depreciation* and is not a cash charge. The ship was paid for in cash long ago. It is just bookkeeping, so profit will be lower than cashflow by that amount.

If a merchant ship is depreciated (or written off) over 20 years on a linear basis (there are several methods, but this is the most common), it means one-twentieth of its original cost is included in the company's overhead costs each year for 20 years. For example, if the ship was purchased for $10 million cash and depreciated at the rate of $1 million per annum, the position might be as shown in Table 6.6. In each of the first two years

Table 6.6 Example of profit (loss) account and cashflow for shipping company purchasing vessel for cash (equity) ($ million)

	Profit (loss) account		Cashflow	
	Year 1	Year 2	Year 1	Year 2
1 Freight revenue	10	10	10	10
2 Less: operating costs	5	5	5	5
3 voyage costs	3	3	3	3
4 depreciation[a]	1	1	0	0
5 Total operating profit/cashflow	1	1	2	2
6 Less capital expenditure on ship	None[a]	None	10	0
7 Total profit/cashflow	1	1	(8)	2

[a]Captal expenditure is covered by the depreciation item (see text)

the company has the same profit of $1 million, which is calculated by deducting costs, including depreciation, from the total revenue earned. However, the cashflow profile is quite different. The operating cashflow at line 3 is $2 million in each year because depreciation is not a cash item – it is simply a bookkeeping entry, so it does not appear in the cashflow calculation. From this is deducted the cash payment for the ship in year 1, giving a negative cashflow of $8 million in year 1 and a positive cashflow of $2 million in year 2.

However, this is not the whole story. Not many shipping companies buy their ships for cash. A particularly important aspect of cashflow is the method used to pay for the ship. In Table 6.6 the company pays cash on delivery and that shows up as a 'lump' in the cashflow, following which there is nothing more to pay for capital. If the ship is purchased with a loan, the cashflow profile changes because the cashflow now includes payment of interest and repayment of the loan. This situation is illustrated in Table 6.7

Table 6.7 Example of profit (loss) account and cashflow for shipping company purchasing vessel on five-year loan ($ million)

	Profit (loss) account		Cashflow	
Line	Year 1	Year 2	Year 1	Year 2
1 Freight revenue	10	10	10	10
2 LESS: operating costs	5	5	5	5
3 voyage costs	3	3	3	3
4 depreciation[a]	1	1	0	0
5 Total operating profit/cashflow	1	1	2	2
6 LESS interest at 10%	1	0.8	1	0.8
7 Profit/cashflow after interest	0	0.2	1	1.2
8 LESS capital repayment	None	None	2	2
9 Total profit/cashflow	0	0.2	(1)	(0.8)

[a]Captal expenditure is covered by the depreciation item (see text)

which shows what happens if, instead of paying cash, the ship is financed with a five-year loan. Although the company generates a positive operating cashflow of $2 million (line 5), after deducting interest (line 6) and capital repayments (line 8) it has a net cash outflow in both years. If the company has sufficient funds available, this negative cashflow required to meet finance payments may not present a serious problem. The problems arise if there is a negative cashflow but no cash reserves to meet it.

Estimating a ship's depreciation

Equity investors in public shipping companies face a different problem. If they are investing for the long term they need to estimate how much profit the company is making, and that depends crucially on how much depreciation is deducted to arrive at a fair estimate of the profit earned. Eventually the ship wears out, so its cost must be deducted from profits at some point and the usual approach used by accountants is 'straight-line depreciation'. The ship is written off in equal proportions over its expected life. The longer it lasts, the less depreciation can be deducted each year. An example illustrates two important points about the depreciation of merchant ships. If we analyse the Panamax bulk carrier sales shown in Figure 6.7, we find that the relationship between year of build and sale price is approximately linear. The regression coefficient is 0.93, indicating a relatively good fit, suggesting that the depreciation curve is linear, and the expected life is about 25 years.

That is very typical because the fifth special survey involves heavy repairs, though market conditions are also influential. For example, between 1995 and 2000, a period of generally weak market conditions, bulk carriers were on average scrapped at 25.2 years of age and tankers at 24.7 years, but in 2006, a year of high earnings, the average scrapping age was 28 years for tankers and 30 years for bulk carriers. Specialized ships have longer lives, notably cruise ships which averaged 43.8 years, livestock carriers 33.9 years and passenger ferries 30 years. In these cases shipping companies may choose to refurbish their vessels rather than demolish them. This calls for a word of caution in determining the life expectancy of these specialized ships. Steel ships can be repaired at almost any stage in their life and there are examples of ships

Figure 6.7
Market value and age of Panamax bulk carriers
Source: Clarkson Research Studies (1993)

operating in protected markets such as the United States coastal trades or the Great Lakes for more than 50 years. A shipowner may choose to refurbish an old vessel rather than build a new one, but it can be very costly and is all a matter of economics. So although specialist ships may appear to last more than 25 years we need to take the cost of life extension and refitting into account.

Cashflow costs and gearing

Capital is the cashflow item over which the owner has the most control at the outset. Operating and voyage costs can be adjusted marginally, depending on the ship he buys, but the cash payments associated with capital can be very high or non-existent, depending on how the ship is financed. The initial purchase of the ship may be paid for with cash, either from reserves or, in the case of very large companies, from cashflow. In that case there is a one-off capital payment and no further cashflow relating to capital until the ship is sold. A shipowner who follows this route and purchases his ships for cash has no further cash costs and can survive on a freight rate equal to operating and voyage costs. For the 5-year-old Panamax bulk carrier in Table 6.1 the operating and bunker costs are $11,820 per day.[4] If instead of paying cash the shipowner borrows the full purchase price from a bank over 20 years the capital repayments would be $11,155, almost doubling the daily payments the company is committed to making to $22,975 a day. In a volatile market like shipping that would present a problem, since the company often would not be able to meet the payments out of trading income. That is why banks rarely advance the full capital cost of the vessel, requiring the borrower to meet a portion of the purchase price of the ship from equity. The ratio of debt to equity is referred to as *gearing*; the higher it is, the riskier it is.

Security and bank lending policy

The terms on which bank loans are made available, and in particular the gearing they permit, are very important. We will discuss debt finance in Chapter 7, but it is worth previewing the way banks approach the repayment of interest and principal on a shipping loan. Since most commercial banks lend money at only 1 or 2 percentage points above the rate at which they borrow, there is little margin for risk – the bank must be sure before it lends that it will receive repayment of capital and interest in full. For this reason a major consideration in ship finance is the security against the loan. A shipowner borrowing money must be able to satisfy the lender that if he defaults the loan can be recovered. The following methods are used to provide security:

- Assignment of earnings, insurances, etc.
- The lender takes a first mortgage on the ship being purchased, giving him the first claim on the proceeds of the sale should the borrower default.

- A mortgage on other ships or assets may be offered. As with any security the bank must be convinced that in a forced sale the assets will realize sufficient cash to cover the outstanding debt.
- The income from a long charter with a 'blue chip' company is assigned to the lender and provides assurance that the cashflow will be available to service the loan.
- A guarantee of the loan may be given by the owner, shipping company, the shipbuilding company constructing the vessel or a government agency such as the UK's Export Credit Guarantee Department.

The choice of finance, and the obligations that arise as a result, have a tremendous impact on the shipowner's cashflow commitments. During recessions shipowners who fund investment with equity are safe so long as freight revenue is sufficient to cover operating and voyage costs. The ship may not be profitable, but at least the owner remains in control. The shipowner who has financed his investment from debt faces a very different situation. He must make regular payments to his banker to cover interest and capital repayments. If the freight rate only covers operating and voyage costs, as often happens during depressions, he must meet his financing costs from elsewhere or lose control of the business to his bankers. Thus two shipowners running identical vessels with similar operating and voyage costs face radically different cashflows during a depression if one has financed his fleet on an equity basis and the other using debt.

Taxation

Taxation does not figure prominently in the accounts of most bulk shipping companies. The international nature of the business makes it possible to avoid tax by registering a company under one of the many open registry flags (see Section 16.5) which exempt shipping companies from tax. During the recession of the 1980s many shipping companies switched to flags of convenience which charged only a nominal tonnage tax; in 2005, 49% of world tonnage was registered in this way (see Table 16.4). In response some European countries started, with the approval of the European Union, to offer special taxation schemes for shipping companies registered under their domestic flag. These schemes had three components: a tonnage tax approximating to zero corporation tax; a reduction in social contributions for seafarers and shipping companies; and a reduction to zero of personal income tax for national seafarers.

For example, the Danish International Shipping Register (DIS), which was set up in 1988, exempted crew from national tax and in 2002 a tonnage tax scheme was introduced, basing taxation on the tonnage of ships the company was operating, at a specified rate per tonne, with no regard to the actual operating profits of the company. Germany, the Netherlands, Norway, the UK, Belgium and Greece have all introduced schemes. Other reasons for registering in a particular country are to take advantage of investment incentives available to local businesses, or where other business activities make this route economic.

6.5 THE REVENUE THE SHIP EARNS

The classification of revenue

The first step is to define how revenue is received. As we saw in Chapter 5, there are several different ways a shipowner can earn revenue, each of which brings a different distribution of risk between the shipowner and the charterer and a different apportionment of costs. The risks are shipping market risk, which concerns the availability of cargo and the freight rate paid, and operational risk, arising from the ability of the ship to perform the transport. The costs are those discussed in the previous section. Each of the revenue arrangements deals with these items differently:

- *Voyage charter*. This system is used in the voyage-charter market, the specialist bulk market and in a rather different way in the liner trades. The freight rate is paid per unit of cargo transported, for example $20 per ton. Under this arrangement, the shipowner generally pays all the costs, except possibly cargo handling, and is responsible both for managing the running of the ship and for the planning and execution of the voyage. He takes both the operational and the shipping market risk. If no cargo is available, if the ship breaks down, or if it has to wait for cargo he loses out.
- *Time charter*. The charter hire is specified as a fixed daily or monthly payment for the hire of the vessel, for example $5,000 per day. Under this arrangement, the owner still takes the operational risk, since if the ship breaks down he does not get paid. The charterer pays fuel, port charges, stevedoring and other cargo-related costs. He takes the market risk, paying the agreed daily hire regardless of market conditions (unless the charter rate is linked to the market in some way).
- *Bare boat charter*. This is essentially a financial arrangement in which the charter hire only covers the financing cost of the ship. The owner finances the vessel and receives a charter payment to cover expenses. All operating costs, voyage costs and cargo-related costs are covered by the charterer, who takes both the operational and the shipping market risk.

A discussion of these revenue concepts can be found in Table 5.1. For simplicity the discussion in this chapter assumes that revenue is earned as a unit freight rate per ton mile of cargo carried.

Freight revenue and ship productivity

The basic revenue calculation involves two steps: first, determining how much cargo the vessel can carry in the financial period, measured in whatever units are appropriate (tons, ton miles, cubic metres, etc.); and second, establishing what price or freight rate the owner will receive per unit transported. In more technical terms, the revenue per deadweight of shipping capacity can be viewed as the product of the ship's productivity,

measured in ton miles of cargo transported per annum, and the freight rate per ton mile, divided by the ship's deadweight:

$$R_{tm} = \frac{P_{tm}.FR_{tm}}{DWT_{tm}} \tag{6.6}$$

where R is the revenue per dwt per annum, P the productivity in ton miles of cargo per annum, FR the freight rate per ton mile of cargo transported, t the time period and m the ship type.

The concept of a ship's 'productivity' is useful because it measures overall cargo-carrying performance, encompassing operating performance in terms of speed, cargo deadweight and flexibility in terms of obtaining backhaul cargoes. For example, a combined carrier potentially has a much higher productivity than a tanker because it can carry a backhaul of dry cargo if one is available. The analysis of productivity can be carried further by subdividing into its component parts as follows:

$$P_{tm} = 24 \cdot S_{tm} \cdot LD_{tm} \cdot DWU_{tm} \tag{6.7}$$

where S is the average operating speed per hour, LD is the number of loaded days at sea per annum, and DWU is deadweight utilization. This definition states that ship productivity, measured in terms of ton miles of cargo transported in year t, is determined by the distance the vessel actually travels in 24 hours, the number of days it spends loaded at sea in a year, and the extent to which it travels with a full deadweight of cargo. By further examination of each of these components a precise definition of productivity can be obtained.

OPTIMIZING THE OPERATING SPEED

When a vessel is earning unit freight revenue, the mean operating speed of the ship is important because it determines the amount of cargo delivered during a fixed period and hence the revenue earned.

In a high freight rate market it pays to steam at full speed, whereas at low freight rates a reduced speed may be more economic because the fuel cost saving may be greater than the loss of revenue. This certainly happens in practice. For example, in early 1986 the VLCC fleet was operating at a speed of around 10 knots, but when freight rates rose in 1988–9 it speeded up to almost 12 knots. For the same reasons, a substantial increase in bunker prices will change the optimum operating speed for a particular level of freight rates because it increases the cost saving for a given reduction in fuel consumption.

The financial logic behind the optimum operating speed calculation can be illustrated with a simple example in Table 6.8 which shows the effect of speed on the cashflow of a ship for different fuel prices and freight rates. By slowing down from 14 knots to 11 knots, the amount of fuel used in a year is more than halved, from 33.9 tons per day

Table 6.8 Effect of speed on cashflow for high and low freight and bunker costs

Ship speed knots	Fuel consumption tons per day	FUEL COST SAVING by slowing down		REVENUE LOSS by slowing down	
		$/day	$/day	$/day	$/day
14	33.9	—	—	—	—
13	27.2	2,697	674	1,440	4,320
12	21.4	5,016	1,254	2,880	8,640
11	16.5	6,979	1,745	4,320	12,960

Assumptions: 70,000 ton cargo; 300 days a year at sea; 10,000 mile round voyage

bunker assumptions		freight assumptions	
high $400/ton	low $100/ton	low $10/ton	high $30/ton

to 16.5 tons per day, bringing a saving in bunker costs that depends on the level of fuel prices. There is, however, a corresponding loss of revenue, because at the lower speed less cargo is delivered. The size of this loss depends on the level of freight rates. As a result the shipowner is confronted by a trade-off between lower costs and lower income, and the balance will determine his decision.

To illustrate this point we can examine the circumstances set out in Table 6.8 under which it would pay the shipowner to slow down to 11 knots. Bunker costs are $400/ton (high) and $100/ton (low), whilst freight ranges from $30/ton (high) to $10 per ton (low).

- *Case 1*: fuel cost $100/ton and low freight rates – he would save $1.745 million on bunkers but would lose $4.3 million revenue, so it is not worth slowing down.
- *Case 2*: fuel cost $400/ton and low freight rates – he would save $6.9 million and lose $4.3 million revenue so it is worth slowing down.
- *Case 3*: fuel cost $400/ton and high freight rates – he would save $6.9 million costs but would lose $12.9 revenue, so it is not worth slowing down.

In fact, for any level of freight rates and fuel costs there is an optimum speed.

MAXIMIZING LOADED DAYS AT SEA

A ship's time is divided between 'productive' loaded days at sea and unproductive days spent in ballast, in port, or off hire. A change in any of these variables will affect the number of loaded days at sea, *LD*, as follows:

$$LD_{tm} = 365 - OH_{tm} - DP_{tm} - BAL_{tm} \tag{6.8}$$

where *OH* is the number of days off hire per annum, *DP* the number of days in port per annum, and *BAL* the number of days in ballast per annum.

Days off hire reflect time spent for repairs, breakdowns, holidays, etc. A survey of bulk carriers showed an average of 24 days per annum off hire, though this figure can be expected to vary with conditions in the freight market. Owners will always attempt to minimize the time the vessel is not earning, but during periods of low freight market activity the ship may spend substantial time waiting for cargo, this being one of the major costs incurred during a market recession. For example, a ship that waits 12 days for a cargo with daily operating costs of $6,000 will have lost $72,000.

Port days depend upon the type of ship, the loading facilities available and the cargo being loaded. The more time the ship spends in port the less it spends carrying cargo. Homogeneous cargoes such as iron ore and grain can load very quickly where good facilities are available – iron ore loading rates of 6,000 tons per hour are common. Difficult cargoes such as forest products and general cargo may take weeks rather than days to load under some circumstances. Ships handling bagged sugar can spend a month loading or discharging.

Days spent in ballast is the third and most important determinant of loaded days at sea. For tankers and other single cargo ships it is a simple calculation, since backhauls are not generally available and the ship spends half its sea time in ballast. For combined carriers, most bulk carriers, reefers and liners the calculation is more difficult because these vessels can carry a wide range of different cargo types, and are often able to pick up backhaul cargo. Relatively little statistical information is available about the average time spent in ballast. A rule of thumb is 'the bigger the ship, the more time in ballast'. For example, a 30,000 dwt bulk carrier is always better placed to obtain a backhaul than a 160,000 dwt vessel since draught restrictions may limit the larger vessel's ability to pick up part cargoes.

The financial impact of obtaining a backhaul cargo can be illustrated by the example in Table 6.9 of a Panamax bulk carrier operating in the coal trade from Hampton Roads, USA, to Japan during the shipping depression in 1985. At a freight rate of $15 per ton this vessel would have a negative cashflow of $500,000 per annum when operating on a 50% ballast basis. However, by picking up a backhaul of coal from Newcastle, New South Wales, to Norway at a rate of $15 per ton, the vessel would generate a positive cashflow of $19,000 per annum.

DEADWEIGHT UTILIZATION

This refers to the extent to which the vessel travels with a full payload of cargo. In other words, it is the ton mileage of cargo carried divided by the ton mileage of cargo that the

Table 6.9 The effect of the backhaul on cashflow

	Cargo 000 tons per year	Freight per ton $	Annual revenue $m	Annual cost $m	Cashflow $'000
Backhaul	308	15	4.62	4.43	19
No backhaul	252	15	3.78	4.28	(500)

vessel could have carried if it had always obtained a full payload. In practice, the deadweight cargo capacity of a vessel represents a physical maximum, and it is a commercial decision whether this capacity is fully utilized. The shipowner always has the option to accept a part cargo and it is common practice in both the dry bulk and the tanker markets, especially during recessions. The change was particularly noticeable in the tanker market after the 1973 oil crisis, when the oil companies were no longer able to match cargo parcels to ships. Conversely during the 2003–7 boom there was enormous pressure to use ships as efficiently as possible by obtaining a full cargo.

An interesting example of deadweight utilization is the grain trade between the US Gulf and Japan. In the 1970s this trade was shipped in 25,000 dwt bulk carriers, but during the 1980s it was taken over by Panamax bulk carriers. Because the parcel size is restricted to 55,000 tons by the water depth in the Panama Canal, a 65,000 dwt Panamax cannot load a full deadweight, but in a relatively weak freight environment Panamax owners were prepared to settle for a part cargo. But by 2007 three things had happened. Handymaxes had edged up in size to 55,000 dwt; Panamaxes had increased to 75,000 dwt; and freight rates were much higher. As a result the part cargo trade was less attractive to the Panamaxes, but ideal for Handymaxes, which took it over. An unusual exception to the rule that ship sizes increase with time.

Products tankers also carry many part cargoes. Two popular parcel sizes in this trade are 33,000 and 40,000 tonnes, neither of which fills the popular 37,000 dwt and 47,000 dwt products tankers. The matter is further complicated by the high cubic of naphtha, a common oil products cargo (see Table 11.5). As a result products tankers often trade with a part cargo. With this in mind, some shipyards design products tankers with scantlings of 47,000 dwt and a hull optimized to 40,000 dwt, a reminder that the issue is not filling the ship, but making a profit.

In conclusion, investors face many decisions concerning the trade-off between revenue and cost variables. A combined carrier offers the shipowner the option to obtain very high deadweight utilization by carrying alternate cargoes of oil and dry cargo, while incurring higher capital and operating costs. Containerization involves heavy investment in cargo-handling efficiency, whereas the ro-ro combines some of the benefits of containerization with a higher degree of cargo flexibility. But many of the decisions are less dramatic but equally important – for example, paying extra for a faster bulk carrier that can make more trips during a boom, or a bigger products tanker that has the edge in long-haul trades even if it often carries part cargoes.

6.6 SHIPPING ACCOUNTS – THE FRAMEWORK FOR DECISIONS

So far we have focused on the cost and revenue relationships which determine how a shipping company or investment project performs financially. Now it is time to pull this together using the accounting framework which shipping companies and their investors use to take financial decisions.

What company accounts are used for

First a brief note about the comparability of financial information. Shipping companies register in many countries around the world and different financial reporting standards mean that financial information is not always in a comparable form. However in recent years significant progress has been made in coordinating financial reporting standards through the International Accounting Standards Board (IASB). In 2003 the IASB published the first International Financial Reporting Standard (IFRS 1). This was adopted by the European Union for public companies in 2004 and by 2008 about 100 countries complied with this standard.

Company accounts are compiled for three quite different purposes, each calling for a different presentation of the information. One is to show the financial standing of the company. Potential creditors need to know if the company is financially sound and likely to meet its commitments. Most jurisdictions impose strict rules regarding the provision of this type of financial information, obliging limited liability companies to publish accounts and as noted above there are now international guidelines setting out what company accounts must contain. For example since January 2005 listed companies in the European Union must comply with the International Financial Reporting Standards (IFRS1). Naturally companies, know these accounts will be read by their competitors as well as their suppliers and generally prefer to reveal as little as possible.

The second purpose of accounts is for the assessment of tax. The tax authorities lay down rules for what is and is not permissible in a particular country regarding the calculation of the profit upon which tax is raised. This means that the published accounts of a company registered in that country reflect the accounting conventions of the local tax system, which may make them quite different from, and much less useful than, the accounts published by the company's internal management for the purposes of running the business.

Finally we have the 'management accounts', which are compiled to help the management of the company in their decision-making. This is the aspect of financial reporting we are most interested in. Three separate, but connected, financial statements are generally used by the accounting profession to supply information for management purposes; income statement, the balance sheet, and the cashflow statement. Each has its own 'slant' on the business.

In this section we will review these financial statements. Since shipping is a dollar denominated business we will use as an example the accounts of a company listed in the USA. Our aim is to understand the economics of the business but note that the accounts used, which were selected to illustrate the type of financial issues shipping companies deal with, predate IFRS 1.

The income statement

The income statement, referred to in the UK as the profit and loss account, shows how much profit (net revenue) the company made during the accounting period. This tells us how much wealth the company created, a crucial piece of information since a company generating profits is increasing in value, whilst a company losing money is on the slippery slope. If we think of the company as a stream of net revenue, then the income

Table 6.10 Shipping company income statement

	Year end ($millions)		
	2003	**2002**	**2001**
Operating Revenue	1,576	783	1,039
less Operating expenses:			
Voyage expenses	395	239	250
Vessel operating expenses	211	168	155
Time-charter hire expense	305	50	66
Depreciation and amortization	191	149	136
General and administrative	85	57	49
Sub-total **Income from operations**	**390**	**119**	**383**
Write-offs & gains on vessel sales	–90		
Restructuring charge	–6		
Equity income from joint ventures	7	5	17
Sub-total **operating revenue**	**300**	**124**	**401**
Interest expense	–81	–58	–66
Interest income	4	3	9
Other loss	–45	–16	–7
Net income	**177**	**53**	**337**
Memo			
Earnings per share – basic	4.43	1.35	8.48

Source: based on the published accounts of a public shipping company

statement tells us the rate of flow of the stream. Table 6.10 shows the income statement for a large shipping company for three accounting periods, 2001–3. In 2003 the company earned $1.58 billion operating revenue from its ships, including both timecharter and spot income. From this they deducted five cost items: $395 million voyage expenses; $211 million operating costs; $305 million for ships chartered in; depreciation of $191 million; and general and administration costs $85 million. That leaves $390 million income from vessel operations. However, it is then necessary to make some other adjustments that had nothing to do with vessel operations, but affected the company's wealth. A major item was the write-off of $90 million on ships which were sold during the year for prices below their book value. There was also a $6 million restructuring cost for closing some overseas offices and $7 million joint venture income. After taking account of these the operating income was $300 million. Finally, the interest payments and 'other losses' (mainly tax) are deducted to give the net income for the company in 2003 of $177 million.

The balance sheet

The balance sheet shows the company's wealth at a specific point in time, in this case 31 December 2001, 2002 and 2003 which was the company's year end. It starts by

reporting the total assets of the business (i.e. everything the company owns), and then deducts the liabilities (i.e. money owed to third parties). Analysts are also interested in the balance sheet because it tells them how the company is holding its wealth. It is all very well having spectacular profits, but if a company has all its wealth tied up in ships and no cash to pay the bills, it could be a very risky situation.

Usually the balance sheet divides the calculation of wealth into three components. First, the current assets of the business are funds that can be realized quickly without changing the basic structure of the business or incurring penalties. Second, there are the 'fixed' assets which, for a shipping company, include the value of the vessels the company owns and other assets such as buildings and investments in other companies. Valuing the vessels raises issues about whether they should be valued at book value (i.e. acquisition cost less depreciation) or market value since the two methods can produce very different results (see Section 6.4 for a discussion of the calculation of depreciation). Finally, we deduct the liabilities (i.e. the money owed) which usually takes the form of any outstanding bills, debt, bonds and other financial commitments that must be met at some time in the future. The fact that the capital value of the ships is so high and subject to extreme volatility makes it difficult to disentangle the underlying value of the business, taking one cycle with another, from the cyclical elements that depress or increase returns.

Table 6.11 provides an example of a relatively complex shipping company balance sheet. The layout is conventional, with the assets listed at the top of the table in sections 1.1–1.3 and the liabilities in the second half of the table in sections 2.1 and 2.2. In this case the total assets in 2003 were $3.588 billion, and the sum of long- and short-term liabilities was $1.921 million. The difference between these two is shareholders' equity, which was $1.667 billion.

The current assets, shown in Section 1.1, include cash in the bank of $295 million, plus accounts receivable (i.e. invoices which have been presented, but not paid) of $147 million and some pre-paid expenses and other assets of $39 million, giving the company total current assets of $481 million. In section 1.2 the ships in the company's fleet are valued at $2.4 billion, based on cost less accumulated depreciation. This method of valuation, known as 'book value', is not always a reliable guide to the market value of the vessels. In fact the income statement included a write-off of $90 million from the sale of ships whose sale price was lower than the book value. In addition to the ships the balance sheet reports some capital leases, which nowadays have to be declared, and advance payments on some tankers currently under construction. Section 1.3 includes various other assets totalling $533 million in 2003, including $96 million worth of shares in other shipping companies and an investment in some financial leases. Unusually for a shipping company, there are also some intangible assets and 'goodwill'. Overall the company's assets consist of 13% cash and working capital, 70% ships, and the remaining 17% is various odds and ends.

On the liabilities side, by far the biggest liability in 2003 was $1.5 billion of long-term debt. In addition, there are various short-term obligations listed in section 2.1.

Table 6.11 Shipping company balance sheet

	Year end ($ millions)	
	2003	2002
1. ASSETS		
1.1 Current Assets		
Cash and cash equivalents (note 1)	295	289
Accounts receivable	147	71
Prepaid expenses and other assets	39	28
Total current assets	481	388
1.2 Vessels		
Vessels at cost less depreciation	2,387	1,928
Vessels under capital leases, at cost,	38	
Advances on newbuilding contracts (note 3)	151	138
Total vessels	2,575	2,067
1.3 Other assets		
Marketable securities (note 2)	96	14
Restricted cash		5
Deposit for purchase of company (note 4)		76
Net investment in direct financing leases (note 5)	73	
Investment in joint ventures (note 6)	54	56
Other assets	60	30
Intangible assets and goodwill (note 7)	249	89
Total other assets	533	269
TOTAL ASSETS	**3,588**	**2,724**
2. LIABILITIES		
2.1 Current liabilities		
Accounts payable	52	22
Accrued liabilities	120	84
Current portion of long-term debt	102	84
Current obligation under capital lease	1	
Total current liabilities	275	190
2.2 Long term liabilities		
Long-term debt	1,498	1,047
Obligation under capital lease	35	
Other long-term liabilities	113	45
Total long-term liabilities	1,646	1,092
TOTAL LONG- & SHORT-TERM LIABILITIES	**1,921**	**1,281**
Stockholders' equity	**1,667**	**1,442**
TOTAL LIABILITIES	**3,588**	**2,724**

1. The company has loans which specify a minimum cash balance
2. Shareholding in two other shipping companies
3. Payments already made to shipyard on new ships under construction
4. 10% deposit paid against the purchase of another shipping company
5. Capatilized value of investment in financing leases
6. The appraised value of a 50% holding in a joint venture company
7. Goodwill purchased with companies

Source: based on the published accounts of a public shipping company

1. less accumulated depreciation of $1,034,747 (2002; $940,082)
2. less accumulated depreciation of $438 (2002: nil)

The cashflow statement

Finally there is the cashflow statement, which tells the analyst exactly how much cash the company paid in or paid out during the period, where the cash that was spent came from, and where it went. Often the trigger of bankruptcy for shipping companies is not the multi-million dollar debts owed to the bank, it is the bunker supplier who, faced with an unpaid bill, decides to arrest a ship. So it is always important to have enough cash in hand. The cashflow statement is in many respects similar to the income statement, but it deals strictly with cash payments, excluding certain items such as depreciation which are not actually paid in cash.

The cash flow statement in Table 6.12 is divided into three sections, each dealing with a different aspect of the company's activities. Section 1 deals with the cash provided by operating activities; section 2 deals with the cashflow arising from financing activities; and section 3 deals with the cashflow from investing activities. If we take each of these in turn, we can see how the company's business was developing.

The operating activities in section 1 generated $456 million in 2003. The key point here is that the cash flow from operating activities is quite different from the net income reported in Table 6.10. That showed net income of $177 million in 2003, but in section 1.2 the cash statement adds back non-cash items which appeared in the income statement, including depreciation of $191 million, losses on the write-down of vessels of $92 million (a pure balance-sheet item), and various other non-cash items. Changes in working capital and expenditure for dry docking are then deducted to give positive net cashflow from operating activities of $456 million – more than twice the net income.

In section 2 we see the cashflow arising from financing activities. In 2003 this was also strongly positive, with $447 million of cash generated. This cash was generated mainly by refinancing – they raised $1.98 billion of new long-term debt, $25 million by issuing common stock, made $63 million scheduled debt repayments, and prepaid $1.47 billion of debt, leaving $447 million free cash.

The way the company used the cash raised from operating and financing is shown in section 3. Investments made by the company in 2003 cost $895 million. They paid $730 million for new companies and $372 million for new ships. The sale of old ships generated $242 million. There were various other minor investments, including the purchase of shares and some leases.

Pulling all this together, the company generated $456 million cash from operating its ships; topped it up with $447 million of additional external finance; and invested $895 million in buying companies and ships. But despite all this activity the company's cash balance changed by only $8 million in the year. Somebody has done good job of balancing the books!

Not all companies publish accounts in this form, but the above examples illustrate the general principles of financial accounting in shipping. Whether the company has 40 ships or 400 the operating activities are about increasing revenues and squeezing costs to generate income; the financing activities are about managing funds, whether from a bond issue or an investment by a high net worth relative so that the company can do what it needs to when it needs to do it; and the investment activities are about implementing the

Table 6.12 Shipping company cashflow statement

	Year end ($ millions)		
	2003	2002	2001
Cash provided by (or used for):			
1. OPERATING ACTIVITIES			
1.1 Net income	177	53	337
1.2 Non-cash items (to add back):			
Depreciation and amortization	191	149	136
(Gain) loss on sale of assets	–2	1	–1
Loss on write-down of vessels	92		
Other non-cash items	44	4	20
total	325	154	155
1.3 Change in working capital	–4	7	28
1.4 Expenditures for drydocking	–43	–35	–20
Net cash flow from operating activities	456	180	500
2. FINANCING ACTIVITIES			
Net proceeds from long-term debt	1,981	255	688
Scheduled repayments of long-term debt	–63	–52	–72
Prepayments of long-term debt	–1,467	–8	–752
Decrease (increase) in restricted cash	6	–1	–8
Proceeds from issuance of Common Stock	25	4	21
Repurchase of Common Stock		–2	–14
Cash dividends paid	–36	–34	–34
Net cash flow from financing activities	447	163	–171
3. INVESTING ACTIVITIES			
Expenditures for vessels and equipment	–372	–136	–185
Proceeds from sale of vessels and equipment	242		
Purchase of companies	–705	–76	–182
Purchase of intangible assets	–7		
Purchase of available-for-sale securities	–37		–5
Proceeds from sale of available-for-sale securities	10	7	36
Decrease (increase) in investment in joint ventures	26	–26	
Net investment in direct financing leases (note 3)	–20		
Other	–5	–2	0
Net cash flow from investing activities	–895	–233	–336
Cash and cash equivalents, beginning of the period	285	175	181
Cash and cash equivalents, end of the period	292	285	175
Increase (decrease) in cash and cash equivalents	8	110	–6

Source: based on the published accounts of public shipping company

company's strategy. Cashflow does not make a good business, but well-managed cashflow certainly smooths the way for good businessmen to get on with what they are good at.

6.7 FOUR METHODS OF COMPUTING THE CASHFLOW

Our aim in this chapter is to focus on how costs can be controlled and how revenue can be increased within the overall constraints imposed by the ship, the business organization

and the legal jurisdiction under which a company's vessels operate. At the beginning of this chapter we discussed the importance of cash management in navigating through the shipping cycles that are such a feature of the business and examined the cost and revenue items that underlie a shipping business's cashflow. It now remains to discuss the practical techniques for preparing operational cashflow calculations that can be used as a basis for decision-making.

In shipping the usual measure of cashflow is *earnings before interest, tax, depreciation and amortization* (EBITDA). This measures the 'cash in hand' generated by the business during a period of time and is calculated by deducting out-of-pocket expenses from revenue. Four methods of cashflow analysis are widely used in the shipping industry, each of which approaches the cashflow from a different perspective:

- *The voyage cashflow (VCF) analysis* is the technique used to make day-to-day chartering decisions. It computes the cashflow on a particular ship voyage or combination of voyages. This provides the financial basis for operational decisions such as choosing between alternative charter opportunities where there are several options, or in a recession deciding whether to lay up the ship or fix it.
- *The annual cashflow (ACF) analysis* calculates the cashflow of a ship or a fleet of ships on a year-by-year basis. It is the format most often used for cashflow forecasting. By projecting the total cashflow for the business unit during a full financial year, it shows whether, on specific assumptions, the business as a whole will generate enough cash to fund its operations after taking account of complicating factors such as tax liabilities, capital repayments and periodic maintenance.
- *The required freight rate analysis* is a variant on the annual cashflow analysis. It focuses exclusively on the cost side of the equation, calculating the level of costs which must be covered from freight revenue. This is useful for shipowners calculating whether a ship investment will be profitable and bankers carrying out credit analysis to decide how much to lend. It can also be used to compare alternative ship designs.
- *The discounted cashflow (DCF) analysis* is concerned with the time value of money. It is used for comparing investment options where the cashflows differ significantly over time. For example, a new ship involves a large initial investment but is cheap to run, whereas an old ship is cheap to buy but has higher costs later in its life. DCF analysis provides a structured way of comparing the two investments.

These methods are complementary and each approaches the cashflow in a different way appropriate to the needs of different decisions.

The voyage cashflow analysis

The VCF analysis provides information about the cash that will be generated by undertaking a particular voyage or sequence of voyages. Typically the owner with a ship which is open on a particular date will have brokers' lists showing cargoes available in the relevant loading area. Sometimes there will be one obvious cargo, so the decision is easy.

In most cases, however, there will be several alternatives, all possible but none ideal, so a decision is needed about which cargo to take. This means having to decide whether to accept the grain cargo from the US Gulf to Japan, or from the US Gulf to Rotterdam, whether to fix now or wait a few days to see if the rates improve, and whether to lay up the vessel or to continue to trade. By providing an estimate of the profitability of a particular voyage, the VCF analysis plays an essential part in making operating decisions.

An example of a voyage cashflow analysis is shown in Table 6.13. A Panamax bulk carrier is on a multi-leg voyage from the US Gulf to Japan with grain, then ballasting down to Australia, where it picks up another cargo of coal to deliver to Europe before returning in ballast to East Coast North America to reload grain. The aim is to estimate how much cash the voyage will actually generate.

This table is in a summarized form, and in practice a more detailed voyage estimating programme would be used, but it covers the main issues. The four sections of the table are reviewed below:

1 *Ship information*. Details of the ship size, speed, bunker consumption, etc. In this case the speed is 15 knots on the loaded and ballast voyages and a 5% sea margin is deducted to allow for weather conditions and other delays. The ship, which is relatively modern, burns 33 tons per day on the laden voyage and 31 tons on the ballast voyage. Operating costs are shown as a daily rate assuming 350 days a year on hire (note that the cashflow attributable to operating costs will not necessarily fall within the time-scale of the voyage). The bunker price is $338 per ton for bunker oil and $531 per ton for diesel oil for the auxiliaries. Bunker prices vary around the world and a bunkering plan will be considered, to ensure that the ship bunkers in the cheapest location.
2 *Voyage information*. This section shows details of the voyage – port days, distance, cargo carried, and the freight rate for each leg of the voyage. The port time of 3 days loading and 2 days discharging includes time waiting for a berth, documentation, loading and discharging cargo, bunkering and a day for transiting the Panama Canal. It is not always easy to estimate port times precisely. In this case the cargo is 54,000 tons of grain on leg 1 and 70,000 tons of coal on leg 3. A ship of this type would probably carry about 3,500 tons of bunkers and stores, leaving an available cargo capacity of 71,500 tons, so the vessel is not fully loaded on the first leg. On this voyage the ballast legs are much shorter than the cargo legs, which is good – the shorter, the better. The round voyage is calculated from the speed, less the sea margin for good weather, the voyage distance on loaded and ballast legs, and the port times. In addition, a congestion provision is shown in line 2.6 which could cover port time, delays at certain ports such as loading coal, or congestion at known chokepoints such as the Dardanelles for tankers leaving the Black Sea. In total the voyage is 31,089 miles, takes 116 days (90.9 days at sea and 25 days in port), transports 124,000 tons of cargo and the freight is $5.75 million.
3 *Voyage cashflow*. The freight earnings are repeated in line 3.1. From this are deducted the broker's commission, and voyage costs which include bunkers, diesel

Table 6.13 Voyage cashflow analysis for 75,000 dwt bulk carrier (with backhaul), 4 May 2007

1. SHIP INFORMATION Ship Type	Speed (knots)			Bunkers (tons/day)	
	Design speed	Sea margin	voyage speed	Main	Auxiliary
1.1 Bulk carrier, 75,000 dwt					
1.2 Laden voyages	15	5.0%	14.25	33	1
1.3 Ballast voyages	15	5.0%	14.25	31	1
1.4 Operating cost $/day		5,620	At 350 days on hire pa		
1.5 Bunker price $/ton				338	531

2. VOYAGE INFORMATION Route	col (1) Distance (miles)	col (2) Days at sea	col (3) Days in port	col (4) Cargo (tons)	col (5) Freight $/ton
2.1 Port days/voyage - loading			3		
2.2 Port days/voyage - discharge			2		
2.3 Voyage details:					
Leg 1: US Gulf–Japan	9,123	26.7	5	54,000	56.0
Leg 2: Japan–Australia	4,740	13.9	0	Ballast	
Leg 3: Australia–Europe	12,726	37.2	10	70,000	39.0
Leg 4: Europe–East Coast North America	4,500	13.2	0	Ballast	
2.4 Total loaded voyages	21,849	63.9			
2.5 Total ballast voyages	9,240	27.0			
2.6 Port congestion provision			10		
2.7 Total round voyage	31,089	90.9	25	124,000	5,754,000

3. VOYAGE CASHFLOW	$	Notes
3.1 Freight earnings $	5,754,000	From row 2.7 above
3.2 *less* Broker's commission	86,310	At 1.5%
3.3 *less* Voyage costs		
Bunker oil for main engine	995,674	Days at sea *consumption*price
Diesel oil for auxiliaries	48,270	Days at sea *consumption*price
Port costs	418,000	Cost of four port calls
Canal dues	80,000	One Panama canal transit
Total	1,541,944	
3.4 less operating costs	651,378	days on voyage * operating cost/day
3.5 Voyage cashflow	3,474,369	Cash generated by voyage (less OPEX)

4. VOYAGE EARNINGS		
4.1 memo: Days on the voyage	116	From line 2.7 including congestion
4.1 Time-charter equivalent $/day	35,596	Equals (line 3.5/line 4.1) + row 1.4

Note: Freight rates shown are as on 4 May 2007

for auxiliaries, port and canal costs. Operating costs are then deducted in line 3.4 to calculate the net voyage cash flow.

4 *Voyage earnings*. Finally, in line 4.1 we calculate the time-charter equivalent for the round voyage, which is $35,596 per day.

In this example the freight rates are taken from a period of very strong earnings in May 2007. The ship would earn more than enough to cover its full capital costs. To put the voyage time-charter equivalent into perspective, on the same date, 4 May 2007, the 3-year time-charter rate for a modern Panamax bulk carrier was $34,000 per day, but the 1-year-rate was $41,750 per day.

So what does the owner do in this situation? Basically, money is flooding in and the ship is generating almost $10 million a year. The owner will earn a very decent return if he accepts the voyage at this level of freight rates, but he could match it with less trouble if he puts the ship out on a 3-year time-charter at $34,000/day and if he puts the ship out on a 1-year time-charter at $41,750/day he could get more. It all depends on what he thinks will happen in future, and that means anything from the end of this voyage to the next three years. He may remember that five years earlier in August 2002 the rate for US Gulf–Japan grain was $19.40 per tonne and the backhaul from Newcastle, NSW to Europe was $10.20 per tonne. Admittedly bunkers were cheaper at $153 for fuel oil and $213 for marine diesel oil, but at those rates the voyage would only pay $6357 per day. Could it happen again? Should he take a time-charter while the rates are so good? It's the million-dollar decision that shipowners ponder every day.

For older ships strong markets like this are very profitable. A few voyages generating over $3 million each soon generate more cash than the ship is worth in a normal market. It is easy to see why in strong markets old ships are rarely scrapped unless they have serious physical problems. But if we rerun the voyage estimate for the August 2002 scenario the ship does not earn enough to cover its operating costs. This puts the owner in a very difficult position. If he accepts the charter in these circumstances he will lose money on the voyage, even if things go as planned. With old ships he knows that things do not always go as planned. However, if he refuses the cargo he will be even worse off. His operating costs must be paid whether the ship has a cargo or not. One option is to send the ship to lay-up, saving a large part of operating costs, but unless the vessel is carefully maintained during lay-up its future value can be badly affected.

In these circumstances it is easy to see how during recessions the business becomes totally preoccupied with the problem of obtaining enough cash to pay each day's bills as they come in and with cutting costs wherever possible. The lesson relearned by each generation of over-leveraged shipowners and their bankers is that once the recession has started it is too late. There are no real options. With a real effort the owner might cut his annual operating costs, using a cheaper crew, defer all but the most essential repairs and tighten up on administration costs. However, if he is highly leveraged, whether the ship is new or old, the $1,500 per day he might save will not make much difference to his cashflow. Indeed, if he cuts costs too much it could lead to expensive operational problems.

If cash is not available elsewhere and the bankers press for payment, the only option may be to sell assets to raise cash. This usually means selling a ship, and brings us back to the sale and purchase decision that we discussed at the beginning of the chapter in Figure 6.1. The problem is that a ship that cannot generate a positive cashflow, even when well managed, will not command a high price on the market. As desperate owners

are driven to sell their ships in order to raise cash, and as few potential purchasers can be found, the price falls. For newer vessels, a speculative investor will almost always be found, but for old ships whose economic life may not span the depression the demolition yard may be the only willing purchaser.

The moral is that financially shipping is a business of feast and famine. When times are good, as they are in the example in Table 6.13, the challenge is to invest the funds wisely. But surviving depressions depends upon being able to generate cash when other shipowners are losing money and, as we saw in Chapter 3, recessions are a regular feature of the shipping market. By the time the voyage decision arrives, it is too late. Banks rarely lend money to customers who are in financial difficulties and if they do, it is usually on very disadvantageous terms. Financial planning for such contingencies must be undertaken before the ship is purchased, when rates are high, and the shipowner still has some room for manoeuvre. Cashflow planning is the technique to use.

The annual cashflow analysis

ACF analysis is concerned with calculating the cashflow generated by the business as a whole over a period of time. In this sense it is less concerned with the ship as an operating unit than with the total cashflow that the business must finance over a period of time, either months or years.

There are several different methods of calculating the annual cashflow, but the simplest is the receipts and payments method shown in Table 6.14 (a simpler version of the cashflow statement in Table 6.12). The top of the table shows cash revenue, the lower half of the table shows cash costs, and the bottom line indicates the cashbook balance carried forward from one year to the next in the company's bank account. This simple example illustrates the ACF technique for a one-ship company trading over a four-year period. The figures are loosely based on actual market conditions between 1990 and 1995, and the freight rates, prices, operating costs and the outstanding loan are shown as a memo item at the bottom of Table 6.14. For simplicity, inflation and bunker price changes have not been included in the analysis.

The shipping company has an opening balance of $8.5 million (line 1). On the last day of year 0 it purchases a 1992 built tanker of 280,000 dwt for $22 million. A bank loan is used to finance 70% of the purchase price, to be paid back in equal annual instalments of $3.08 million per annum over 5 years. The remainder of the purchase price is paid from the company's own cash reserve. Receipt of the loan from the bank is shown in line 2.2 as a capital receipt of $15.4 million, while the payment for the ship is shown in line 4.4 as $22 million. In year 1, freight rates are running at $31,824 per day and the ship generates total revenue of $10.8 million (line 2.1), more than enough to cover operating costs, voyage costs and capital charges, so the company ends year 1 with a positive bank balance of $4.45 million. However, freight rates fall to $12,727 per day in year 2, $17,768 per day in year 3 and $10,107 per day in year 4. Each year the company's bank balance is slowly eroded, so that by the end of year 3 the strong positive balance has disappeared and the company needs to raise an additional $798,000 in cash just to meet day-to-day commitments.

Table 6.14 Annual cashflow analysis Case 1: 280,000 dwt tanker built 1976 scrapped at 4th survey

$000s		Year 0 (1990)	Year 1 (1991)	Year 2 (1992)	Year 3 (1993)	Year 4 (1994)	Year 5 (1995)
1 Opening balance		8,500	1,900	4,450	815	(798)	(1,487)
2 Cash receipts							
2.1 Operating revenue (gross)		0.0	10,820	4,327	6,041	3,436	
2.2 Capital receipts		15,400					
2.3 Revenue from ship sale						6,300	
3 TOTAL RECEIPTS		15,400	10,820	4,327	6,041	9,736	
4 Cash payments							
4.1 Operating costs			3,650	3,650	3,650	3,650	
4.2 Dry docking							
4.3 Voyage costs							
4.4 Purchase of ship		22,000					
4.5 Loan repayments			3,080	3,080	3,080	6,160	
4.6 Interest			1,540	1,232	924	616	
4.7 Tax payments							
5 TOTAL COSTS		22,000	8,270	7,962	7,654	10,426	
6 CASHBOOK BALANCE AT YEAR END		1,900	4,450	815	(798)	(1,487)	(1,487)
memo	Charter rate / day	22,883	31,824	12,727	17,768	10,107	15,789
	Days trading		340	340	340	340	340
	Second-hand price of ship	22,000	20,000	9,500	11,000	8,000	10,000
	Operating costs $/day	10,000	10,000	10,000	10,000	10,000	10,000
	Outstanding loan (year end)	15,400	12,320	9,240	6,160	0	0
	Asset cover	1.426	1.6234	1.02814	1.7857		

At the end of year 4 the company is only generating enough cash to pay its operating costs and, to make matters worse, in year 4 it faces its fourth special survey, with an estimated cost of $5 million. Faced with a negative cashflow it cannot fund from its own cash reserves the company would be forced to make some major decisions of the type discussed at the beginning of the chapter. One option would be to sell. The second-hand price for a VLCC in average condition shown in the memo section of Table 6.14 is $8 million. However, a ship due for its fourth special survey is not in average condition and would not attract even that price – a scrap sale at $6.3 million would be more likely. With $3.08 million of the original loan still outstanding and debts of $798,000, a sale for $6.3 million would leave the shipping company with a loss of $1.487 million, compared with an opening balance of $8.5 million. Obviously this option would suit the bank, which would be repaid in full, but the shipping company would have lost heavily on the deal. By selling the ship any hope of recovering the losses would be gone.

Table 6.15 Annual cashflow analysis Case 2: 280,000 dwt tanker built 1976 traded past 4th survey

$000s	Year 0 (1990)	Year 1 (1991)	Year 2 (1992)	Year 3 (1993)	Year 4 (1994)	Year 5 (1995)
1 Opening balance	8,500	1,900	4,450	815	(798)	(9,707)
2 Cash receipts						
2.1 Operating revenue (gross)	0.0	10,820	4,327	6,041	3,436	5,368
2.2 Capital receipts	15,400					
2.3 Revenue from ship sale						11,000
3 TOTAL RECEIPTS	15,400	10,820	4,327	6,041	3,436	16,368
4 Cash payments						
4.1 Operating costs		3,650	3,650	3,650	3,650	3,103
4.2 Dry docking					5,000	
4.3 Voyage costs						
4.4 Purchase of ship	22,000					
4.5 Loan repayments		3,080	3,080	3,080	3,080	3,080
4.6 Interest		1,540	1,232	924	616	308
4.7 Tax payments						
5 TOTAL COSTS	22,000	8,270	7,962	7,654	12,346	6,491
6 CASHBOOK BALANCE AT YEAR END	1,900	4,450	815	(798)	(9,707)	171
memo Current account interest	190	445	82	(80)	(971)	17
memo Charter rate / day	22,883	31,824	12,727	17,768	10,107	15,789
Days trading		340	340	340	340	340
Second-hand price of ship	22,000	20,000	9,500	11,000	8,000	11,000
Operating costs $/day	10,000	10,000	10,000	10,000	10,000	8,500
Outstanding loan (year end)	15,400	12,320	9,240	6,160	3,080	(0)
Asset cover	1.4286	1.6234	1.0281	1.7857	2.5974	

The second option is to put the ship through survey and trade on. The cashflow in Table 6.15 shows what would happen in years 4 and 5 if the company followed this strategy. First, the owner would have to raise an overdraft of, say, $10.5 million cash to meet his negative cashflow in years 3 and 4. This will be difficult. Few bankers are willing to lend to a business with no assets and a negative cashflow. There is little that can be done to raise money within the business. Cost economies might be possible if the company is paying top rates to the crew and maintaining the vessel to a very high standard. Closing expensive offices is another source of economy. If rigorous cost-cutting saves $1,500 per day, that is worth $0.5 million in a full year. This might convince his bankers that he is determined to tackle the problem, but would not even pay the interest on his overdraft. The best the company can offer its bankers is a straight gamble on the market. Bankers do not generally gamble, but since the choice is between foreclosing and

providing a $10.5 million overdraft, it is not so much a matter of gambling as choosing between unpalatable options. Such decisions test the concept of relationship banking which we discuss in Chapter 8.

On this occasion, if the bank decided to back the owner, it would pay off. The out-turn in year 5 (Table 6.15) shows how quickly a company's financial position can change in shipping. Freight rates increase to $15,789 per day in year 5, which brings in an extra $1.9 million income (line 2.1). In response to higher freights the market price of the ship goes up to $11 million. Since the ship has now passed survey, it would probably fetch this price if sold, so its real asset value has increased by 75% from $6.3 million to $11 million in a year, adding $4.7 million to the net worth of the company. Lower operating costs of $3.1 million contribute an extra $0.5 million, so the company's financial position has improved by $7.2 million. At the end of that year the last instalment on the loan is paid off, so there will be no more repayments. If the company sold the ship it would end the year with a balance of $17 million, from which it has to pay interest on its current account. However, the owner has no debt and the ship has passed its survey. He has survived and by taking a gamble he and his bankers have avoided taking a loss. If all goes well the owner will soon be a rich man and the banker will have a grateful client.

As always in recessions, the crucial issue is survival. By the time the unpaid bills start to pile up in year 4 it is too late to do very much – the right time to raise questions about costs, efficiency and working capital is before the ship is purchased. The example discussed in the preceding paragraphs shows how a realistic ACF analysis can provide the framework for thinking ahead and planning financial strategy in the shipping market. If the shipowner had borrowed less, or borrowed more and provided for emergency working capital at the outset, the problem would never have arisen. Or would it? We started this chapter by likening competition in a depressed shipping market to a marathon race with only a few prizes. Someone has to lose. It is through ACF analysis that shipping companies and their bankers can weigh up their fitness to finish the race, and identify those actions that can enhance their chances of future survival.

The discounted cashflow analysis

So far we have concentrated on cashflow analysis which helps management to think through the implications of certain decisions in terms of the future cashflow of the business. But business is not just about surviving recessions. Staying in business also depends on making a commercial return on capital, and that calls for sound investment decisions. Often the decision facing management is a choice between investment projects where the future cashflows are well established, but different. For example, consider a shipowner who purchases a tanker for $45 million and is offered two different deals by oil companies, Big Petroleum and Superoil Trading:

- Big Petroleum offers to charter the ship for $18,000 per day for 7 years, trading 355 days a year. At the end of the charter the oil company guarantees to buy the ship for $35 million.

- Superoil Trading's proposal is a little more complex. To fit its trading patterns the company wants the owner to have the cargo tanks epoxy-coated. This will cost $3 million, bringing the total price up to $48 million. However, Superoil is willing to buy the ship at the end of the charter for $45 million. Also, they want to escalate the daily charter rate by $2,000 each year from $12,000 per day in year 1 to $24,000 per day in year 7.

The owner is particularly impressed by Superoil's contract. The charter revenue over the 7 years of $44.3 million is exactly the same as for the Big Petroleum deal. However, the buyback terms are far better. He loses only $3 million on the ship with Superoil, compared with $10 million in the Big Petroleum deal. It seems he will be $8 million better off with Superoil. Although this seems obvious, Superoil has a reputation for driving a hard bargain and the owner is worried. So he should be. He has ignored the time value of money.

If we take the time value of money into account, we find that there is less difference between the two offers than there appears at first sight, as we will demonstrate using DCF analysis. The principle behind this analysis is that because investors can earn interest on their money, cash paid on a future date is worth less than the same amount of cash paid today. For example, $1,000 invested today at 10% interest is worth $1100 in a year, but $1,000 paid in a year is worth $1,000. So $1,000 today is worth 10% more than $1,000 in a year's time. Putting it another way, the 'present value' of $1100 paid in a year is $1,000.

DCF analysis converts future payments into a 'present value' by discounting them. The method is as follows. The first step is to determine the 'discount rate', which represents the time value of money to the company. There are several ways of doing this. The simplest way, if the company has a cash surplus, is to use the interest rate which the company would receive if it invested the cash in a bank deposit. Or the discount rate might be set at a level which reflects the average return on capital obtained from investments in other parts of the business. Many businesses use 15% per year. Finally, if the company has to borrow to finance the project, the marginal cost of debt might be more appropriate.

Once the discount rate has been agreed, we can discount the future cashflows. In Table 6.16 we do this for the two contracts, and the two parts of the table have the same layout. In row 1 we show the purchase price of the ship, in row 2 the time-charter revenue, and in row 3 the total cashflow. In row 4 we use 12% per annum to calculate a 'discount factor' for each year. Row 5 shows the discounted cashflow, calculated by multiplying the cashflow in each year by the discount factor for that year. Finally this discounted cashflow is summed over all years to produce the net present value (NPV) of each project shown in row 6 in the year 0 column.

For the Big Petroleum contract the NPV is –$5,400. It seems he would be better off investing in stocks, though not by very much. However, the real surprise comes when we look at the Superoil Trading contract. The $8 million extra return from this project has completely disappeared. The NPV is $64,700, which on a $48 million project is insignificant. The reason why this project looked so good is that all the extra revenue

Table 6.16 Example of discounted cashflow (DCF) analysis for tanker charter options ($000)

Row		Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7
Big Petroleum									
1	Ship purchase/sale	(45,000)							35,000
2	Timecharter revenue		6,390	6,390	6,390	6,390	6,390	6,390	6,390
3	Cashflow	(45,000)	6,390	6,390	6,390	6,390	6,390	6,390	41,390
4	*Discount rate (at 12% pa)*	*1.00*	*0.89*	*0.80*	*0.71*	*0.64*	*0.57*	*0.51*	*0.45*
5	Discounted cash flow	(45,000)	5,705	5,094	4,548	4,061	3,626	3,237	18,723
6	Net Present Value (npv)	(5.4)							
	memo: Time charter rate $/day		*18,000*	*18,000*	*18,000*	*18,000*	*18,000*	*18,000*	*18,000*
Superoil Trading									
1	Ship purchase/sale	(48,000)							45,000
2	Timecharter revenue		4,260	4,970	5,680	6,390	7,100	7,810	8,520
3	Cashflow	(48,000)	4,260	4,970	5,680	6,390	7,100	7,810	53,520
4	*Discount rate (12% pa)*	*1.00*	*0.89*	*0.80*	*0.71*	*0.64*	*0.57*	*0.51*	*0.45*
5	Discounted cash flow	(48,000)	3,804	3,962	4,043	4,061	4,029	3,957	24,210
6	Net Present Value (npv)	64.7							
	memo: Time charter rate $/day		*12,000*	*14,000*	*16,000*	*18,000*	*20,000*	*22,000*	*24,000*

was received towards the end of the project and was heavily discounted. In financial terms Superoil's offer is not significantly better than the Big Petroleum deal.

The internal rate of return

An alternative approach to calculating the return on investment projects is the internal rate of return (IRR). Whereas the NPV method starts from a net cashflow in current terms and calculates the value today, IRR technique works out the discount rate which gives an NPV of zero. The IRR in the two examples works out at 12% for both projects. This is exactly what we would expect since the NPV is close to zero in both cases using a 12% discount rate.

The calculation of the IRR is an iterative process, and rather more time-consuming than the NPV. Fortunately, most computer spreadsheet programs now have IRR functions which provide estimates quickly and easily.

6.8 VALUING MERCHANT SHIPS

Estimating the market value of a ship

Valuing ships is one of the routine tasks undertaken by sale and purchase brokers. A merchant ship is a substantial physical asset and, as we have seen, values can change rapidly, so investors and bankers need to check how much the asset they are buying or

financing is really worth. Valuation procedures are well established in the industry and merchant ships are bought and sold as 'commodities', so obtaining valuations does not usually present a particular problem. The banker, owner or investor can call up a broker and receive a valuation certificate within a few hours. However, like any valuation process there are hidden complexities which the prudent banker/investor takes into account.

The valuation establishes how much the ship is worth at a point in time and it has five common uses. The first is to establish the current market value of a vessel being purchased or offered as collateral against a loan. When drawing up a loan agreement, bankers seek an independent 'collateral value' of the ship. Second, loan documentation often includes a clause requiring the borrower to maintain collateral at a prescribed level. If a merchant ship is held as part of the collateral package, it is necessary to update the market value of the vessel to establish whether the collateral conditions are being met. A third use is to establish the market value of the fleet owned by a company making a public offering or issuing a bond, and the values will appear in the related documentation, for example the prospectus. Fourth, companies publishing their accounts may include a current market value of the fleet. Finally, an investor buying a second-hand ship may obtain a valuation as a check against the price, especially if there is not much else on the market.

Shipbrokers are the main source of valuations. For a fee, most shipbroking companies will issue a certificate indicating the market value of a named vessel. The first step in preparing a valuation certificate will be to consult the shipbroking company's reference databases to establish the ship's physical characteristics and recent sales of similar ships, including vessels currently in the market. During this process the valuer will note the following features of the ship:

- *Ship type.* For example, whether the ship is a tanker, bulk carrier, container-ship, chemical tanker, etc.
- *Ship size.* The size will normally be measured in the most appropriate unit – deadweight, TEU, cubic meter, cubic feet. Bigger ships are generally worth more than smaller ships.
- *Age.* The usual 'rule of thumb' is that ships lose about 4–5% of their value each year as they age, which is usually calculated from the year of build, not the anniversary of delivery. This suggests that the economic life of most merchant ships is about 20–25 years, by which time the vessel has depreciated to scrap value. Figure 6.7 shows the relationship between age and value for a sample of Panamax bulk carriers.
- *Yard of build.* The relationship between value and yard/country of build is difficult to establish. For ships built in Japan and Korea the yard of build does not make a great deal of difference. However, there are some countries whose ships sometimes sell at a discount. Brazil, Romania and China are three which come to mind. However, there are no hard and fast rules and this is more a caution rather than a prescription.
- *Specification.* The valuer will be looking for features of the ship which might affect its value because it does not match up to its peer group. Speed, fuel economy, cubic capacity, engine make, cargo-handling gear and tank coatings are areas where

differences may be found. For example, an unusual engine can be a problem, as can poor cubic capacity in a products tanker. This is all relative. Most small bulk carriers have cargo-handling gear so an ungeared Handy bulker may be more difficult to sell. Conversely there is no guarantee that a Panamax bulk carrier with cargo-handling gear will achieve a premium because most Panamaxes are not geared.

Valuers do not usually carry out a physical inspection of the vessel. Even if they have the time and resources to do so, shipbrokers are not usually qualified to carry out technical inspections and their valuation assumes the ship is 'in good and seaworthy condition'. The responsibility for establishing the physical condition of the ship lies with the purchaser, owner or lender. The exception is that if a special survey is imminent, this may be taken into account if the valuer believes the market would do so.

Valuations are made on a 'willing buyer, willing seller' basis. Shipping is a small market and if no 'willing buyer' is available, prices may be heavily discounted. Although the 'last done' is taken into account, the valuation reflects the broker's judgement of what the ship would sell for if put on the market at that date. This is important. In a rising market, the broker's valuation will generally lead the historic statistics. Conversely, in a falling market the broker's valuation may be lower. If there have been no sales of similar vessels for several months the valuation is entirely judgemental and two brokers may arrive at very different valuations, depending on how they believe the market would price the ship.

Although ship valuation is generally straightforward, problems arise from time to time due to the technical complexities of valuing a ship. One common issue is what to do if the ship has a current time charter. It is unrealistic to ignore the charter, but valuing it goes outside the normal shipbroking expertise. One method is to carry out an NPV calculation (see Section 6.7), based on the charter revenue and projected operating costs, but this raises two difficult questions – how to value the ship at the end of the charter and the creditworthiness of the charterer. Most brokers prefer to value vessels charter-free. Lack of liquidity is another problem. As mentioned above, some ship types are rarely sold, so differences of opinions as to the current market value are difficult to resolve. To deal with this problem bankers often ask for several shipbrokers to value the vessel and average their valuations. Complex ships are particularly difficult to value. For example, a chemical parcel tanker of 30,000 dwt may cost more than twice as much to build as a conventional products tanker of the same size. Because the market for specialized vessels is often thin, with only two or three buyers, brokers find it very difficult to provide valuations. A final issue is whether the valuation should reflect the 'quality' of the ship. Brokers are not in a position to judge the condition and quality of the ship. From a market viewpoint, quality ships generally sell more easily but do not necessarily obtain a better price, especially in a weak market. It is a difficult area and valuers usually fall back on the 'average condition' clause in the valuation certificate.

Estimating the scrap value of a ship

Many banks and financial institutions valuing ships adopt a rule that after a certain age the ship is valued at its scrap value rather than its market value, also referred to as its demolition or recycling value. Sometimes the gap between market and scrap value may be very considerable. For example, a 20-year-old Panamax bulk carrier in August 2007 was worth $16 million, whilst its scrap value was only about $5 million. The rationale for valuing ships at scrap is that as the vessels become older the prices become more volatile. For example, a bank which lent an apparently prudent 50% against the $16 million Panamax bulk carrier could find that in less than 18 months the price has fallen to $5 million, which is insufficient to cover the outstanding loan.

Valuing at scrap involves two steps. Firstly the lightweight (lwt) tonnage of the ship must be established. This is the physical weight of the vessel (i.e. the amount of water it displaces). For example, a VLCC might have a lightweight of between 30,000 and 36,000 tons, depending on its method of construction. If the lightweight of the ship is not available it can be estimated by looking up the lightweight of similar ships, though this is not a precise process. Second the current scrap price for the ship must be established. Scrap prices are quoted in dollars per lightweight ton, and many brokers publish values and lists of ships sold for demolition. In practice, scrap prices are almost as volatile as second-hand ship prices. During the last 20 years the scrap price of tankers has swung between $100/lwt and $550/lwt. Finally, the scrap value is calculated by multiplying the lightweight of the ship by the scrap price. For example at a price of $430/lwt the scrap value of a Panamax bulk carrier of 12,300 lwt is $5.3 million.

Estimating the residual value of a ship

So much for the current value of a ship, but what will it be worth in future, for example at the end of a 10-year lease? Since we cannot answer this question with certainty, we need an approach which gives an acceptable assessment of the likely value. The basic methodology is to use the three determinants of a ship's price: the depreciation rate, the rate of inflation and the market cycle. Take as an example a new bulk carrier costing $28 million in 1996 (see Table 6.17). If we assume that vessel depreciates at 5% per annum on a straight-line basis during the first 10 years of its life, by the end of 10 years its book value will have fallen to $14 million. However, during this time we assume that shipbuilding prices

Table 6.17 Example of residual value calculation

	Value $ million
Age at which residual value calculated	10
Initial cost of the ship	28
Depreciation rate (% per annum)	5%
Book value after 10 years	14
Inflation rate (% per annum)	3%
Expected residual value	18.3
Cyclical trough margin, say	70%
Resale price at trough	5.5
Value at cyclical peak	70%
Resale price at peak	31.1

have increased by 3% per annum, so the replacement cost after 10 years would be $18.3 million. This is the most likely value. However, we need to take account of the market cycle, which we have seen can affect the resale price by plus or minus 70%, if we take the most extreme price movements in Figure 5.9. A sale at the top of the market could bring a price of $31 million, which is higher than the initial purchase price of the ship. If, however, the sale occurs at the bottom of a trough and we allow for a price 70% below the trend value, the minimum resale value would fall to US$5.5 million, which is 20% of the initial cost.

This approach has many pitfalls. Depreciation rates and inflation are difficult enough to predict, but the market cycle is the real challenge. The cyclical value range of $5.6 million to $32 million is so wide that a view has to be taken on what cycles might lie ahead. This is pure shipping risk and it is up to the investor to decide what level of risk he is prepared to accept. For example, a cyclical trough margin of 70% has happened, but only in very extreme circumstances such as the mid-1980s depression. The view might be taken that this is unlikely to happen in the period under consideration, so a smaller residual value range would be appropriate. Study of the market cycles discussed in Chapter 3 and the market fundamentals in Chapter 4 can help to narrow the range, but will never entirely remove it. That is the judgement that no amount of statistical analysis will remove. Someone has to take a risk. That, after all, is what the shipping market is all about.

6.9 SUMMARY

In this chapter we have reviewed the shipowner's financial performance. We started by observing that shipping companies have a great deal of influence on their future cashflow when they frame their strategy. The choices between new ships and old, flexible ships and specialized, and debt and equity finance all make a difference. Once these major decisions are made an owner can use his management skills to optimize cashflow on a day-to-day basis through efficient ship management and resourceful chartering, but major cost and revenue items are beyond his control. They have already been determined by the initial investment decision. Once these particular decisions have been made, the owner is very much at the mercy of the market and his bankers.

Cash is the difference between costs and revenue. Costs are subdivided into operating costs (which represent the fixed costs of running a ship), voyage costs (which are variable, depending upon the way in which the ship is employed) and capital costs. Crew costs account for almost half of operating costs and the shipowner can reduce these by purchasing a highly automated ship, which reduces the number of crew required, or operating under a flag that allows the use of a low-cost crew. Voyage costs are dominated by bunker prices which can be controlled or reduced by investing in modern tonnage with the latest fuel-efficient machinery or by reducing the design speed. Both operating and voyage costs are likely to be substantially higher for an old ship than a new ship, while economies of scale lead to lower unit costs for bigger ships.

On the revenue side the owner can play the spot market, in which he accepts full market risk, or time charter, which shifts that risk to the charterer. Earnings also depend on the 'productivity' of the ship, that is, the number of tons of cargo it can carry in a year. Again we find that the initial investment decision has a part to play in determining productivity by investment for rapid cargo handling, greater cargo flexibility to enable the ship to pick up backhauls, and high speed (we will discuss this in Chapter 12, which deals with specialized shipping). Drawing these factors together with the influences on cost, we can deduce that in terms of the trading cashflow there are many options. Age, size, technical flexibility and cargo management all play a part in generating more revenue and cutting costs.

When we turn to the capital account, the picture changes substantially. The large modern ship financed by debt carries an annual cashflow for interest and debt repayment far in excess of its operating costs, whereas the small old vessel financed on equity would have no cashflow obligations on the capital account. As a result, during a depression the owner of a small, old vessel can afford to withdraw from the market and leave his vessel in lay-up until conditions improve, whereas the owner of the large, modern, debt-financed vessel faces a fixed capital charge that must be paid even if the ship is laid up.

We also discussed how the industry reports costs and revenues, covering the income statement (profit and loss account), the balance sheet and the cashflow statement. In addition, we reviewed cashflow forecasting techniques, including voyage cashflow analysis which addresses voyage decisions; annual cashflow analysis for longer-term planning; and discounted cashflow analysis for comparing projects when the timing of payments is an issue. Finally, we looked at methods for valuing ships and estimating their residual value.

The topics in this chapter may be dry, but they go to the heart of the business. In the last resort it is for the shipowner to blend the operating, commercial and financial aspects of the business into the business strategy that suits him best. The trade-off between cost minimization, revenue maximization and the approach to ship finance gives each shipping venture its own particular characteristics.

7 Financing Ships and Shipping Companies

For the ordinary investor, the tramp company remains a form of investment to be avoided. It is a very special business and at its best financed and managed by those who are versed in its difficulties.

(A.W. Kirkaldy, *British Shipping*, 1914)

7.1 SHIP FINANCE AND SHIPPING ECONOMICS

Ships tie up a lot of capital. Container-ships and tankers can cost up to $150 million each, about the same as a jumbo jet, while LNG tankers, the most expensive ships, cost $225 million each. In 2007 investment in new ships reached a new record of $187.5 billion,[1] and second-hand sales reached $53.5 billion (see Figure 7.1). As a result, capital can account for up to 80% of the costs of running a bulk shipping company with a fleet of modern ships, and decisions about financial strategy are among the most important that shipping companies make. But shipping has distinctive characteristics which make financing different from other asset-based industries such as real estate and aircraft. Broadly speaking, bankers like predictable earnings, well-defined corporate structures, high levels of disclosure and well-defined ownership, whilst investors look for consistent growth and high yields. However, many shipping companies do not meet these criteria. Because the ships are internationally mobile and their owners can choose their legal jurisdiction, shipping companies are able to adopt less formal corporate structures than are found in most other businesses employing such large amounts of capital. In addition the revenue flows are highly volatile, as are asset values. This history of volatility was described in Chapter 3. Thus, a ship is not just a transportation vehicle, it is a speculation. This makes life interesting for shipowners but difficult for potential lenders and investors who are used to dealing with more stable businesses. As a result, ship finance is generally regarded as a specialist business and, for example, the rating agency Moody's classifies it as 'exotic' finance.

This brings us face to face with a paradox. Given all these difficulties, raising finance should be difficult, but historically the industry has generally suffered from too much finance. In 1844 George Young complained to a British House of Commons Select

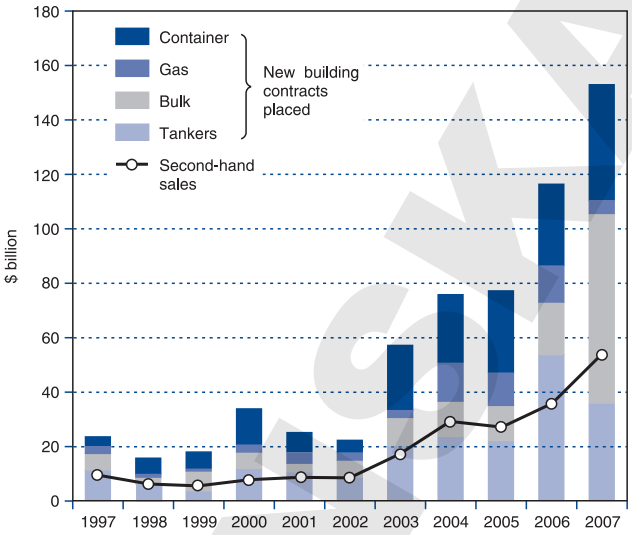

Figure 7.1
Investment in merchant ships, 1997–2007
Source: CRSL

Committee that during the period 1836–41 mortgages for the purchase of ships had led to an increase in the supply of shipping 'inducing persons without capital or with inadequate capital to press into shipowning, to the injury of shipowners in general'.[2] One hundred and sixty years later the same complaint could still be heard and even the bankers were complaining about the intense competition, with 150 banks targeting the ship finance market. There have been times when the industry has indulged in phases of wild speculation, often using borrowed money, but it would be wrong to say that ship finance drives the market – that responsibility lies firmly with the shipping investors. It does, however, help to grease the tracks of the shipping roller-coaster.

Our aim in this chapter is to explain the role of ship finance in the shipping market from the shipowner's and the ship financier's point of view. We will start by looking at how ships have been financed in the past, and then we will explain how ship finance fits into the world financial system alongside other forms of investment. Then, we will examine the options open to shipping companies wishing to raise finance. Finally we will draw some conclusions about the interplay between the activities of bankers on the shipping markets discussed in Chapter 4 and the way in which bankers should approach this form of lending.

7.2 HOW SHIPS HAVE BEEN FINANCED IN THE PAST

Ship finance in the pre-steam era

Although the history of ship finance can be traced back to the joint stock companies of the sixteenth century, the logical starting point for a discussion of modern ship finance is the 1850s when steamships started to appear in significant numbers. A widely used technique was the 'sixty-fourth' company. In the United Kingdom a ship is registered as 64 shares, so an investor could buy part of a ship as a standalone investment. An investor who bought 32 sixty-fourths owned half the ship, while to hold 64 equal shares was to be a sole owner. Legally shareholders were tenants in common, each having a separate interest which could be sold or mortgaged without reference to other owners of the vessel.[3]

There were three ownership structures. Shares could be held by individuals on their own account, by individuals organized into partnerships, or by investors in a joint stock enterprise. However, most ships were owned by one person. According to records for ships registered in the City of London in 1848, out of 554 vessels, 89% were owned by individuals and 8% by trading partnerships. The remaining 3% were owned by joint stock companies. Only 18% of the vessels were mortgaged, mainly to cover the cost of repairs.[4] Where partnerships were used, they were generally limited to only two or three partners, possibly reflecting the difficulty of managing larger groups.

The evolution of the shipping corporation

As ships grew in size during the second half of the century, the joint stock company rapidly became the preferred financial vehicle for raising the large sums of money required. A major factor in this development was the Companies Act 1862, which protected investors from liability claims by company creditors. This opened the way for small investors whose other assets were now protected, though share ownership in such a risky and individualistic business tended to be restricted to family and friends.

A good example is the Tyne Steam Shipping Company which was formed as a joint stock company with limited liability on 1 July 1864. The company was to carry the growing bulk export trade of bulk coal from Newcastle on Tyne. It owned the first bulk carrier, the *John Bowes* (see Chapter 10). The nominal capital of the company was set at £300,000 in 12,000 shares of £25 each. Initially 10,100 shares were issued on which £18 was paid up, raising £181,800. This was used to purchase 10 vessels for £150,000, leaving £30,000 working capital. Approximately one-quarter of the shares were taken by previous owners of the new company's steamers and the rest were sold, as far as possible, to the public locally because 'a shareholder at London, Liverpool or Manchester brings little business to the company'.[5] This company is typical of many others in the international shipping industry at this time. A few such as Cunard (now part of Carnival Cruise Lines) and Hapag-Lloyd are still in operation.

Although these companies were capitalized with equity raised from the public, share ownership was often closely controlled and many companies relied on self-financing or borrowing rather than share capital to finance expansion. For example, share ownership in the Charente Shipping Company Ltd, which was set up in 1884 with share capital of £512,000 and a fleet of 22 vessels, was 'limited to a small and closely-knit family group'.[6] In each subsequent year, with only two exceptions, the company ordered at least two new ships, and by 1914 the fleet had increased from 22 ships to 57. No further capital was raised and investment was paid for from cashflow, and despite the many cycles adequate investment funds were always available from internal funds (see Chapter 3 for a review of these cycles). Majority ownership remained with three families, the Harrisons, the Hughes and the Williamsons.

Other companies were less conservative. In the nineteenth century borrowing was common. According to Sturmey, during the long recession of 1904–11 many heavily indebted lines failed and 'the financially conservative men who controlled the major shipping lines observed the failure and took the lesson to heart'. For the next 50 years

British shipowners stuck firmly to the policy of financing investment from accumulated depreciation reserves. 'Borrowing became anathema'.[7] In 1969 the Rochdale Committee of Inquiry into Shipping found that only £160 million out of over £1,000 million capital employed by British owners was represented by loans, a 16% gearing rate.[8] The same financial conservatism was shared by many of the older established Greek names.

Although this policy provided protection against recessions, earnings were never strong enough to fund expansion or attract external equity. Between 1950 and 1970 the return on British shipping shares averaged only 6% per annum compared with 15% per annum for all companies. As a result, although most of the larger shipping companies were publicly listed, no cash was raised by issuing equity capital to the public[9] and the British fleet played little part in the post-war bulk shipping boom.

Charter-backed finance in the 1950s and 1960s

In the 1950s the balance of financial conservatism, with its protection from market cycles and high leverage which boosts the return on equity, took a new turn. The rapidly growing industrial economies in Europe and Japan needed cheap raw materials. Industrial shippers, particularly oil companies and steel-makers, started to look abroad for new supply sources. As a result an important new player entered the ship financing game, the industrial shipper. As more raw materials were sourced abroad, shippers needed the cheapest possible transport, using very big ships operating between specialized terminals. Oil companies and steel mills offered shipowners time charters as an incentive to order these large ships, and the owners would raise a loan to buy the ship against the security of the time charter.

This was known as charter-backed finance and it typically involved ordering a new ship, obtaining a long-time charter for the ship from a creditworthy organization such as an oil company, and using the time charter and a mortgage on the hull as security to obtain a bank loan covering a high proportion of the purchase price of the ship. This allowed shipowners to expand their fleets with little equity and it played a major part in building up the independent bulk shipping fleet. It originated in the 1920s when the Norwegians started to build up a tanker fleet. In 1927, as part of their fleet replacement programme, Anglo Saxon Petroleum Ltd offered 37 ten-year-old tankers at between £60,000 and £70,000 each with 10-year time charters. The financing terms were 20% cash down and the balance over 5 years at 5% interest.[10] Twenty-six were bought by Norwegians, mostly newcomers to the business, who were able to borrow against the time charters. The process took another step forward after the Second World War when Norwegian owners could only obtain licences to order ships abroad if the vessels were 100% financed abroad. Soon adept Norwegian brokers perfected borrowing techniques based on pre-construction time charters. This initiated the great expansion of the Norwegian fleet which, during the 1950s, almost trebled in size, drawing heavily on finance raised from American banks.[11]

Greek shipowners were also quick to exploit this opportunity. A high proportion of tanker construction was financed with American loan capital and 'Greek owners appear to have operated largely on the basis of securing a time charter for 7 or even 15 years

from an oil company, a 95 per cent mortgage from American financiers on the security of the time charter, then building to fit the charter and finally sitting back to enjoy the profits'.[12] US shipowners were equally active, though the charter-back system was refined to its most sophisticated form in the *shikumisen* arrangements developed between Japanese charterers and Hong Kong shipping entrepreneurs.

The one-ship company

The aim of the time-charter system was to reduce transport costs and this led to a different form of legal and business organization. The most important innovation was the single-ship company. Using the flags of convenience developed for this purpose (see Chapter 16, Section 16.5), these one-ship companies became the building-blocks for complex shipowning empires. Each ship was registered as a separate company, with ownership vested in the group and management handled through an agency. This suited bankers because for financing purposes the ship could be treated as a separate company, secured by a mortgage on its hull and a time charter. Although organization structures were loose, with few published financial accounts and little financial transparency, very high leverage rates could be achieved because the bank had the security of both the hull and the time charter.

This phase of charter-backed finance dominated ship finance for about 20 years, but during the 1970s and 1980s gradually shrank in importance. There seem to have been three reasons. First, the charters had been made available during a period of structural change when charterers needed to encourage owners to order the large vessels they needed. By the early 1970s economies of scale had been pushed to their limit and it was no longer necessary for shippers to make this onerous commitment in order to secure the ships they needed. Second, after two decades of headlong growth in the bulk trades, there was a change of trend and the crude oil and iron ore trades stopped growing (see Chapter 4). Third, some shipowners who had expected to 'sit back and enjoy the profits' found themselves locked into contracts whose small profit margins were eaten away by inflation. Worse still was the failure of several charterers to honour their commitments, notably Sanko in the mid-1980s. As the market and the needs of charterers changed in the following decades, time charters became much more difficult to obtain and the financing structures used by the shipping industry changed.

Asset-backed finance in the 1970s

In the early 1970s, after two decades of highly leveraged charter-backed finance, shipping bankers started to revise their lending policies. Instead of securing the loan against a long-term contract, for a brief but disastrous spell in the early 1970s many bankers were prepared to rely on the first mortgage on the hull, with little additional security. A prominent banker summarized the reasons for this change as follows:

> A long-term charter-party with no or few escalation clauses built into it can be disastrous to the shipowner … Inflation, engine breakdowns and other accidents as well as changes in currencies can very quickly alter or wipe out the best

> planned cash flows … On the other hand, shipowners who run vessels on the spot market have recently been better off … Many bankers have objected to a gearing of 1 to 5, or lending of up to 80 per cent of the cost price or market value of the vessel… I believe that from a commercial bank's point of view this form of lending has caused no major disasters, and the main reason is perhaps that good, well maintained modern ships have retained their value or even appreciated.[13]

In short, bankers started to see shipping as a form of 'floating real estate'.

This was a fundamental change of policy because it removed the link between supply and demand. During the period of charter-backed finance, newbuilding was restricted by the availability of charters. If the hull was regarded as acceptable collateral, there was no limit to the number of ships which could be ordered from the slimmest equity base. When, in 1973, petrodollars flooded into the world capital markets, shipping seemed an obvious target. The tanker industry was swept away on a tidal wave of credit which allowed 105 million deadweight of tankers, representing 55% of the fleet, to be ordered in a single year. In the stampede for business, financing standards became so casual that loan syndications could be arranged by telephone with little documentation and few questions asked.[14] It took the tanker market 15 years to recover.

Unfortunately, that was not the end of the story. In the 1980s the shipping industry experienced its worst recession for fifty years just at a time when the capital markets were again awash with petrodollars, generated by oil at $40 per barrel, and desperate shipbuilders started to use credit as a thinly disguised way of building for stock. Mortgage-backed debt underpinned orders for 40 million deadweight of bulk carriers in 1983–4 when freight rates were at rock bottom. The rationale was counter-cyclical ordering, but the volume of orders was so great that the cycle did not turn. With so many deliveries, the recession dragged on through 1986 and the owners could not service their debt, causing many defaults and reducing second-hand ship prices to distress levels as owners were forced to sell ships to raise cash.

Financing asset play in the 1980s

As the shipping market cycle bottomed out in the mid-1980s, the distress sales created opportunities for 'asset play' (i.e. buying ships cheaply and selling them at higher prices). The problem was that conventional sources of equity and debt had no interest in additional shipping exposure, so new sources of finance were required. One of the first devices to emerge was the self-liquidating ship fund. Bulk Transport, the first of these schemes, was set up in February 1984 and proved very successful, with assets appreciating to four times their purchase price during the following four years. As the success of the early schemes filtered into the market place, imitators appeared, using the same basic structure and offering equity to non-shipping investors. Ironically, as the market cycle matured and asset values increased it became progressively easier to place the equity. Eventually, a total of about $500–600 million was raised and invested in ships purchased at higher prices towards the top of the cycle. As a result few investors made a commercial return and some lost their money.

A parallel development was the re-emergence of the Norwegian K/S limited partnership as a vehicle for financing speculative investment in second-hand ships. K/S partnership structures were similar to ship funds, or indeed the trading partnerships of the 1840s, but had the added advantage that profits earned by investors were tax-free, provided they were reinvested within a specified period. At a time of high personal tax rates in Norway this was very attractive to private investors, many of whom invested in K/S companies set up to buy ships. Perhaps the most significant development was not so much the K/S structure, which had been available for many years, but the growth of the Norwegian banks during this period. At the beginning of the 1980s the Norwegian banks carried a shipping portfolio, variously estimated at around $1 billion. During the 1980s it grew to a peak of around $6–7 billion in 1989. The availability of this finance and the willingness of Norwegian banks to make advances to the K/S companies, despite their unconventional structure, must surely be one of the key factors in determining the phenomenal success of this market (see page 306 below for more details of the K/S structure).

Developments of corporate finance in the 1990s

After the lengthy financial crisis of the 1980s, when financing had mainly been limited to small mortgage loans, in the 1990s the ship finance industry had to rediscover many of the more conventional ship finance techniques. Syndication of shipping debt is a good example of how things had changed. During the early 1970s large shipping loans were often syndicated, but this practice had lapsed during the recession, due mainly to the difficulty of placing assets trading in such a disturbed market. The widely publicized difficulties of mid-1970s syndications did not help. During the intervening period the value of shipping transactions was so low or so dubious that syndication virtually disappeared and had to be rediscovered by the new generation of shipping bankers who had taken over in the late 1980s. There was also a wave of KG companies set up in Germany to finance container-ships. These structures, based on German private partnerships, began to be used extensively in the early 1990s as a way of providing cost-effective and secure ‘off balance sheet’ finance for container-ship operators at a time when the fleet was expanding rapidly. Many of the costs of raising the finance are borne by private shareholders.[15]

After the disappointing performance of the ship funds, a few of which were public offerings, in the early 1990s there was little activity as the market weighed up the liability implications of the US Oil Pollution Act 1990 and the tightening regulatory environment. These developments probably encouraged a more corporate approach as a way of protecting the interests of high net worth shipping families operating tankers. In addition corporate structures began to look more acceptable to shipping companies operating at the quality/industrial end of the shipping market. This case was strongly argued by shipping experts such as Peter Stokes. From 1993 onwards there were a series of important IPOs including Teekay, Frontline and General Maritime, all of which grew into substantial public shipping companies. High-yield bonds also appeared in 1993, marking a major development in the ship finance business. Bankers who had learned

their trade during the 1980s could hardly imagine that a bulk shipping company would be able to apply for a credit rating and issue bonds, but by the late 1990s they were doing so with regularity and even a few more exotic structures such as synthetic securitizations put in an appearance. So by the early years of the twenty-first century ship finance had become more sophisticated, though commercial bank debt continued to predominate.

Shipbuilding credit

Finally, a source of ship finance available throughout the period was shipbuilding credit. During each of the recessions reviewed in Chapter 3 shipyards would compete by offering shipowners favourable credit. This practice was already common in the nineteenth century when some UK shipbuilders would, out of their own funds, allow a reliable client 25–30% credit for 3–5 years to tide them over a period of low freight rates. By the early twentieth century governments had decided that shipbuilding was an important strategic industry and became involved in the provision of subsidized credit. In the 1920s the German and French governments offered favourable credit terms to help their yards win business against the then dominant British shipbuilding industry. During the recession of the 1930s, the Danish, French and German governments all offered government credit schemes to owners. The practice of subsidizing credit reappeared in the first major post-Second World War recession of 1958–63 and was regulated by the OECD Understanding on Export Credit in 1969. The provision of credit is generally coordinated by a government-controlled credit agency (the Export Credit Guarantee Department in the UK, Hermes in Germany, COFACE in France, KEXIM in Korea, EXIM Bank in Japan, etc.). These agencies are responsible for coordinating the credit on behalf of the government and providing financial guarantees and interest rate support when appropriate.

7.3 THE WORLD FINANCIAL SYSTEM AND TYPES OF FINANCE

Where does the money to finance ships come from?

This brief historical review has touched on many ways of financing shipping, showing how the financial techniques employed have changed from one decade to another. We now turn to a more rigorous discussion of the financial structures currently in use. Raising ship finance is essentially a matter of persuasion, so a good starting point is to return to two basic questions: 'where does the money to finance ships come from', and what do businessmen have to do to get it?

To answer these questions we need to look at the world financial system as a whole. The flow chart in Figure 7.2 shows how the different parts of the system fit together. Column 3 on the right shows the *source* investment funds; column 2 shows the markets where these funds are traded, while column 1 shows the arrangers who act as intermediaries and risk-takers in providing businesses needing capital, including the shipping companies, with access to the pool of funds in columns 2 and 3.

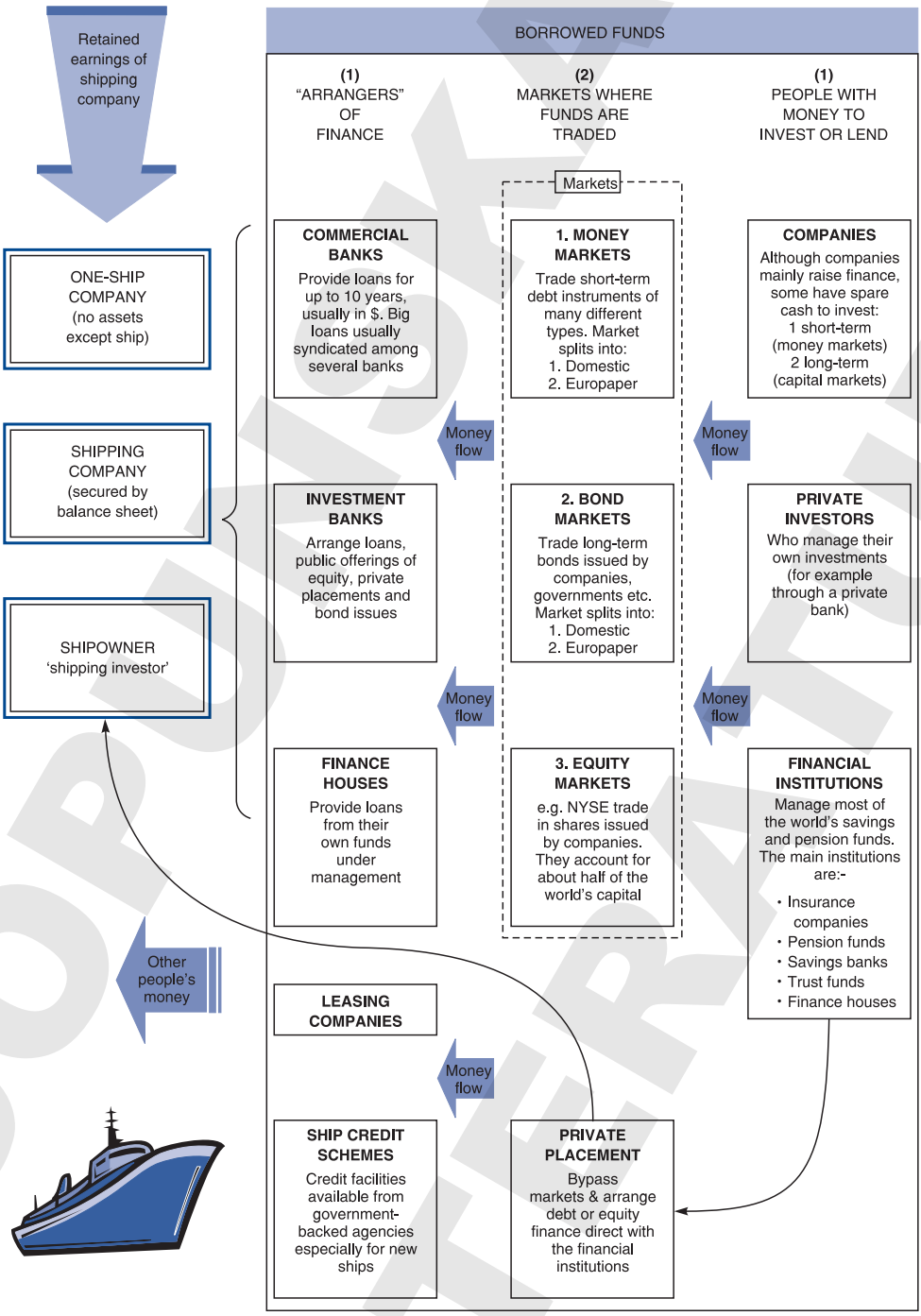

FIGURE 7.2
Where the money comes from to finance ships
Source: Martin Stopford 2007

Investment funds come from savings

First the source: the money comes from corporate or personal savings which need to be invested. Some corporations and individuals handle the investment themselves. For example, an individual might buy a house as an investment and let it out. But nowadays about 80% of savings end up in the hands of professional investment managers such as insurance companies, pension funds, savings banks, finance houses, trust funds, mutual funds and commercial banks which take money on deposit, so-called 'institutional investors'.[16]

Investors and lenders

These professional fund managers in column 3 of Figure 7.2 have two options. They can invest the money or they can lend it. The investor commits funds to a business venture in return for a share of the profits. Usually the only way to get this money back is to sell the 'equity' stake in the business to someone else (if the equity in the company is traded on an exchange it is called a public company and its shares can be bought or sold on the stock market where they were issued). In contrast, the lender advances money for a predetermined period in return for regular interest payments and a predetermined schedule for the repayment of the principal so that by the end of the agreed period the 'debt' has been repaid in full. This is an important distinction for anyone trying to raise finance because investors and lenders see the world from a very different perspective.

Investors take risk for profit, so they are interested in the upside. How profitable could the investment be? Is this a business which could make a 30% return? Is there a convincing reason why profits will be high? Lenders just get paid interest, so they want to be sure they will be repaid. This makes them more interested in the downside. Is the business sound? Could it survive in an adverse market? Are the borrowers taking risks that might damage their ability to repay? Since lenders do not share the profits they are less interested in this aspect of the business. Shipowners are often puzzled about why bankers are more interested in recessions than booms. This is the reason.

Private placement of debt or equity

One method open to fund managers is to place the funds directly with companies which need finance. This is known as private placement and it is shown at the bottom of column 2 in Figure 7.2. The lender, which might be a pension fund or an insurance company, negotiates a financial agreement to suit both borrower and lender. The structure of this agreement could be either debt or equity. Whilst private placement is quite widely used, especially for long-term loans, as a general technique for managing investment, it presents practical difficulties. Fund managers face the administrative task of analysing detailed investment proposals. More importantly, the loan or investment is not liquid. Once the transaction is placed, there is little the investor can do to adjust his portfolio of such loans and investments. In practice this market is only accessible to shipping companies of investment-grade quality.

The financial markets buy and sell packaged investment funds

An alternative is to use the financial markets. Ingeniously, the world financial system has succeeded in developing three markets which trade investments which have been processed as standard packages known as 'securities', a term used to refer to all standard investment instruments. The two main types of securities are 'stocks' which are packaged equities, and 'bonds' which are packaged loans. Packaging investment into securities is rather like containerizing cargo. It takes a unique investment package and processes it into a unit which conforms to rigid standards, making it easy to buy and sell without specialized knowledge. The capital markets where securities are traded are strictly regulated to ensure that the rules are followed. Each of the three markets shown in column 2 of Figure 7.2 trades in a different type of security.

- *Money markets* trade in short-term loans (less than a year). The 'market' consists of a loose network of banks and dealers linked by telephone, e-mail and computers (rather like the voyage charter market) who deal in any short-term debt securities such as bankers' acceptances, commercial paper, negotiable certificates of deposit, and Treasury bills with a maturity of 1 year or less and often 30 days or less.[17] It is where the banks trade with each other, but companies use it too. For example, a shipowner with spare cash who wants to keep his funds liquid can purchase 'commercial' paper which gives him a slightly better return than he would get on deposit. The markets trade funds held in local currency by local investors (the domestic market) and funds held outside the issuing country (in Europe the eurocurrency market). These markets have a different interest rates structure,[18] the eurodollar interest rate being the London Interbank Offered Rate (LIBOR).
- *Bond markets* trade in interest bearing securities with a redemption date of more than a year, often 10 or 15 years. Companies issue bonds or debentures (bonds not secured by collateral), via a dealer, and to make it tradeable a bond must have a credit rating (see Box 7.1). For example, bonds rated less than BBB– by Standard & Poor's (S&P) or Baa3 by Moody's are known as 'high-yield' bonds. Interest is obtained by redeeming coupons attached to the bonds and the rate of interest reflects the credit rating. For example, a bond rated AAA will pay lower interest than a bond rated BB. The bond is subject to a deed of trust between issuer and bondholder, known as the 'indenture'. This is designed to protect the bondholder with property pledges, protective covenants and working capital requirements, and it also sets out redemption rights. Dealings in off-shore funds are referred to as the 'eurobond' market.
- *Equity markets* trade in equities (also known as securities or stocks). This allows creditworthy companies to raise capital by means of a 'public offering' on the stock market. To raise capital in this way a company must follow regulations (e.g. laid down by the SEC in the United States) and convince the shareholder that the investment will be a good one.[19] Issues are made through an investment bank and the cost of underwriting, legal and auditing fees is usually about 7–9% of the sum raised.

BOX 7.1 BOND RATINGS AND APPROXIMATE INTERPRETATION

Moody's	S&P	Approximate interpretation	
Aaa	AAA	Capacity to service debt extremely strong in all forseeable circumstances	Investment Grade
Aa1	AA+		
Aa2	AA		
Aa3	AA–		
A1	A+	*Getting more risky*	
A2	A		
A3	A–		
Baa1	BBB+	Debt service will be met, barring some serious and unpredictable catastrophe	
Baa2	BBB		
Baa3	BBB–	*Medium grade*	
Ba1	BB+	Judged to have speculative elements	Speculative Grade
Ba2	BB		
Ba3	BB–	Acceptable for now but easily foreseeable adverse conditions could impair capacity to service debt in future	
B1	B+		
B2	B		
B3	B–		
Caa	CCC		
Ca	CC	Highly vulnerable to non-payment	
C	C		
	D	Payment is in default	

Source: Compiled from rating agency material

Checked against

Standard & Poor's investment grade ratings in order from the highest to the lowest are: AAA, AA+, AA, AA–, A+, A, A–, BBB+, BBB and BBB–. Standard & Poor's non–investment grade ratings in order from the highest to the lowest are: BB+, BB, BB–, B+, B, B–, CCC+, CCC, CCC– CC, C, D and SD.

Moody's Credit Ratings - Moody's investment grade ratings in order from the highest to the lowest are: Aaa, Aa1, Aa2, Aa3, A1, A2, A3, Baa1, Baa2 and Baa3. Moody's non-investment grade ratings in order from the highest to the lowest are Ba1, Ba2, Ba3, B1, B2, B3, Caa1, Caa2, Caa3, Ca and C.

http://www.quantumonline.com/RatingsNotes.cfm

Over half the world's capital is held as investments traded in the securities markets, and in 2005 the world equities market totalled $55 trillion and corporate bonds about $35 trillion. That compares with $38 trillion of bank deposits, so the capital markets are the first choice of global investors.[20] Shipping only accounts for a small proportion of these funds. To put the annual financial requirements of the shipping industry into context, if the total world capital were $100, the transport industry, which includes airlines, shipping, ports, etc., would need to raise 18 cents. Obtaining even such a small sum is not easy. The job of the markets is to channel funds to where they can be used

most productively. There are many other industries fishing in the same pool, so borrowers must offer a competitive rate of return. Raising money in the equity markets generally involves issuing a prospectus and selling the 'story' to investors. In the capital markets the main preoccupation of institutions buying the bonds is the risk that the company will be unable to repay the money it has borrowed, so to raise capital a shipping company must achieve recognized standards of credit-worthiness. It does this by obtaining a 'credit rating' from one of the credit rating agencies. This opens the door to the bond markets and determines the cost of finance to the borrower.

The role of the credit rating agencies

For a bond to be placed by the issuer, the financial institutions which buy it must have a reliable indication of whether the yield (i.e. the coupon divided by the price) reflects the risk and whether the principal is likely to be repaid on time. To address this need a shipping company issuing bonds must obtain a credit rating for the transaction from one or more of the credit rating agencies. In return for a fee the credit rating agency evaluates the issuing company's credit history and its ability to repay, and issues a credit rating which provides a current opinion on the creditworthiness of the obligor with respect to the specific financial obligation, including an estimate of the risk of default. The credit rating generally takes the form of a letter to the bank handling the issue.

The four main credit rating agencies are Standard & Poor's, Moody's, Fitch, and Duff & Phelps, and there is generally a requirement to obtain a rating by at least two of these. The slightly different rating systems used by the two largest agencies are shown in Box 7.1 with a rough definition of what they mean. AAA ('triple A') is the best, and Baa3/BBB– and above are 'investment grade'. Investment-grade rating characteristics are such factors as reliability, strong debt cover, a strong market position for the company's products and the scale of the business. To get this rating the company must be strong enough to survive almost any imaginable crisis. In contrast, bonds with lower ratings have 'significant speculative characteristics'[21] and are referred to as 'high yield' because they require higher interest rates (they are also known as 'junk bonds'). In this way investments are 'packaged' before they are offered to the market. Because of the volatility of revenues and the competitiveness of the market, shipping companies are rarely awarded investment-grade ratings, though a few large and diversified shipping companies have achieved that distinction.

Definition of 'shipowner' and 'shipping company'

Before proceeding with the discussion of financing techniques, we should clarify the distinction between a 'shipowner' and a 'shipping company'. These terms are used interchangeably in the business, but when we discuss finance it makes life much easier if we define them precisely.

A *shipowner* is an individual who owns a controlling interest in one or more ships. Part A of Figure 7.3 shows a typical structure. The ships are usually registered as one-ship companies in which the owner has the controlling interest, whilst the cash and other

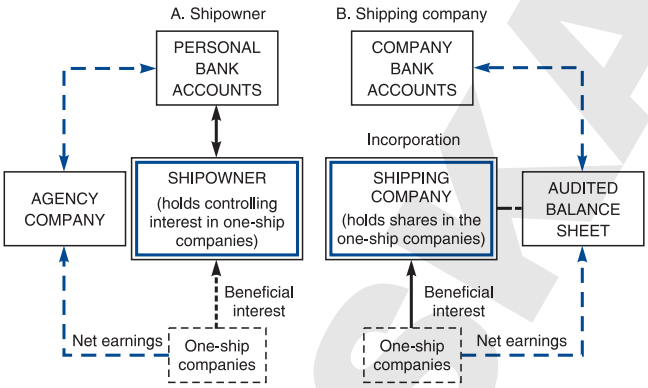

Figure 7.3
Definition of shipowner and shipping company
Source: Martin Stopford, 2007

assets associated with the shipping business are held separately, usually in bank accounts in tax-efficient locations. The two are quite separate, and an independent agency or management company is generally set up to deal with the day-to-day operations. Since this structure is not transparent to third parties, in order for the ships to trade, the owner and the agency must establish their creditworthiness. Hence the importance of the good name of a shipowner trading in this way. But the fact remains that the assets are dispersed and potential financiers have little control.

In contrast a *shipping company* of the type shown in part B of Figure 7.3 is a legal organization which owns ships. It may be a legal partnership, company or corporation in a jurisdiction with enforceable laws of corporate governance, with an audited balance sheet showing its controlling interest in the ships it operates and the status of its other assets, liabilities and bank accounts. Its executive officers are responsible for running the business and taking investment decisions. This distinction between the proprietor and the company exists in all businesses, but in shipping it is crucial and gives ship finance its unique flavour. As we saw in Chapter 2, *shipping businesses* (i.e. shipowners and shipping companies) vary enormously in size. In 2004, 32 had more than 100 ships, while 256 had 20–49 ships, 460 had 10–19 ships, and over 4,000 had fewer than five ships.

The main methods of raising ship finance are summarized in Figure 7.4 and include private funds, bank loans, the capital markets, and special purpose companies SPCs. *Private funds* include cash generated by the business, which is important during booms, and loans or equity from friends, relatives or venture capitalists. It is often the only source available to start-up businesses. *Bank loans* are a major source of finance for shipowners and shipping companies, with four types listed in Figure 7.4: mortgage loans secured against the ship; corporate loans secured against the company balance sheet; shipyard credit; and mezzanine finance. The market for commercial bank loans is very competitive and it is also flexible because the loans can easily be refinanced if circumstances change. Private placements with financial institutions are included under this heading. *Capital markets* can provide shipping companies with equity through an initial public offering (IPO) of shares or debt by issuing bonds. They work best for larger shipping companies, especially those with over $1 billion net worth. A final option is to use a special purpose vehicle (SPV) to own the ships and raise the finance. This technique is often used when shipping companies want the use of ships without having them on the balance sheet or when tax allowances are available. For example, UK tax leases and German KG partnerships fall into this category.

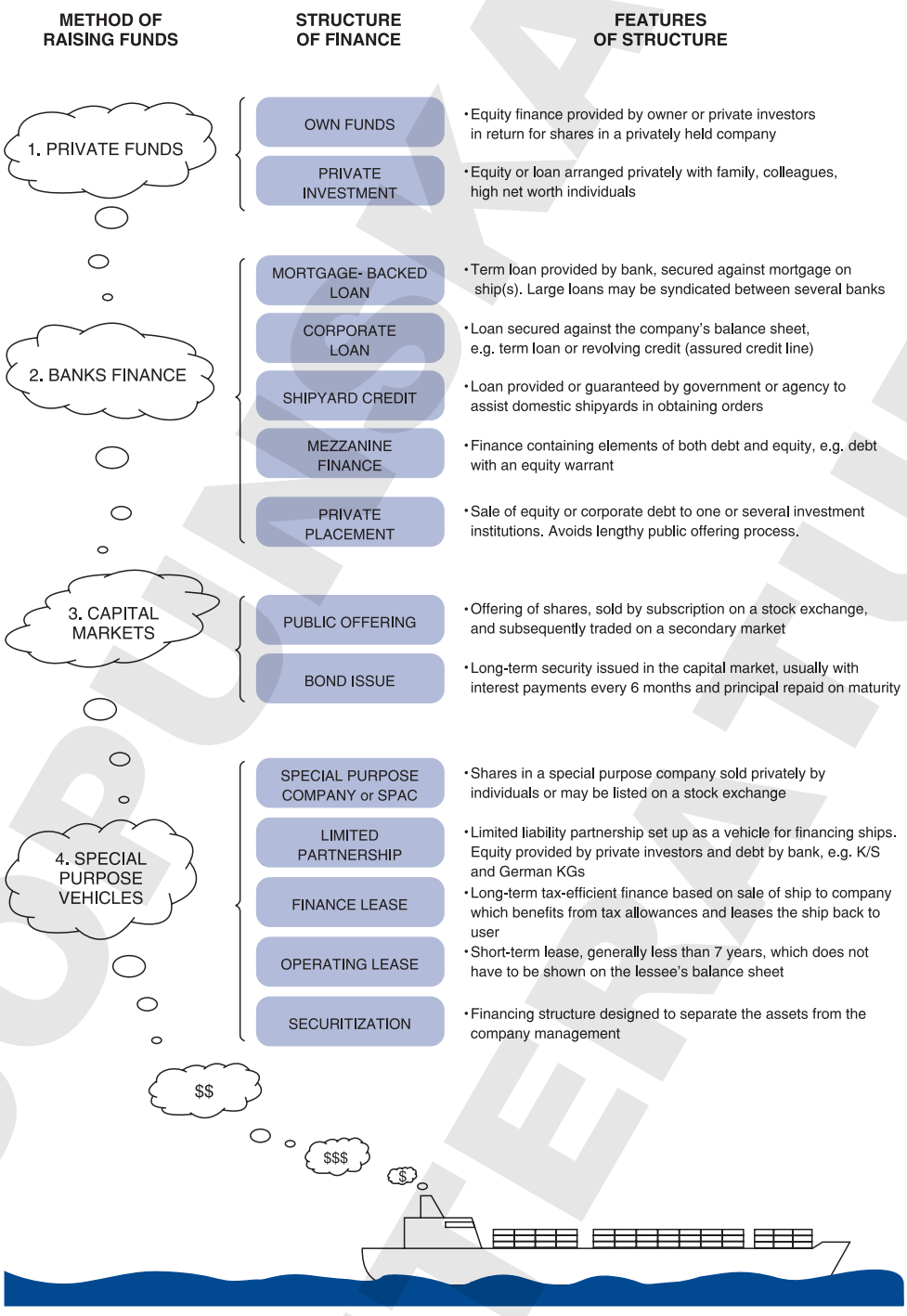

Figure 7.4
Fourteen options for financing merchant ships
Source: Martin Stopford, 2007

BOX 7.2 INSTITUTIONS PROVIDING OR ARRANGING SHIP FINANCE

Commercial banks: These are the most important source of debt finance for the shipping industry. Many have dedicated ship finance departments. They offer term loans of 2–8 years which they mainly finance by borrowing from the capital and money markets. This short-term funding limits the tenor of loans commercial banks are willing to take onto their balance sheet and most are uncomfortable with more than 5–6 years. A balloon payment is often used to lower the debt servicing burden on modern ships, but borrowers who want longer-term finance must look elsewhere such as the capital markets or leasing companies. Loans are generally quoted at a margin over LIBOR. Typical spreads range from 60 basis points to 200 basis points (a basis point is one hundredth of a percentage point). Sums of more than $100 million are generally syndicated between several banks. In addition to loans, banks now offer many other services, including risk management products, mergers and acquisitions, financial advisory services etc.

Investment banks: These arrange and underwrite finance but do not generally provide capital themselves. They will arrange loan syndications, public offerings of equity, bond issues in the capital market and the private placement of debt or equity with financial institutions or private investors. Some of the large Investment banks have specialist shipping expertise and a few smaller ones, such as Jefferies, specialize in this area.

Ship credit banks: In some countries credit is provided by specialist shipping banks which either obtain their funds in the market or issue bonds which have tax concessions for local investors.

Finance houses and brokers: Some financial institutions (GE Capital, Fidelity Capital, etc.) which have substantial funds under management have specialist shipping departments which lend direct to the industry. In addition there are a number of organizers and brokers of ship finance who specialize in putting together inventive financing packages.

Leasing companies: These specialize in leasing assets and some will arrange long-term leasing of ships. In addition, in Japan leasing companies are significant lenders. Since they are subject to different regulations they can offer long-term finance which commercial banks could not take onto their balance sheets.

Shipbuilding credit schemes: Some countries offer shipbuilding credit to domestic and foreign owners. The terms of export credit are agreed under the OECD Understanding on Export Credit and currently are set at 80% advance for 8.5 years (see page 296 which discusses newbuilding finance).

Larger companies have more options because they can access the capital markets, and investment banks help them to issue bonds, equity and private placements, whilst smaller shipping businesses mainly rely on loans from the commercial banks. There are at least 200 institutions world-wide with specialist expertise in some aspect of ship finance, usually through shipping departments. A brief description of the main ones and their activities is given in Box 7.2. In what follows we will go through the four ways shipowners and shipping company can raise finance, following the structure set out in Figure 7.4. We start with the two main sources of finance for established shipping companies, private equity (Section 7.4) and bank loans (Section 7.5), then we move on to capital markets (Section 7.6) and finish up with the various SPC financing structures (Section 7.7).

7.4 FINANCING SHIPS WITH PRIVATE FUNDS

The first and most obvious way of financing ships is with the owner's private resources, the earnings of other ships he owns, or an investment or loan from friends or family. This source of finance was widely used in the nineteenth century when investment by family members dominated many companies that were nominally public, and it is still the main source of start-up capital today. For example, Sir Stelios Haji-Ioannou, the well-known entrepreneur who founded Stelmar Tankers and Easyjet, got started in 1992 with $30 million capital from his father[22] which he paid back in 2004. Most shipping businesses finance at least part of their activities from internally generated equity, and family ownership remains a common form of finance in Greece, Norway, Hong Kong and other countries with a seagoing tradition. The advantage is that close friends and relations who understand shipping are more likely to tolerate the volatility of its returns. Occasionally companies may place equity privately on a broader basis, gathering together a group of investors who take a significant share in the business.

On a broader note, during the 2003–8 shipping boom private equity firms started to show more interest in the shipping business, primarily in more specialized sectors where cashflow volatility is seen to be lower than in mainstream bulk and container shipping. In the European ferry sector, for example, there was considerable amount of private equity activity: Grandi Navi Veloci was bought by Permira and then sold on to Investitori Associati; Scandlines was bought by 3i, Allianz Capital Partners and DSR; UN RoRo was bought by KKR; and Marfin purchased the Panagopulos stake in Attica Group. Elsewhere, 3i bought Dockwise and, in the services sector, Istithmar bought Inchcape Shipping Services from Electra and Exponent bought V Holdings from Close Brothers Private Equity.[23]

7.5 FINANCING SHIPS WITH BANK LOANS

Bank loans are the most important source of ship finance. They provide borrowers with quick and flexible access to capital, while leaving them with full ownership of

the business. This is also an important business for banks, and in 2007 the various institutions lending to the shipping industry had loan portfolios ranging in size from $1 billion to $20 billion. Because ship finance is specialized (it has to cope with all those cycles we discussed in Chapter 3!), it is usually managed by a separate department. Typically the head of ship finance has a group of marketing officers who know the business; administrative staff to handle the portfolio; and credit officers who report to the credit side of the bank, but understand the shipping business. There are three main types of loans available to shipowners: *mortgage-backed* loans, *corporate* loans, and loans made under *shipyard credit* schemes. Occasionally a bank will arrange mezzanine finance.

Loans of this sort have three limitations. Firstly, banks will only advance limited amounts, so large loans must be syndicated amongst a group of banks. Managing large syndications can be difficult when the shipping market is poor. Secondly, loans are usually restricted to 5–7 years and an advance rate of 70–80%, both of which are limiting. Thirdly, the bank requires a mortgage against the ship, and restrictive covenants. This can become complex and inconvenient for large companies with many ships. In effect this is retail finance, with the commercial banks acting as the intermediaries between the capital markets and the small shipping companies.

Mortgage-backed loan

A mortgage-backed loan relies on the ship for security, allowing banks to lend to one-ship companies which would not otherwise be creditworthy for the large loans required to finance merchant ships. As we noted in the previous section, there are many shipping businesses whose assets are held privately, with no audited accounts and no reliable way for the banker to access company funds in the event of a default. This sort of transaction will generally use a structure of the type set out in Figure 7.5. The borrower is a one-ship company registered in a legally acceptable jurisdiction such as Liberia. This structure isolates the asset from any claims arising elsewhere in the owner's business. Security may be sought both from the borrower and the owner.

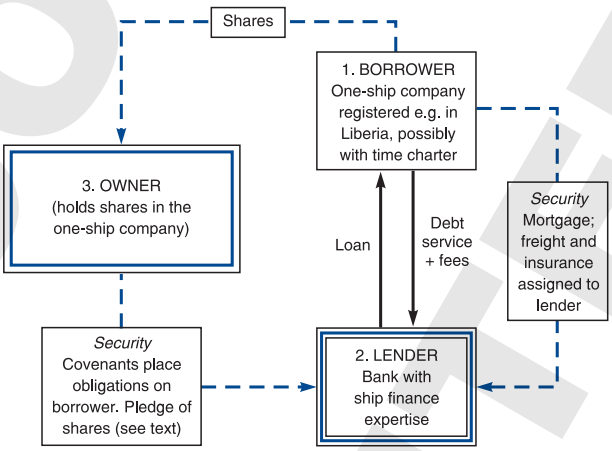

Figure 7.5
Mortgage-backed bank loan model
Source: Martin Stopford, 2007

To raise a loan the shipowner approaches the bank and explains his requirements. If the bank is prepared to consider a loan, the bank

officer draws up a proposal, discusses it with the borrower and negotiates any points which are not acceptable. Negotiating terms is an important part of the lending process. The lender obtains a valuation of the ship offered as collateral (see Section 6.8 for valuation methods) and decides what proportion of its current market value can safely be advanced. This will depend on the age of the ship and the state of the market. Some bankers consider that loans should not exceed 50% of the market value of the vessel unless additional security is available. Additional security in the form of a time charter, mortgages on other ships, a personal guarantee from the owner or a history of successful business with the owner, may persuade the bank to increase the loan to 60–80% of the ship's current value. In some exceptional circumstances bankers may lend 100%. However, there are no firm rules. Banking, like shipping, is a competitive market. If a competitor offers 80% against a first mortgage, that is the market rate.

A credit judgement must be made on whether the risk is acceptable to the bank. It is here that the real skill of ship finance lies. From the shipowner's point of view higher leverage is generally better, but only if the return on equity is higher than the cost of borrowing. If, for example, the business earns 10% per annum but borrows at 7% per annum, leveraging increases the return on equity. But if the average return is less than 7%, leverage actually reduces the return on equity. In shipping the return on assets is often dangerously close to the cost of funds, so borrowers walk a fine line.

Another consideration for the bank is the security of the transaction if things go wrong for the borrower. This involves a mortgage on the ship, assignment of insurance and earnings (freight) to the lender and various other covenants designed to ensure that the assets held as security are adequate if sold, to cover the outstanding loan. This includes covenants covering such issues as the loan to value ratio, conditions precedent to drawdown, and restrictions on dividends. They will also define the events which constitute a default.

The loan proposal, which is generally set out in a letter with a *term sheet* attached, generally covers the seven key issues listed below, with a disclaimer making it clear that the offer is subject to various conditions such as credit committee approval. The bank officer's challenge is to find a combination of terms which are acceptable to the customer and the bank's credit officer.

1. The *amount*, or maximum size of the loan. This depends on security (i.e. the value of the ship, etc.) and the other factors listed below. Normally the advance will be 50–80% of the market value of the ship, depending on its age and the security available. The purpose of the loan and terms on which it can be drawn down are defined.
2. The *tenor (term)*, the period over which the loan is to be repaid. Banks prefer to lend for no more than 5–7 years, since the bank funds its loans by borrowing short (see below), but longer terms may be approved for strong credits.
3. The *repayment*, which determines how the loan is repaid. This is usually by equal instalments, probably every 6 months. For modern ships a 'balloon' repayment may

be used to reduce the annual principal repayments (e.g. repay half the principal at the end) and possibly a grace period at the start.

4. The *interest rate*: loans are generally made at a 'spread' over the bank's funding cost, for example, LIBOR for a dollar loan. Spreads range from 0.2% (20 basis points) to 2% (200 basis points)
5. The *fees* that are charged to cover the bank's costs in arranging and administering the loan. For example, a 1% arrangement fee, charged when the loan is drawn, and a commitment fee to cover the cost of tying up the bank's balance sheet, even if the loan is not drawn.
6. The *security*: the loan agreement requires assets to be pledged as collateral to which the bank has legal access if the borrower defaults. This is usually a mortgage on the vessel, but other security may be sought.
7. The *financial covenants*: the borrower pledges to do certain things and not to do others. Affirmative covenants pledge to comply with laws, maintain the condition and class of vessels held as collateral and maintain the value of collateral relative to the loan. Restrictive covenants limit third-party debt, cash dividends and the pledging of assets to third parties.

The term sheet only deals with the key issues, and once these are agreed a detailed loan agreement must be drawn up, which is likely to lead to more negotiations over the precise terms and the wording of covenants. Finally, before a firm offer can be made the bank officer must obtain *credit approval* from the bank's credit department. For a client well known to the bank, this will only take a few days, but for difficult or risky loans obtaining credit approval can be a lengthy process. The credit officers or credit committee review the borrower's ability to service the loan in all foreseeable circumstances and the security available in the event of a default. Cashflow projections will probably be used to review debt service obligations under different market scenarios. It simplifies the review if the ship has a time charter, provided the charterer is creditworthy. A shipbrokers' valuation is obtained to establish the ship's market value, and other security is reviewed, along with the covenants. The credit officer may ask for some terms to be revised, and this will need to be agreed with the borrower. When credit approval is obtained and the offer accepted, a closing is arranged at which evidence of security is provided, the papers are signed and the funds transferred. Repayment then proceeds in accordance with the loan agreement.

The structure of commercial bank lending

In most businesses loans are made to a company, but shipping banks generally use the model shown in Figure 7.5. The ship to be financed is registered as a one-ship company under a flag (i.e. in a country) with well established and enforceable maritime law. The bank makes the loan to this company, taking a mortgage on the ship. Freight and insurances are assigned to the bank with a 'dividend stopper' to ensure that funds remain within the company and the bank takes a pledge of shares from the owner. In addition to giving the bank control in the event of a default, this insulates the ship

from other claims on the owner's fleet. It suits the shipowner because the major flags of convenience are acceptable to most banks, so the ship can be registered in a low cost tax-free environment (see Chapter 16).

Since bank loans play such a big part in financing the shipping industry, it is worth spending a little time understanding the economics which drive commercial bank lending. The basic model is shown in Figure 7.6. The capital the bank lends to the shipping industry comes from two sources: the bank's equity and bonds issued by the bank. By financing part of its loan portfolio with equity the bank ensures that it can absorb bad debts and still meet its obligations to bondholders. However, the bank's equity caps the amount of loans it can commit to at any time. During the last twenty years the international banking industry has been trying to establish minimum requirements for equity. In 1988 The Bank for International Settlements (BIS), which is located in Basel, established a guideline that 8% of the bank's portfolio must be funded with equity. This became known as BASEL I. Sixteen years later BASEL II introduced a more sophisticated guideline which took the riskiness of the bank's portfolio into account in arriving at its required equity. Under the new system some high-risk loans could require equity cover of up to 12%.

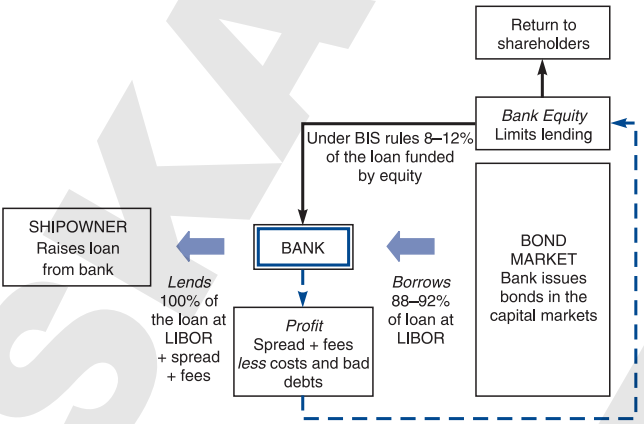

Figure 7.6
Bank funding model for ship loans
Source: Martin Stopford, 2007

The bank makes a profit on loans in two ways. Firstly, it lends to shipowners at a 'spread' which is typically in the range 20–200 basis points over its financing cost, depending on the customer and the risk. Secondly, the bank charges fees for arranging and administering the transaction. On the cost side, the bank must pay its overheads and the cost of any loans which have to be written off. What is left after these charges is profit on equity. Clearly it is a very tightly balanced equation, with the bank juggling the potential revenues from interest and fees against the cost of overheads and the risk of bad debt. An example in Table 7.1 illustrates the economics for a $100 million loan.

The loan of $100 million is repaid in five $20 million instalments (row 2) and the bank receives a payment of 1% spread over LIBOR (row 3). LIBOR payments (row 3) are only shown on the equity portion of the loan because the remainder is paid out by the bank to service its bonds. An arrangement fee of 1% is charged in the first year (row 5). Administration expenses, shown in row 6, are $500,000 million in the first year, and thereafter $100,000 a year. The bank's net earnings are shown in row 7, which is the sum of interest and fees, less administration expenses.

Table 7.1 Bank funding calculation on $100 million ship loan

		$ million				
		1	2	3	4	5
1	Loan outstanding, 31 Dec	100	80	60	40	20
2	Principal repayment, 31 Dec	20	20	20	20	20
Bank receives revenue from:						
3	Interest spread over LIBOR (1%)	1.0	0.8	0.6	0.4	0.2
4	LIBOR paid on the 8% of the loan covered by equity (1)	0.5	0.4	0.3	0.2	0.1
5	Arrangement Fee (1%)	1.0				
Bank incurs costs on:						
6	Bank administration expenses	0.5	0.1	0.1	0.1	0.1
7	Net earnings, after costs	2.0	1.1	0.8	0.5	0.2
	Return on capital calcualtion					
8	Bank equity committed	8	6.4	4.8	3.2	1.6
9	Return on bank equity (before debt provision)	24.8%	16.9%	16.4%	15.4%	12.3%
Risk calculation						
10	Bad debt provision	0.5%	0.5%	0.5%	0.5%	0.5%
11	Return on bank equity (after provision)	18.5%	10.7%	10.2%	9.1%	6.0%

Note 1: LIBOR assumed at 6% pa

Percentage of bank's equity reserved:	Return on bank's equity				
4%	37.0%	21.4%	20.3%	18.3%	12.0%
8%	18.5%	10.7%	10.2%	9.1%	6.0%
12%	12.3%	7.1%	6.8%	6.1%	4.0%

Bad debt provision:	Return on bank's equity				
0.1%	23.5%	15.7%	15.2%	14.1%	11.0%
0.3%	21.0%	13.2%	12.7%	11.6%	8.5%
0.5%	18.5%	10.7%	10.2%	9.1%	6.0%
0.7%	16.0%	8.2%	7.7%	6.6%	3.5%

Size of the loan	Return on bank's equity (before provision)				
$100 million	24.8%	16.9%	16.4%	15.4%	12.3%
$50 million	18.5%	15.4%	14.3%	12.3%	6.0%
$25 million	6.0%	12.3%	10.2%	6.0%	–6.5%

Source: Martin Stopford 2005

Next we come to the return on capital calculation. Under Basel I the bank must cover 8% of the loan from equity, which in this case is $8 million in the first year. As the loan is paid down, the allocation of equity also reduces. The return on equity (ROE) is calculated by dividing earnings (row 7) by equity (row 8), giving 24.8% in year 1, falling to 12.3% in year 5 (row 9). The return falls because the loan reduces in size, but the administration cost does not, which is probably a realistic assumption. In fact many shipping loans are paid down long before their full term. Although this is an impressive return we have not factored in the bank's risk. If any loans in the bank's shipping portfolio are not repaid, earnings are reduced. To deal with this we need to set aside a 'bad debt provision' reflecting the probability of the loan being written off. In this example a provision of 0.5% is shown in row 10. After deducting this provision the ROE in the first year falls to 18%. Still a pretty good return, but by year 5 it is down to just 6%.

Three ROE sensitivity analyses are shown at the bottom of Table 7.1. The first shows the effect of varying the bank's equity contribution between 4% and 12%. Clearly this has a massive effect on profitability, producing returns ranging from 37% to 12% in year 1. The second sensitivity table shows the effect of changing the bad debt provision. Reducing the provision to 0.1% (a one in one thousand chance of write-off) increases the return from 18.5% to 23.5%. Conversely increasing the bad debt provision from 0.5% to 0.7% reduces the return from 18.5% to 16%. Thirdly, we see the relationship between ROE and the size of the loan. The $100 million loan makes four times the ROE in the first year as the $25 million loan.

This analysis highlights three economic characteristics of commercial ship lending. Firstly it shows the importance of economies of scale in banking. The administrative work does not vary significantly with the size of the loan, so small loans are much less economic than big loans. Syndications are commercially attractive because the lead bank is paid for the administrative work, but only retains a small proportion of the loan on its balance sheet. This means that the fee revenue is high relative to the size of the loan actually booked. Secondly, the profitability of the loan diminishes with time because the sum outstanding reduces relative to the administrative cost. This suggests that the bank has an interest in recycling loans as quickly as possible. It also suggests that from the bank's point of view a balloon payment (e.g. a large lump-sum repayment at the end of the loan period) gives a better return because the sum outstanding remains higher. Thirdly it illustrates how sensitive the profitability of the loan is to risk management. A shipping bank which reduces its annual write-off to 0.1% of the portfolio can make a profit, whilst a bank with a higher write-off rates will consistently lose money (these are hypothetical examples). If nothing else, this emphasizes the importance of managing the portfolio in a way which ensures that even if there are defaults, there are few write-offs.

Corporate bank loans

For large shipping companies, borrowing against individual ships is inconvenient because any change in the fleet involves a time-consuming loan transaction. For this

reason large companies with well-established financial structures often prefer to borrow as a company, using their corporate balance sheet as collateral. Most liner companies and a few bulk shipping companies are able to access this type of finance. Mitsui OSK, OSG, General Maritime, A.P. Møller and Teekay are examples.

An example of a corporate loan is provided by a $300 million credit facility raised by General Maritime in June 2001. This credit facility consisted of two parts, a $200 million 5–year term loan and a $98.8 million 'revolving credit' allowing the borrower to draw up to the limit at any time. The term loan was to be repaid in equal quarterly instalments over the 5 years, whilst the principal drawn down against the revolving loan was repaid at maturity. Interest was payable at 1.5% over LIBOR, with a fee of 0.625% payable on the unused portion of the revolving loan, on a quarterly basis. In this case the loan was in fact secured by 19 tankers, with a pledge of the ownership interest in the subsidiaries owning the tankers and guarantees from the vessel-owning subsidiaries. In December 2002 the market value of the tankers was $464.3 million, 50% above the committed loans.[24]

The advantage of this type of arrangement is that it gives the company a flexible source of capital. The term loan has to be paid back relatively quickly, creating a substantial negative cashflow, but the revolving credit provided an overdraft facility which offers flexibility for the business, either to allow it to make unplanned purchases or to cover cashflow fluctuations. In fact in December 2002 they had $129.4 million outstanding on the term loan and $54.1 million on the revolving loan. Large loans are usually syndicated among several banks and have covenants which ensure that the company maintains a strong balance sheet. Typically these covenants cover the leverage rate, the earnings to interest ratio and the asset cover.

Loan syndications and asset sales

Lenders like to diversify their risk and are generally unwilling to keep more than, say, $25–50 million of a particular transaction on their books. For larger loans the usual practice is to spread the risk by sharing the loan among a syndication of several banks. Asset 'distribution', as this is known, is thus used to split large loans into small packages which can be distributed around many banks. In addition to spreading the risk, it allows banks without the expertise to appraise shipping loans to participate in the business under the guidance of a lead bank that does.

Syndicating a large shipping loan of, say, $300 million is a complex task. In addition to the normal credit appraisal process, the lead bank must manage the relationship with the borrower, whilst organizing a syndicate of banks to provide the loan. The simplest way to explain the process is to work through an example of a typical syndication timetable, focusing on the key areas. The main items are as follows:

1. *Getting a mandate*. First the lead bank meets the client to discuss his financing needs. For example, a loan of $500 million might be required to finance a newbuilding programme. The bank's syndication department will be consulted about the terms on which the loan could be syndicated to other banks, and unofficial enquiries will be made to discover how difficult the loan will be to place and what

particular features in terms of pricing, etc. will be necessary. If the bankers are sure the loan can be placed they will offer to underwrite it. Otherwise the offer will be on a 'best efforts' basis. When the client is satisfied with the terms and conditions, he will issue a mandate letter.

2. *Preparation for syndication*. Next, documentation is prepared and the whole package is agreed with the client. Again this is a complex exercise involving the syndications department, the shipping department and the bank's credit control officers. It also requires skills in drafting documentation and preparing an information memorandum designed to answer the questions likely to be raised by participating banks.
3. *Syndicating the loan*. When the preparations are complete the terms will be circulated to those banks which the syndication department believes may be interested in participating. For a specialized business like shipping the list may extend to 20–30 banks which will be asked to respond by a given date, indicating their interest. In the meantime the lead bank will visit interested banks to discuss the proposal and the participating banks carry out their own enquiries, since they will have to process the loan through their own credit control system. Those banks prepared to participate will indicate the sum they are willing to take, and when sufficient commitments have been obtained a closing is arranged at which all banks and the owner sign the necessary documents.
4. *Administration, fees, etc*. The loan documentation sets out the procedures for administering the loan. As a rule the lead bank acts as agent and charges a fee for doing so. For large syndications a management group may be set up. Their task is to handle ongoing problems without the necessity for approaching every participant. The pricing of the loan and the split of fees, etc. between the lead bank and participants will form a key part of the offer documentation.

The time taken to arrange a syndication depends on its complexity. Some loans can be placed very quickly because they are readily acceptable in the market. Others may require many months to line up the full subscription. Obviously one problem to be faced is that the shipowner may not be in a position to wait many months.

Widely syndicated shipping loans can sometimes be difficult to manage. If the borrower runs into difficulties, the lead bank and management group may find it difficult to control a diverse group of participating banks, some of whom know nothing about the shipping market and its cycles. This makes borrowers uncomfortable, and it is often argued that it is better if syndication is restricted to club deals between banks that combine to offer joint financing. For example, five banks may join to finance a $150 million newbuilding programme, each taking $30 million.

Asset sales (participation agreement)

Another form of distribution commonly used by banks is asset sales. The bank books the loan in the normal way, placing it on its balance sheet. For example, it may lend $50 million to a shipowner to purchase an $80 million tanker. If at some later date the

bank decides to reduce its exposure to shipping risk, or to that particular client, it sells the loan to another bank which has room on its balance sheet for shipping risk. Large banks have an asset sales department which arranges the sale of loans. The bank officer in the asset sales department approaches banks that he knows are interested in taking shipping loans. When a buyer has been found the two banks sign a joint participation agreement, transferring a specified proportion of the loan, say $5 million, to the buyer, on agreed terms of interest and capital repayment. Naturally the bank which booked the loan will aim to sell it on favourable terms, retaining a margin for itself. The originating bank will continue to manage the loan in the normal way. In some cases the shipowner may not even be aware that his loan is now held by another bank.

Financing new ships

Now we come to debt finance for newbuildings. Although the principles of financing a new ship are generally the same as for second-hand ships, there are two additional problems to overcome. First, the capital cost of a new ship is generally too high relative to its likely spot market earnings to be financed from cashflow, especially if the loan is amortized over the short periods of 5–7 years favoured by commercial banks. Unless a time charter is available, arranging security can be difficult, especially if a one-ship company structure is used. Second, the finance is needed before the ship is built, so there is a period before delivery when part of the loan is drawn but the hull is not available as collateral.

Pre-delivery finance is usually arranged separately. Shipyards generally require their customers to make 'stage payments' to the shipyard to pay for the material and labour required to build the ship. This involves a down payment to the builder for the purchase of materials on signing the contract, with the balance being paid in roughly equal instalments on keel laying, engine delivery, launching and delivery (see Chapter 14 for a discussion of this practice).

The pattern of stage payments is negotiable. If pre-delivery credit has been arranged, the purchaser makes the first payment from his own funds and the bank makes the remaining stage payments. The risk for the lender is that stage payments are made, but the ship is not completed, either because the shipyard goes bankrupt with a partly finished ship in the yard, technical problems, or because some form of civil or political disturbance prevents completion or delivery. With no ship to act as collateral, additional security is needed, and this is generally covered by a 'refund guarantee' issued by the shipyard's bank. However, problems may arise when dealing with shipyards where bankruptcy is a risk, or located in politically unstable areas. This is where a government guarantee is particularly valuable, or possibly the purchaser can arrange political risk insurance.

Post-delivery finance is generally drawn on delivery of the vessel. It may be obtained from three sources: a shipyard credit scheme, commercial bank credit or by leasing. Bank credit, and leasing are discussed elsewhere, so here we will focus on the shipbuilding credit schemes. There is a long history of governments offering credit to assist its shipyards in obtaining orders, though the availability of this facility is

constantly changing. There are three ways in which a government can make its shipbuilding credit more attractive to the shipowner than commercial bank credit. They are:

1. *Government guarantee*. By obtaining a government guarantee of the loan, the shipowner can borrow from a commercial bank. The value of this guarantee to the borrower depends on the credit standards which the government agency applies in issuing the guarantee. Sometimes the standards are the same as those applied by commercial banks, so the guarantee has little value. If, however, the government wants to help the shipyard win the order, it may guarantee terms which the owner would not obtain from a commercial bank. In doing this the government takes a credit risk, which is in effect a subsidy.
2. *Interest rates subsidy*. Some government agencies offer subsidized interest. For example, a loan is raised from a commercial bank, which receives an interest rate make-up from the government to cover the difference between the agreed rate on the loan and the current market rate. In a low interest rate environment this is less useful.
3. *Moratorium*. In difficult circumstances the government may agree to a one-or two-year moratorium on interest or principal repayments.

Some governments have a bank – for example, the Export Credit Bank of Japan and the KEXIM bank in South Korea – which carries out credit analysis and makes the loan itself. Other governments use an agency which performs the credit analysis, but the loan is provided by local commercial banks. For example, the Export Credit Guarantee Department in the UK performs in this way, following the model illustrated in Figure 7.7.

Government credit schemes stretch back to the 1930s, but the modern shipbuilding credit regime developed in the 1960s when the Japanese shipyards took the first step by launching an export credit scheme offering customers 80% over 8 years at 5.5% interest. Fierce credit competition between Japanese and European shipyards followed, leading to the OECD Understanding on Export Credit for Ships in 1969 (see Chapter 13) which informally regulated

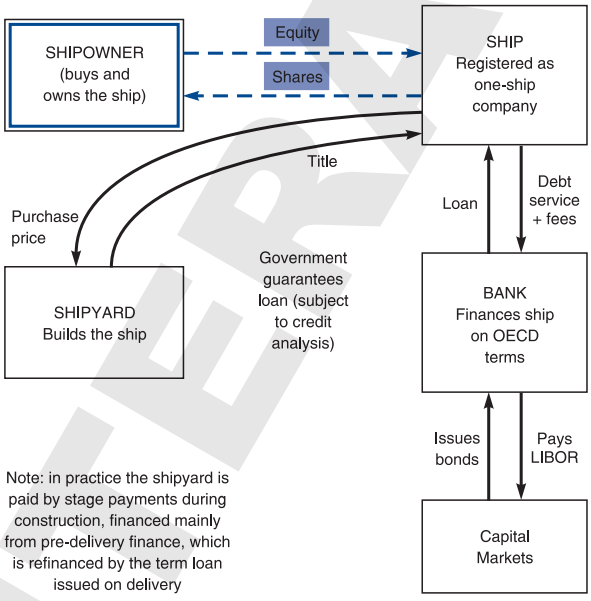

Figure 7.7
Newbuilding finance model
Source: Martin Stopford, 2007

inter-country competition in shipbuilding credit terms; this is still in force and was last updated in 2002.

The OECD Understanding defines a 'ship' as any seagoing vessel of 100 grt and above used for the transportation of goods or persons, or for the performance of a specialized service (e.g. fishing, icebreakers, dredgers). For many years the terms were capped at 80% over 8 years at 8.5% interest, but in 2002 shipbuilding export credit was brought in line with other capital goods and the new agreement approved 80% over 12 years, at the Commercial Interest Reference Rate (CIRR) plus a spread. The CIRR is based on the previous month's domestic bond rate for the appropriate term. Most European shipyards offer OECD terms, though with some local variations for domestic customers. Japan offers export finance in yen through the EXIM bank on OECD terms.

Mezzanine finance structures

Mezzanine finance is a loosely defined term which usually refers to high-yielding debt, typically priced at several percentage points above LIBOR, often with some form of equity 'kicker' attached – for example, equity warrants. One such structure involved $40 million of senior debt, topped by $26 million of mezzanine finance in the form of cumulative participating *preference shares*. These preference shares, redeemable after 5 years, paid a basic 10% per annum dividend plus an additional 20% of cashflow after interest and principal repayment. They also included detachable 5-year warrants for 25% of the company at original cost. Despite the apparent generosity of this offer it was never placed and the company resorted to more conventional financing. Mezzanine finance has not been widely used in shipping and is not easy to place.

Private placement of debt and equity

Finally, instead of borrowing from a bank it may be possible to arrange a private placement of debt or equity directly with financial institutions such as pension funds, insurance companies or leasing companies. An investment bank will normally be retained to handle the placement, which will involve the preparation of a prospectus and presentations to the potential investors. Private placements have the advantage that they do not need to be registered in the USA and avoid some of the lengthy processes required to place tradable securities. This allows established companies familiar to the financial institutions to raise funds quickly and inexpensively. Private placement of debt offers advantages such as fixed interest rate, long tenor and the corporate obligation which leaves individual assets unencumbered.

7.6 FINANCING SHIPS AND SHIPPING COMPANIES IN THE CAPITAL MARKETS

In most capital-intensive industries large companies use the capital markets to raise finance either by making a public offering of shares or by issuing bonds. The advantage

of the capital markets is that once the company is known and accepted by the financial institutions, it offers wholesale finance and a quick and relatively inexpensive way of raising very large sums of money. However, most shipping companies are too small to require funding on this scale and can end up spending a great deal of time and money raising sums that could be obtained more easily from a commercial bank. In short, the capital markets are not a source of finance to be dabbled in. They are a way of life that must be embraced and that is not always easy, given the volatile characteristics of the shipping business.

Public offering of equity

Shipping companies can raise equity by arranging a public offering of stock to be traded on one or more of the stock exchanges around the world. New York, Oslo, Hong Kong, Singapore and Stockholm are all used for public offerings of shipping stock. During the 1990s the shipping industry made real progress in developing this capital source, though it remains a minor player in ship finance. In 2007 there were 181 public shipping companies with a market capitalization (the number of issued shares multiplied by the market value per share) of $315 billion, as shown in Table 7.2. Two companies, Maersk and Carnival Corporation, accounted for $90 billion or 29% of the total market capitalization. Apart from these two, the biggest sector are 'multi-sector' companies. This sector includes large Asian conglomerates such as Mitsui OSK ($16.2 billion), NYK ($11.2 billion), COSCO ($10.5 billion) and China Shipping ($10 billion). Bulk shipping companies include Teekay ($4.2 billion) and Frontline ($3.4 billion). The liner companies include OOIL ($6.1 billion) and NOL ($6 billion). The top 20 companies account for two-thirds of the world market capitalization of shipping companies. This is a significant critical mass, and the public companies as a whole owned 472 million dwt of ships, accounting for 47% of the world fleet, so it is an important part of the shipping business.

If a private company wants to raise equity in the public markets, it must make an IPO. A prospectus is drawn up describing the company, its markets and its financial performance, and offering shares, to be listed on a specified stock exchange where they will be traded (this is important because it allows investors to get their money out whenever they wish to). For example, in 1993 Bona Shipholding Ltd issued a prospectus offering 11 million shares at a target price of $9 per share, to be listed on the Oslo Stock Exchange from 17 December 1993. Once the issue is made and trading starts, the shares are traded in the secondary market where the price is determined by supply and demand. By 1996 the stock in Bona Shipholdings Ltd was trading at $11.79, so investors had made a profit of $2.79 per share. The listing of equity allows investors to buy or sell shares at any time provided there is liquidity (i.e. buyers and sellers). For this to work the offering must be big enough to allow reasonable trading volume. Eventually the company was bought by Teekay.

A company wishing to issue a public offering of shares will first appoint an investment bank to act for it, preparing the prospectus, submitting it to the stock exchange authorities who regulate offerings on their exchange, and arranging for it to be 'placed' with financial

Table 7.2 Top 20 public shipping companies 2007

		Fleet		Market %	
Short Name	Sector	Ships	Dwt (m.)	Cap $ M.	Share
Maersk	Container	841	38.0	50,125	16%
Carnival	Cruise	102	0.7	40,821	13%
Mitsui OSK	Diversified	620	44.8	16,254	5%
NYK	Diversified	583	43.9	11,279	4%
China Cosco Holdings	Container	152	6.5	10,502	3%
China Shipping Dev.	Tanker	95	4.6	10,055	3%
Royal Caribbean	Cruise	44	0.3	9,132	3%
K-Line	Diversified	390	31.3	8,204	3%
MISC	Diversified	167	13.1	7,572	2%
OOIL	Container	95	5.0	6,115	2%
Hyundai MM	Container	109	10.4	5,965	2%
NOL	Container	117	5.5	5,802	2%
Cosco Singapore	Dry Bulk	11	0.6	5,471	2%
Teekay	Tanker	149	15.0	4,142	1%
Tidewater	Offshore	493	0.6	4,074	1%
CSCL	Container	120	4.9	4,006	1%
Bourbon	Offshore	239	0.7	3,489	1%
Frontline	Tanker	101	20.3	3,410	1%
Hanjin Shipping	Container	149	11.1	3,180	1%
Star Cruises	Cruise	26	0.1	2,746	1%
Others		4839	214.7	103,128	33%
Total		9442	472.1	315,474	100%

Source: Clarkson Research Services

institutions which buy the stock at an agreed price. A major responsibility is pricing the shares. The starting point is to value the equity stake being sold, which is done by taking the market value of the ships, adding cash and other assets, and deducting bank debt and other liabilities to arrive at a value for the company. In the example in Figure 7.8 the company has $1 billion assets ($700 million in ships and $300 million in cash) and $500 million debt, so it ought to be worth $500 million. If 50 million shares are issued they should be worth $10 each, but will investors pay more or less than this value per share? The issuer may feel the company, with its dynamic track record, is worth more and ask for $11 per share,

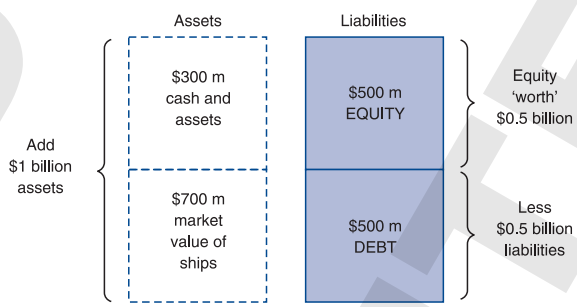

Figure 7.8
Valuing equity in shipping company
Source: Martin Stopford, 2007

but the investors may be concerned by the volatility of the shipping market and only prepared to offer $9.

Pricing an IPO is as much an art as a science, but three factors will generally be taken into account in pricing a shipping offering: the company's market-adjusted net asset value (NAV); the enterprise value based on the company's EBITDA compared to similar listed companies; and, in the case of offerings aimed at income funds and retail investors, the yields of comparable public companies. This establishes the full value of the stock but, except in a very hot new issue market, an IPO will generally have to be priced at a discount to full value in order to ensure that the offer is fully subscribed.

In the USA a preliminary prospectus, known as a 'red herring' (because preliminary portions are printed in red ink), is often issued containing all the details except the price of the shares. Feedback allows the pricing to be fine-tuned and a full prospectus can then be issued. After circulating the prospectus the shipping company generally goes on a 'roadshow' to present their company to institutional investors. These roadshows are often very demanding, involving a gruelling schedule of back-to-back investor meetings spread over one or two weeks. A successful listing depends on convincing institutions that the investment is sound, which depends in turn on the general case for investing in the shipping industry and whether the company looks well managed and has a good 'story'. Since the investors often know little about shipping, that has to be explained, as must the company strategy. A clear corporate structure, a well-defined strategy, a credible management track record, and plenty of information can all contribute to a successful outcome. Technical questions about the value of the fleet and the EBITDA levels must be answered along with more difficult questions like 'what if things go wrong – could you still carry out your plans?' The whole process including the roadshow takes about 10–15 weeks and in New York costs about 9% of the funds raised, though costs in London are closer to 7%. If enough investors are willing to purchase the stock at the offer price, the offering is a success. If not, it may be withdrawn. As the example in Box 7.3 illustrates, things do not always go smoothly. The purpose of the offering was to raise money to buy a fleet of double hull tankers. Since the shares were eventually placed at $11, well below the $13–15 per share target, the company had to borrow an additional $25 million from its bankers.

Raising shipping equity through the stock market has a mixed history, especially in bulk shipping and accessing the public equity markets is not easy. The large public shipping companies listed in Table 7.2 are mainly diversified corporates, with only three single-purpose companies. Two particular problems are the small size of many shipping companies, which excludes them from this type of finance, and the volatility of earnings and asset values. Volatility is an issue because although shipowners thrive on it, Stokes thinks that 'the essentially opportunistic nature of the tramp shipowning business somehow appears incongruous in the context of the stock market, where highly rated companies are those which are able to achieve consistent profit growth year after year'.[25] The corporate structures required by the equity markets can slow decision-making. There are also cultural issues to consider. If a shipowner has the skill to become very wealthy, why should he share his success with equity investors when cheap and flexible finance is available from commercial banks?

BOX 7.3 IPO CASE STUDY

Tough start for TOP float

By Tony Gray

THE flotation of TOP Tankers on the Nasdaq market has been successful – but at a cost. The Pistiolis family company sold the proposed 13.33m shares at $11 per share, substantially below its target range of between $13 and $15. After commencing trading on Friday afternoon [23 July], the shares closed 40 cents down at $10.60, a decline of 3.64%. The gross proceeds of the initial public offering (IPO) were $146.3m.

However, only $134.8m of this sum is to the company's account, as a shareholder sold 1.07m shares. The total could be raised by almost $22m through an underwriter's over-allotment option. The underwriters have a 30-day option to purchase up to an additional 1.54m and 454,545 shares. Based on the IPO price, TOP Tankers and its lender have agreed a $222m secured credit facility – this is $25m more than the $197m indicated in the prospectus.

TOP now intends to acquire 10 double-hull tankers for $251.2m. The 10 targeted tankers comprise eight handymaxes and two suezmaxes built between 1991 and 1992 by Hyundai Heavy Industries in South Korea and Halla Engineering & Heavy Industries respectively. This purchase will increase the size of TOP's fleet to 17 tankers of more than 1.1 m dwt, with 92% double-hulled compared with a global average of 61%.

Source: *Lloyd's List*, 26 July 2004

Despite these reservations, shipping is a key business in the world economy and financial institutions have a place in their investment portfolios for the equity of well-managed transport companies. From this perspective there is no doubt that the equity markets have a part to play in financing liner, bulk and specialist shipping.

Raising finance by issuing bonds

Another way of accessing the capital markets is to issue bonds. A bond is a debt security (known as a 'note') redeemed on a specific date, say in 10 years' time, and on which the issuer pays interest. The basic structure is illustrated in Figure 7.9. The shipping company (the 'issuer') sells bonds to financial institutions (the bondholders) and pays them interest (known as the coupon). At the end of the term the capital is repaid to the bondholder. The bonds issued may be investment grade, sub-investment grade or convertible bonds (i.e. a bond that can be exchanged for common stock). Each has a different pricing and places different demands and obligations on the issuer.

In the USA a bond issue generally obtains a credit rating which determines the interest payable – investment-grade bonds can be placed at lower rates than 'high-yield' bonds. The bond will also include an 'indenture', which is a deed of trust designed to protect the bondholders. Typically it deals with property pledges, working

capital requirements, and redemption rights. A trustee is appointed to represent the bondholders' interest and enforce the indenture.

Issuing a bond is in some ways similar to an IPO. An investment bank handles the placement, drawing up an offer document dealing with the following topics:

- overview of the company and its strategy;
- the terms of the note;
- risk sectors relating to the company and the industry;
- description of the company's business, operations and assets;
- overview of the company's market and regulatory environment;
- biographies of directors and executive officers;
- the indenture and financial tests;
- summary of financial data.

Once the offering memorandum is ready, the investment bankers and the company's top officers will go on the road to make presentations to institutional investors. Like an IPO roadshow, this often involves visiting several cities in one day and is both time-consuming and demanding. However, a well-established issuer who is well known to the investors may not need to do a roadshow. A conference call may be sufficient. Depending on the reception, the pricing and covenants are finalized and, if all goes well, finally the bond is placed.

Compared with bank debt, bonds have several advantages for established corporations. Firstly, they offer long-term finance: typically 10 years, and potentially 15 years. However, in shipping this is not necessarily an advantage since shipping companies like flexibility, and few bank loans run to their full term. More importantly, the principal is not repaid until the bond matures. This makes a difference to the cashflow of the company, especially during periods of low freight rates, as is illustrated in Figure 7.14 which compares debt service on a bond with the repayments

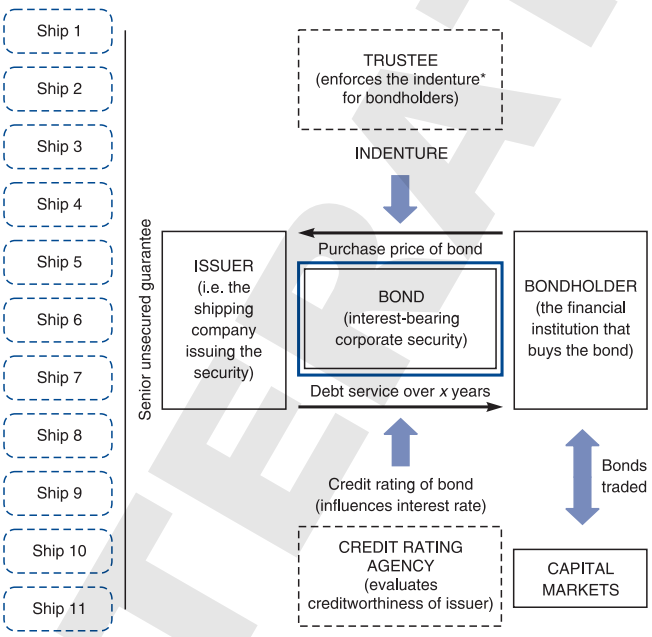

Figure 7.9
Basic structure of shipping bond issue
Source: Martin Stopford, 2007
*Indenture is the equivalent of the loan agreement, including, 'incurrence tests' and 'maintenance covenants'

Table 7.3 Shipping high-yield bond issues

	% Interest	Amount $ Million	Year	Maturity	Sector
Alpha Shipping	9%	$175	1998	2008	Multiple Sectors (5)
Amer Reefer Co. Ltd. (AMI RLF)	10%	$100	1998	2008	Reefers
American Commercial Lines (VECTUR)	10%	$300	1998	2008	Inland Barging
Cenargo Intl PLC (CENTNT)	10%	$175	1998	2008	Ferry
Enterprises Shipholding Inc	9%	$175	1998	2008	Reefers
Ermis Maritime (ERMIS)	13%	$150	1998	2006	Tanker
Gulfmark Offshore (GMRK)	9%	$130	1998	2008	Offshore Support
Hvide Marine (HMAR)	8%	$300	1998	2008	Chemical Tankers
International Shipholding (ISH)	8%	$110	1998	2007	Liner, Specialized
MC Shipping (MCX)	11%	$85	1998	2008	Gas Carriers
Millenium Seacarriers (MILSEA)	12%	$100	1998	2005	Drybulk
Pacific & Atlantic	12%	$128	1998	2008	Dry bulL, container, MPP
Premier Cruises (CRUISE)	11%	$160	1998	2008	Cruise
Sea Containers (SCR)	8%	$150	1998	2008	Diversified/Container Leasing
TBS Shipping (TBSSHP)	10%	$110	1998	2005	Break-bulk
Teekay Shipping Corp. (TK)	8%	$225	1998	2008	Tankers
Equimar Shipholdings Ltd. (EQUIMA)	10%	$124	1997		Tanker
Global Ocean Carriers (GLO)	10%	$126	1997	2007	Dry Bulk, Containerships
Golden Ocean Group (GOLDOG)	10%	$291	1997	2001	Tankers/Drybulk
Navigator Gas Iransporr (NAVGAS)	10.5%	$217	1997	2007	Gas Carriers
Navigator Gas Transport (NAVGAS)	12.0%	$87	1997	2007	Gas Carriers
Pegasus Shipping (PEGSHP)	12%	$150	1997	2004	Tankers
Stena AB (STENA)	9%	$175	1997	2007	Tankers, Rigs, Other
Trico Marine	9%	$280	1997		Offshore Support
Ultrapetrol (Bahamas) (ULTRAP)	11%	$135	1997	2008	Tankers
Sea Containers (SCR)	11%	$65	1996	2003	Diversified/Container Leasing
Transportación Maritima Mexicana (TMM)	10%	$200	1996	2006	Diversified, Container
International Shipholding (ISH)	9%	$100	1995	2003	Liner, Specialized
Pan Oceanic	12%	$100	1995	2007	Dry Bulk
Stena AB (STENA)	11%	$175	1995	2005	Tankers, Rigs, Other
Stena Line AB (STENA)	11%	$300	1995	2008	Tankers, Rigs Other
American President Lines (APL)	8%	$150	1994	2024	Container Shipping
Gearbulk Holding (GEAR)	11%	$175	1994	2004	Specialized Bulk
American President Lines (APS)	7%	$150	1993	2003	Container Shipping
Eletson Holdings (ELETSN)	9%	$140	1993	2003	Tankers
Overseas Shipholding Group (OSG)	8%	$100	1993	2003	Tankers
Sea Containers (SCR)	10%	$100	1993	2003	Diversified/Container Leasing
Transportación Maritima Mexicana (TMM)	9%	$176	1993	2003	Diversified, Container
Transportación Maritima Mexicana (TMM)	9%	$142	1993	2000	Diversified, Container
Sea Containers (SCR)	13%	$100	1992	2004	Diversified/Container Line
Total		$6,331			

Source: A. Ginsberg, 'Debt Market Re-opens', *Marine Money*, June 2003

on a bank loan, and for comparison also shows a typical freight rate cycle (of course the bond will only get a credit rating if the company can demonstrate its ability to service the cashflow in these extreme circumstances). In the example of bond finance in Figure 6.14 case D the company is committed to repaying the full principal in year 15 and this would normally be done by refinancing, provided the company is in good financial shape. Ideally the bonds are rolled forward and each new issue should be cheaper if the company is doing a good job. Finally, once a company is established the bond markets offer very fast access to finance – shipping companies have raised sums in excess of $200 million in 24 hours.

For the shipping industry bonds can be used in two ways. The first is to provide creditworthy private companies which do not wish to go down the public equity route with access to capital market funding. During the 1990s about 50 companies followed this route, raising sums of $65–200 million, and a selection of the bonds issued are listed in Table 7.3). The results were mixed and in retrospect it seems that many were over-leveraged, perhaps because they regarded the bonds as quasi-equity. Interest rates were very high, averaging around 10% per annum, and in the difficult shipping markets of the late 1990s the debt could not always be serviced. The second use of bonds is by established public shipping companies with significant market capitalization which, as mentioned above, can use their credit status and relationship with investment institutions to raise relatively large amounts of capital quickly and easily. For them, bonds offer fast and flexible finance.

7.7 FINANCING SHIPS WITH SPECIAL PURPOSE COMPANIES

So far we have discussed how shipping companies raise finance. However, in this section we take a different approach, and discuss the use of special purpose companies (SPCs) as a means of raising finance to acquire ships. The type of structure we are dealing with is shown in Figure 7.10. The SPC buys the ships and either leases or time-charters them out. A manager is appointed to operate the ships and funds are obtained from equity investors, probably supplemented by a bank loan.

There are two reasons for using SPCs. The first is as a speculative shipping investment vehicle. Ship funds and Norwegian K/S partnerships are examples of structures which have been used in the past to allow private investors to invest in shipping. The structure is set up, the funds invested, and in due course the investment is liquidated. Second, SPCs are often used for off-balance-sheet financing. For example, during the 1990s liner

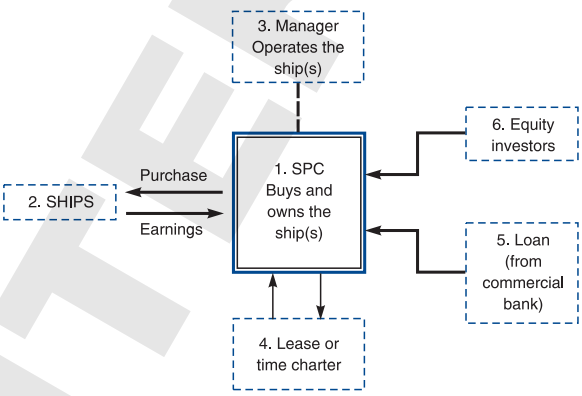

Figure 7.10
Special purpose company finance: basic model

companies preferred to charter ships rather than own them, and extensive use was made of leases and German KG partnerships as a way of securing the use of the ships without actually owning them. Finally, securitization structures take this a step further, but so far for shipping it has had limited success – there have been no securitizations of ships at time of publication, though there have been some of shipping debt.

Ship Funds and SPACs

A *ship fund* is an investment vehicle designed to allow equity investors to invest in a specific investment opportunity. For example, Bulk Transport was set up during the tanker depression in 1984–5 to take advantage of very low second-hand prices by purchasing four ULCCs at prices just above scrap.[26] As an investment it proved extremely successful, with the assets appreciating to five times their purchase cost during the following 4 years. Between 1987 and 1989 a succession of funds were organized by US commercial and investment banks. In most cases the equity raised was $30 to $50 million, often topped up with 40–60% debt in order to improve the return to the investor. In total these funds raised about $500 million of equity capital. A more recent example is Sea Production Ltd, discussed below.

The structure is usually similar to Figure 7.10. An SPC is set up in a tax-efficient location (e.g. the Bahamas, Cayman Islands) and a general manager appointed to handle the buying, selling and operating of the company's ships. For this service he is paid a management fee - for example, one fund with four ships paid $100,000 plus 1.25% of revenue earned. Because ship funds are investment vehicles rather than shipping companies, the shareholders are given the option to wind up the company after 5–7 years, thus ensuring liquidity if the shares prove not to be tradable. To improve the return on equity most funds raised debt finance, increasing the risk–reward ratio for the equity investor.

A prospectus is drawn up setting out the terms on which shares in the business are offered for sale. This document may be anything from a few pages of typescript to a glossy brochure. It sets out the business in which the company is to operate, its strategy, the market prospects, the terms on which shares can be purchased, administrative arrangements, control mechanisms and winding-up arrangements. On the basis of this prospectus shares are sold by private placement to wealthy individuals or institutions, or in a few cases by public offering (see Section 5.4). Investment institutions have limited funds for high-risk ventures of this type, so ship funds depend heavily on wealthy individuals willing to back a good sales story. When sufficient funds have been raised, management purchases ships and operates the company according to the terms set out in the prospectus.

As a 'pure' investment vehicle ship funds face two problems. First, the equity must be raised before the ships are purchased, facing the organizers with the difficult task of finding good-quality ships at very short notice. To deal with this the transaction may be initiated by a company with assets it is willing to sell to the fund. Second, their commercial and management structure is ambiguous. They are not shipping companies because they have a limited life, but they are charged with running ships over a fairly long period. Both these problems arise from the perception of ships as commodities. Although ships

are traded on the sale and purchase market as commodities, in terms of ongoing management they are complex engineering structures. Efforts to 'package' them as commodities bring a whole range of risks which need to be addressed.

But business moves on and in the more confident shipping markets of the early 2000s a new structure, the special purpose acquisition corporation (SPAC), has appeared to deal with the timing and corporate responsibility issues raised by ship funds. This is an enhanced version of the 'blind pool' in which the assets are not identified and acquired until after the funds have been raised. Corporate responsibility is provided by floating the SPAC as a fully reporting listed company, responsible for raising funds to acquire an operating business. The funds are escrowed; a proportion, say 80%, must be invested within a stipulated period, for example 18 months; and the investors must approve the acquisition. Once the ships have been acquired, the SPAC is listed on the NYSE or NASDAQ. This vehicle was used in 2005–6 by several Greek shipping companies to achieve a New York listing – for example, Navios International Shipping Enterprises (Angeliki Frangou), Trinity Partners Acquisition Company/Freeseas, Inc. (Gourdomichalis Bros and Ion Vourexakis) and Star Maritime Acquisition Corporation (Akis Tsiringakis and Petros Pappas). A transaction of this sort typically takes three to four months to complete and the fees are generally lower than for an IPO.

Private placement vehicles

Special purpose companies are also used by public companies as a way of raising private equity by private placement, prior to a market offering. For example, in the USA a private investment in public equity (PIPE) involves the sale of stock in an SPC set up by a public shipping company to accredited investors[27] at a slight discount to the market price. Typically the securities are unregistered, but the company agrees to use its best efforts to register them for resale. In the case of a 'Registered Direct' (RD) placement the securities are registered with the SEC and can be resold to the public immediately. Because the offering is restricted there are fewer disclosure requirements than for a secondary offering; there is no need for a roadshow; and adjusting pricing in response to changing market conditions is easier than in the case of a secondary offering. The cost is generally 4–6% of the gross proceeds, which is cheaper than a secondary offering. All these factors can make a private placement attractive to established small- to medium-sized public companies, which find it difficult to access more traditional forms of equity financing.[28]

An example is the private placement of equity by Sea Production Ltd, a company set up by Frontline Ltd to acquire its floating production business consisting of two floating production, storage and offloading (FPSO) systems, two Aframax tankers for conversion, and a management organization. Sea Production financed the $336 million acquisition with a $130 million bond facility, a bank loan and a $180 million private placement of equity.[29] It was registered on the Oslo over-the-counter market in February 2007 with the aim of a listing on the Oslo Stock Exchange in the autumn. The placement was managed by three investment banks and was heavily oversubscribed, with Frontline taking 28% of the equity which it sold in June 2007. For a well-established

company like Frontline the private placement was a quicker and less expensive way of raising the equity required by Sea Production Ltd than a public listing of shares. The number of shareholders is restricted by the regulatory authorities and the secondary market is generally limited.

Norwegian K/S partnership structures

During the late 1980s substantial amounts of partnership capital were raised through the Norwegian K/S limited partnerships investing speculatively in the purchase of ships. It is estimated that during this period about half of the Norwegian shipping industry operated through K/S companies and during 1987–9 investors in K/S partnerships committed equity of $3 billion.

At the time the K/S partnership, a standard form of Norwegian company, offered investors tax advantages. The K/Ss were usually set up on a one-ship basis with management subcontracted. The organizer appointed a 'general partner' and invited equity partners to commit capital.[30] At least 20% of the committed capital had to be available in cash at the time of incorporation and another 20% within 2 years. The remainder was only called if needed.

As a rule 80% of the purchase price was raised as a bank loan and the remainder with cash drawn against the committed equity. For example the purchase of a $10 million ship requiring $0.5 million working capital might be financed as follows:

	$ million
Mortgage loan (80 per cent)	8.00
Called equity capital	2.50
Uncalled capital	4.85

For tax purposes the committed capital could be depreciated at an annual rate of 25% on a declining balance basis. In addition, provisions could be made for classification costs, though allowable depreciation could not exceed the total capital committed.[31] The K/S shares could be sold, and there was a limited market within Norway through brokers or advertisements in Norwegian newspapers.

In the early 1990s these tax benefits were much reduced and the K/Ss, which had obtained a mixed reputation after a series of losses, fell out of favour, though interest has revived in recent years. They remain a fascinating example of opportunism in ship finance. The speed, flexibility, and relatively low cost of the K/S system were ideally suited to financing asset play during the period of escalating ship values in the late 1980s, allowing many small investors to become involved in shipping. Their weakness, from the investors' point of view, was the lack of the rigorous regulation which plays such an important part in protecting investors in the stock market.

German KG funds

A form of the ship finance which emerged with great success in the mid-1990s was the German KG company, the German equivalent of the Norwegian K/S company. The structure is shown in Figure 7.11. A German registered limited liability partnership

company purchases the vessel from a shipyard (or owner) and obtains a time charter. The purchase price is raised from a bank loan (usually about 50–70%), and equity raised from German high net worth investors and the general manager (usually around 30–50% between them).

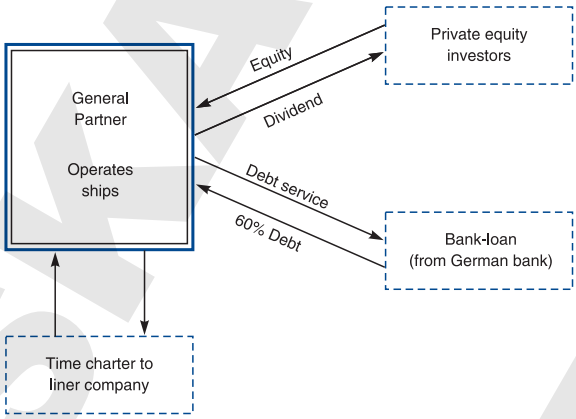

Figure 7.11
KG finance model

By 2004 over 600 ships had been financed by KGs, typically $50–100 million in size. The scheme owes its success to a combination of circumstances. Firstly, during the 1990s the liner companies were earning poor returns and used KGs to move ships off their balance sheet – between 1991 and 2004 the proportion of the container fleet chartered in by liner service operators increased from 15% to over 50%. Secondly, the German shipyards had a very strong position in the container-ship building market, supported by the strong container-ship brokerage community in Hamburg. Thirdly, Germany had a pool of high net worth individuals facing high marginal tax rates and an equity distribution system run by small investment houses. Fourthly, the German banks were in an expansionist phase and willing to provide the loans required. In these circumstances the quick and tax-efficient KG company proved to be an ideal financing vehicle, providing the liner company with container-ships which were 'off the peg' and off the balance sheet. Private investors liked the return of 8% after tax so much that ships became the most popular investment, accounting for about 20% of private funds raised in Germany in 2003.

By 2007 the KG market continued to provide ship finance, especially for the container market, but its competitive position was under pressure as a result of reduced tax benefits, higher capital costs and increased competition from the listed container-ship operators discussed in the next section.

Leasing ships

Leasing 'separates the use and ownership of the vessel'. This technique was originally developed in the property business where land and buildings are often leased. The lessor (i.e. the legal owner) hands the property over to the lessee who, in return for regular lease payments is entitled to use it as though it were his own (known legally as 'quiet enjoyment'). At the end of the lease the property reverts to the lessor. This technique is widely used for financing mechanical equipment, including ships. In arranging this sort of finance there are three main risks to consider: the revenue risk (will the lessor be paid in full for the asset he has purchased?); the operating risk (who will pay if it breaks down?); and the residual value risk (who gets the benefit if it is worth more than expected at the end of the lease?).

The two common types of leasing structures, the *operating lease* and the *finance lease*, deal with these risks in different ways. The operating lease, which is used for hiring equipment and consumer durables, leaves most of the risk with the lessor. The lease can usually be terminated at the lessee's discretion, maintenance is carried out by the lessor and at the end of the lease the equipment reverts to the lessor. This is ideal for big photocopiers where the lessor is an expert in all these practicalities and the lessee just wants to use it. Operating leases generally do not appear on the balance sheet and in shipping have been very widely used for container-ships. Finance leases are longer, covering a substantial part of the asset's life. The lessor, whose main role is as financier, has little involvement with the asset beyond owning it, and all operating responsibilities fall on the lessee who, in the event of early termination, must fully compensate the lessor. Finance leases are typically used for long-term finance of LNG tankers and cruise ships and will generally appear on the lessee's balance sheet.

The main attraction of finance leases to shipping companies is that they bring a tax benefit. Governments in some countries encourage investment by providing tax incentives such as accelerated depreciation, and companies with high profits but no suitable investment of their own can obtain tax relief by purchasing a ship, which they then lease to a shipowner who operates it as his own until the end of the lease. The lessor does not have to get his hands dirty, but, hopefully, he collects a tax benefit, some of which is passed on to the lessee in the form of reduced charter hire. Obviously this depends on the goodwill of the tax authorities. More recently leasing structures of 5–6 years have become more common.

A lease structure is shown in Figure 7.12. The ship, built to the lessee's specification, is purchased by the company providing the finance (the lessor) – a bank, large corporation or insurance company – and leased under a long-term agreement (e.g. a bare boat charter) to the shipping company (lessee). The lease gives the lessee complete control to operate and maintain the asset but leaves the ownership vested in the lessor who can obtain tax benefits by depreciating the ship against profits. Some of this benefit is passed on to the lessee in lower rental (charter) payments. A variant is the leverage lease which raises most of the cost of the ship in bank debt (e.g. 90%) and the lessor buys the equity at a price which reflects the tax benefits he gets from depreciating the whole ship.

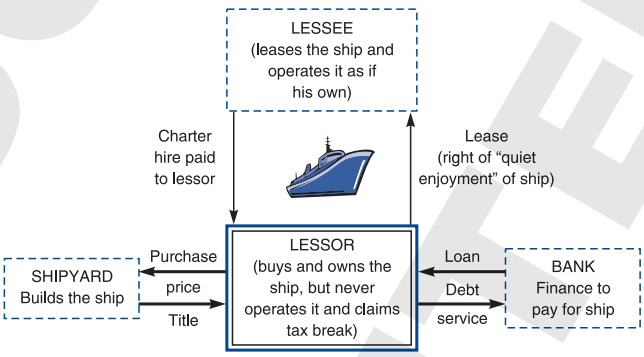

Figure 7.12
Typical lease finance model
Source: Martin Stopford, 2008

This type of finance has several advantages. It provides funding for longer periods than is available from commercial banks, possibly as much as 15 years or even 25 years. Capital costs are reduced to the extent that any tax benefits are reflected in the charter-back arrangement.

It also has drawbacks. The lessor, who has no interest in the ship, must be

satisfied that the lessee will meet its obligations under the lease. Only financially sound shipping companies are likely to qualify. The lessee is tied into a long-term transaction, which makes life much more complicated than just buying the ship and owning it. For example, if he decides after a couple of years to sell the ship, he must go through the complex business of unwinding the lease. Another problem is that, since tax laws may change, the tax benefit is never quite certain, and this must be covered in the documentation. With so many eventualities to cover, the paperwork on leasing transactions can be prodigious. For this reason leasing works best for well-established shipping companies with a well-defined long-term need for the ships, for example to service an LNG project against a long-term cargo contract.

A new development in the early 2000s was the flotation of ship leasing companies based on the model used in the aircraft industry for financing aircraft. The container-ship operator Seaspan, which was floated in August 2005, was modelled on the International Lease Finance Corporation which provides aircraft to FedEx, DHL and UPS. When floated, Seaspan had 23 container-ships leased to major liner operators such as Maersk, Hapag-Lloyd, Cosco, and China Shipping at fixed rates for periods of 10, 12 and 15 years. Operating expenses and interest rates were also fixed, insulating the company from shipping cycles.[32] In 2007 Seaspan had 55 ships and was one of the world's largest container owning companies. Several other companies have followed this model, which provides an alternative to the KG system discussed above.

Securitization of shipping assets

Asset-backed securitization is used to finance mortgage loans, auto loans, credit card receivables, and it has also been widely used in the aircraft industry, which has a similar asset base to shipping. The technique involves taking a portfolio of cash-generating assets (e.g. mortgage loans, aircraft, ships) and selling them to a bankruptcy remote trust which issues bonds serviced with the cashflow from the assets.

The process as it might apply to ships is illustrated in Figure 7.13. Step 1 is for the originator, an aircraft or shipping company, to appoint an investment bank to handle what might well be a lengthy and complex transaction. Step 2 is to set up an SPC and a trust. The trust is controlled by

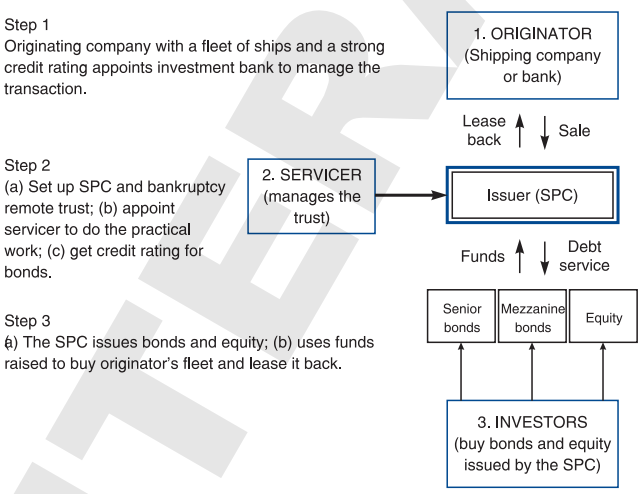

Figure 7.13
Ship securitization financial structure
Source: Martin Stopford, 2007

a board and arrangements are made for a 'back-up servicer' to manage the assets in the event of a default by the lessee. The SPC raises finance by issuing bonds backed by the assets, known as asset-backed securities. These bonds may be issued in several tranches, each with different credit ratings. For example, a senior tranche structured to obtain an investment-grade rating; a second sub-investment-grade tranche which permits repayments to be suspended during difficult periods in the market; and a tranche of equity. The ability to obtain the required credit rating is crucial. In Step 3 the bonds and equity are issued and the SPC uses the funds to purchase the originator's fleet of ships which are then leased back to the originator.

This sort of structure offers long-term finance, plus a degree of flexibility to deal with the realities of a cyclical business. Although asset-backed securitization is often used in the airline industry, the first shipping transaction was only completed in 2006 by the container company CMA CGM to finance 12 new container-ships. An SPC, VegaContainerVessel 2006-1 plc, raised three layers of finance: $253.7 million in senior AAA rated notes; $283.3 million in mezzanine finance from a syndicated bank loan; and a tranche of subordinated equity notes purchased by CMA CGM with the proceeds from simultaneously issuing a $283 million corporate bond. Vega then made loans to 12 SPCs, each of which purchased a container-ship from CMA CGM and bareboat chartered it back. Although this is the first shipping market transaction of its type, similar structures have been used in the aircraft market by flag carriers Iberia (in 1999, 2000 and 2004) and Air France (in 2003).[33]

The reason why this technique is more widely used for aircraft than ships seems to be that the financing options open to shipping and aircraft companies are very different. In the aircraft industry small airlines pay very high spreads to borrow from banks, so asset-backed securitization structures offer cheaper finance. In shipping, debt finance from commercial banks is very competitively priced and the rating agencies are cautious about rating bonds whose cashflow ultimately depends on the spot market. Add the fact that shipowners prefer flexible finance and the limited role of securitization becomes more understandable.

7.8 ANALYSING RISK IN SHIP FINANCE

The risk management options

Although we have discussed many techniques for financing ships, it is important not to lose sight of the fact that raising finance is ultimately a matter of persuasion. There are many opportunities out there and whether the investor is Aunt Sophie or a pension fund, they must be persuaded that the return justifies the risk. However, the justification required by investors and lenders is very different. Investors take a risk in the hope of making a profit. They want to be convinced about the upside potential. Lenders on the other hand, do not share the profits and just want to be repaid on time with interest, so their focus is on strategies to ensure repayment.

The starting point for any analysis, whether by an investor or a lender, is cashflow analysis. Because shipping is so capital-intensive, financial structure has a major impact

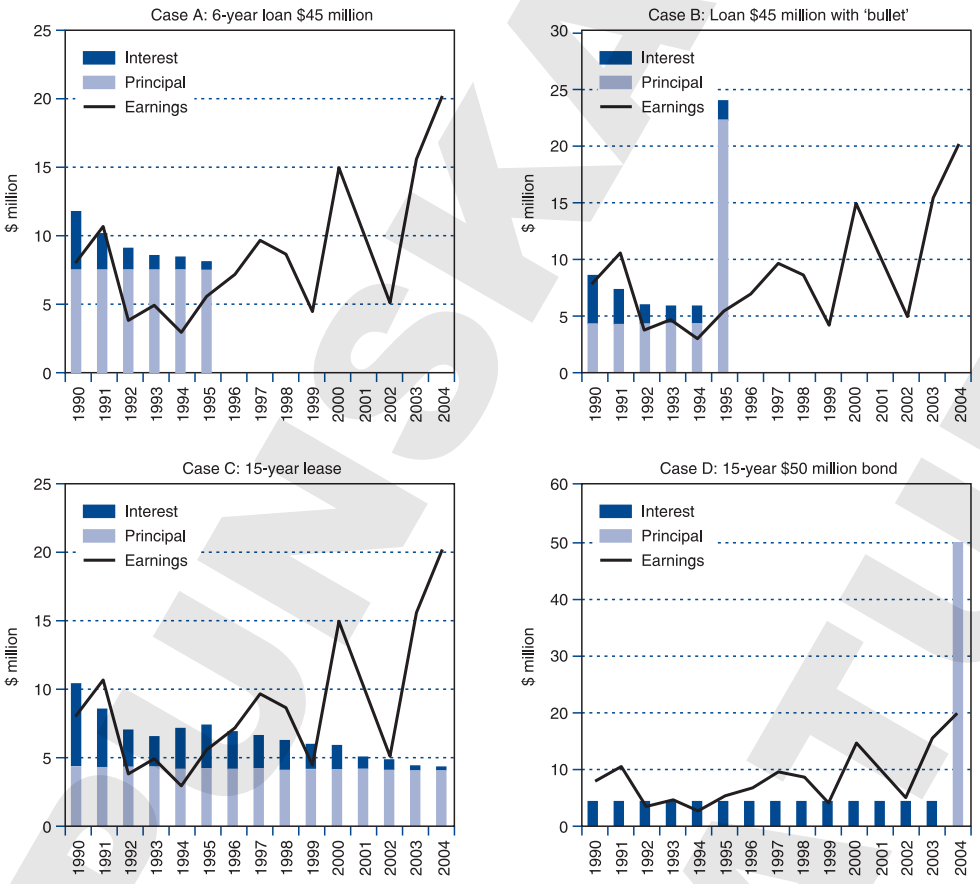

Figure 7.14
Four ship finance options for a new Aframax tanker

on the cashflow and it is only by carefully working through this that the true risks can be identified. To illustrate this point, Figure 7.14 compares four of the techniques for financing a new Aframax tanker valued at $65 million on delivery in 1990. The bars in each chart show the annual interest (at 1% over the prevailing LIBOR rate) and principal repayments, whilst the line shows the actual spot market earnings of the ship in each year, after deducting operating expenses of $6,000 a day in 1990, increasing to $7400 a day in 2004.

- Case A shows a 6-year term loan of $45 million, a 69% advance, amortized in equal payments of $7.5 million over the six years.
- Case B shows a $45 million 6-year term loan repaid at $4.5 million a year, with a $22.5 million 'bullet' payment in the last year.
- Case C shows a 15-year lease which repays the full $65 million in equal instalments of $4.3 million over 15 years and interest on a declining balance basis.
- Case D shows a 15-year bond for $50 million, a 75% advance, with the 9% coupon paid annually and the principal repaid in year 15 (i.e. 2004).

Comparing these techniques illustrates how the different structures cope with the same market cycle. The bank loan in case A is made at the top of a freight cycle, and even in the first year earnings do not quite cover debt repayments. Things get better in 1991, but from 1991 onwards they deteriorate and by 1995 earnings only cover half the debt service. The only comfort for the bank is that by 1994 over $30 million has been paid down, so the ship's market value of $20 million covers the outstanding $15 million. However, if the customer runs out of cash in 1993, that faces the bank with all the hassle and indignity of repossessing a ship, an act no banker wishes to contemplate. So a 6-year loan is not ideal for financing a new vessel.

Case B addresses the problem by introducing a bullet loan in which 50% of the principal is not repaid until the end of the term (a 'bullet loan' has a one-time re-payment of principal at its termination, in this case 50%). Debt service is much reduced and easily covered by earnings in the first two years, though there is still a small shortfall from 1992 to 1995. The problem comes when the bullet has to be repaid because the owner does not have the money – the cumulative deficit is $23 million. Of course the company could refinance, but after four years of recession the value of the ship has fallen to $18.5 million, less than is needed to cover the $23 million bullet. The new structure has 'reorganized the deckchairs', but the ship is still not generating enough cash to repay a 69% six-year term loan.

Case C takes a longer-term perspective, using a 15-year lease. This spreads the principal repayments over a much longer period. As with the bank debt, the transaction faces a problem between 1992 and 1996 when earnings are inadequate to cover lease payments. However, from 1996 to 2004 a substantial surplus is generated, and by the end of the transaction in December 2004 the obligation is fully paid down and the second-hand value of the 15-year old ship is now $20 million – a nice bonus for the lessor. Longer-term finance has evened out the long cycles, so although the market paid shipowners less revenue in the first half of the period, it came back in the second half. However, if the shipping company had no alternative source of funds, it would have defaulted on lease payments early in the period, so that is a problem. The fact that the lessor gets any residual profit is another.

Case D is a 15-year bond for $50 million. The principal is not repaid until the final year, so debt service is just the coupon which is fixed at 9%. In fact earnings are sufficient to pay interest every year except 1992 and 1995 when there is a very small deficit. Over the 15 years the ship generates $70 million after paying the coupon, enough to repay the $50 million bond and leave a $20 million surplus for the equity holders. Since the ship is now worth $20 million, this is a profitable transaction all round. So provided the company had $2 million working capital to cover the two bad years, the bond worked out pretty well, though this is just a hypothetical example. It is doubtful whether such a structure could be placed in the high-yield market without some partial amortization, due to the refinancing risk.[34]

The conclusion is simple enough. Shipping cycles cover long periods and are not always the extreme cycles of the 1980s. In this particular example earnings averaged $18,000 a day in the first half of the period and $32,000 a day in the second half, so any financial structure relying on earnings to repay interest and principal during the first half of the period was bound to run into problems (if this revenue sequence had been reversed it would have been a very different story). The bond works well because it defers repayment of principal until the end of the period, by which time in this example

BOX 7.4 SHIPPING RISK CHECKLIST

The following are some of the issues that should be considered when weighing up the risk in a shipping transaction:

1. *Market risk*. Shipping markets face cyclical revenues and prices as discussed in Part 2 of this book. Cycles vary unpredictably in length and severity, which affects a company's ability to meet obligations and the value of collateral. What is the position in the cycle and its future development?
2. *Operating risk*. Technical problems can lead to off hire, reduced earnings, repairs and poor reputation with charterers. Failure to comply with regulations relating to safety and pollution can result in port state detention and problems with classification societies, insurance, pools and conferences.
3. *Counterparty risk*. Are charterers creditworthy and is the full charter status of the vessel known? For example, a vessel may have been sub-chartered several times.
4. *Competitive risk*. Shipping companies operate in a competitive environment which may affect their financial performance. Does the company have any protection from predatory competition or overinvestment?
5. *Diversification risk*. Market segments have different cycles, customers and ship types (see Chapter 12). Diversification reduces risk if the sector cycles are not highly correlated and specialization increases it (the 'portfolio effect').
6. *Operating and voyage cost risk*. How sensitive is the business model to cost changes (e.g. fast ships use a lot of fuel)? Fuel costs, crew costs, port costs, repair costs and insurance can all change.
7. *Ship size and age risk*. Is the fleet age profile balanced and how well equipped is the company to manage it? New ships carry a high capital cost, and are vulnerable to changes in capital costs. In contrast, old ships face lower capital costs and are vulnerable to operating, repair and regulatory costs.
8. *Financial structure*. How vulnerable is the company's financial structure (e.g. debt must be serviced regardless of market circumstances)? New fleet has a high breakeven point, old fleet vulnerable to repair costs.
9. *Workout risk*. How easy would the company be to deal with in the event of a default? This involves the relationship with management and the difficulty of repossessing and operating assets depending on the type and age of ships, flag, etc.
10. *Management risk*. How does performance compare with peer group and how vulnerable is the company in terms of succession and depth of the management team?
11. *Environmental risk*. Pollution liability is a major risk and for private companies the corporate veil can be pierced, but not public shipping companies. Cargo, geography and insurance all important.

the cash has accumulated; but in such a volatile business as shipping there is a risk that repayment coincides with an adverse market when the cash is not available and refinancing is difficult, so bondholders need to be happy with the company and its management.

In these circumstances lenders offering loans in a competitive banking market have little choice but to take a view on what lies ahead, and we discuss this in Chapter 17. There are many risks to consider. Shipping is vulnerable to *economic risk* caused by volatility of the world economy. *Operating risk* arises from problems with the ships and the companies which manages them. And of course there is *shipping market risk*. These are the main risks categories, but there are plenty of others to consider and Box 7.4 provides a checklist of the most important ones, covering everything from market cycles to the environment.

7.9 DEALING WITH DEFAULT

One of the cornerstones of ship finance is the fact that the loan or investment is secured by ships which are negotiable assets, and in the event of a default or business failure can be seized by the creditors and sold. However, the realizable value of this security depends to some extent on the practical ability of the mortgagee (or bondholders) to recover the assets, and it is worth briefly considering some of the issues which this raises.[35] The following comments refer mainly to situations where a borrower defaults on its debt obligations by failing to make the payments required under the loan agreement.

Because ships trade internationally and may be in a remote part of the world when the problem arises, the first practical issue in dealing with a default is to obtain accurate information about what is actually going on. The borrower is not impartial, so other information sources are needed if only to check the accuracy of information being provided. With large sums of money at stake, the situation can also change very rapidly, especially where other creditors are involved, so prompt action can play an important part in resolving the situation favourably. Broadly speaking, there are three ways a lender can minimize this sort of risk: by monitoring the performance of the borrower to give early warning that the risk of default is increasing; by putting controls in place to protect the lender's interests when things start to go wrong; and by having a well-thought-out strategy for managing any defaults which occur.

Monitoring the performance of a borrower is a delicate matter, but early warning of problems helps because by the time a default occurs some of the options for dealing with the situation are no longer available. Regular monitoring of vessel values against a minimum value clause in the loan documentation provides a warning of market weakening and can trigger a dialogue with the borrower in a falling market, though establishing the precise value of ships held as collateral can be contentious if the valuations obtained by the owner and banker are different. Obviously this does not identify problems caused by mismanagement. Some banks routinely check the financial strength of borrowers by a periodic review of the company's whole business, especially in a weak market. This is not easy but it may give early warning signals that things

are not going well for the business as a whole. Another tactic is to inspect the ships regularly and look for signs of cash shortages – for example, a lack of spare parts or neglected maintenance. But this is expensive and requires a certain amount of tact.

Various steps can be taken to ensure that the lender has control in the event of a default. An enforceable mortgage on the ship and the assignment of all freights and insurances to the lender provide basic protection. Less common is a pledge of shares in the owning company, which the bank holds, with a letter of resignation from the directors. Or a personal guarantee from the shipowner may be requested. Guarantees of this sort are not easily obtained and can be difficult and unpleasant to enforce, but they may provide some leverage if things start to go wrong.

Once a default has occurred the lender as mortgagee must be prepared to deal with four practical issues, all of which are likely to require prompt action: the location of the ships; claims by other creditors; the condition of the ships and class; and the cargo aboard the ship.

The location of the ships is important because this determines the legal jurisdiction and, once the default has been declared, determines what the lender has a legal right to do. Some legal jurisdictions are better than others for arresting ships, so it may be advantageous to sail to a more favourable jurisdiction, if the ships can be moved. Other financial claims need to be addressed promptly because some, such as crew wages, rank ahead of the mortgagee's claim and must be settled first.

Trade creditors owed money for bunkers and stores must also be considered because if they are not paid there is the risk that these creditors will arrest the ship, creating a problem for the lender. Their services will be needed anyway if the ship is to continue trading. The third issue is the condition of the ships. Companies short of cash often defer maintenance and the supply of spares, so repairs may be needed, or worse the ship may not be in class. In that case it cannot be moved until repairs have been made. Finally, if there is cargo on board, that must be dealt with.

For all these reasons lenders often face a difficult and complex situation. Broadly speaking, there are three approaches, none of them attractive: (a) to provide the owner with the financial support to trade on; (b) to foreclose and trade on with a new company under new management; and (c) to foreclose and sell the assets either privately (which probably offers the best price) or through an Admiralty sale (which has the advantage of wiping out any claims against the ship). If the problem is market-driven and the relationship with the borrower is good, option (a) may make sense, provided there is upside in the assets, but if the problem is mismanagement, option (b) may be more appropriate. Either way, a decision to trade on means raising cash, and this can be done by selling off ships, negotiating with trade creditors to clear debts at a discount or supporting the owner until things get better. Otherwise a cash injection by the lender will be needed. The choice will depend on the circumstances. Selling ships under pressure can result in distress prices and is a poor option if the default takes place in a recession when the ships have upside potential. But if the default occurs in a normal market and assets can be sold for a fair price, this may be a more attractive option.

This is a superficial review of a difficult and complex subject but hopefully enough to demonstrate that managing default is one of the aspects of ship finance where practical skills are required, so ideally it is better for banks to choose clients who do not default!

7.10 SUMMARY

In this chapter we have discussed how the shipping industry finances its requirement for capital in a business which is volatile and historically has offered low returns. We started by reviewing the history of ship finance. This revealed that the type of finance available to the shipping industry has gone through distinct phases. As the world economy grew in the 1950s and 1960s there was a long phase of charter-backed investment, mainly initiated by the shippers. This was followed by new forms of asset-backed finance during the very volatile markets of the 1980s, notably ship funds and K/S companies. Finally, in the 1990s, shipping companies have shown more interest in corporate structures, with public offerings and corporate lending.

The money to finance ships comes from the pool of savings which are mainly held in three markets: the money markets (short-term debt), the capital markets (long-term debt) and the stock market (equity). Nowadays most of the investment is carried out by institutions such as pension funds and insurance companies, though there are a few private investors. Accessing these financial markets can be done directly by the shipping company, or indirectly through an intermediary such as a commercial bank. Direct access requires well-defined corporate structures which are less widely used in shipping than elsewhere. Shipping has traditionally relied heavily on bank debt, particularly bulk shipping. We divided the more detailed discussion of methods of ship finance into four broad groups.

Firstly, *private funds* represent an important source of financing. Initially the funds may come from a family member or a private investor, but subsequently the ships generate their own cashflow which can be used to develop the business.

Secondly, *commercial bank finance* is the most important source of funding for shipping companies. We drew the distinction between a 'shipowner' and a 'shipping company' and noted that commercial banks finance both, using the 'one-ship company' as a vehicle. Loans may be backed by a mortgage or the corporate balance sheet. For large loans a syndication can be arranged. Shipyard finance is sometimes used to finance new ships, since it addresses the difficult question of the pre-delivery guarantee, and credit terms are occasionally subsidized. Finally, we mentioned mezzanine finance, which is rarely used, and private placements, where financial institutions lend to or invest directly in shipping companies.

Thirdly, the capital markets allow established shipping companies to raise finance by issuing securities. Equity can be raised by an initial public offering of shares placed in the equity market, where the shares are subsequently traded in the secondary market. To raise debt finance a company with a credit rating from the rating agencies can issue bonds in the bond markets. These can be for 15 years or longer; the company pays

interest (coupon) to the bondholder, and the sum advanced (the principal) is repaid in full when the bond matures.

Fourthly, we discussed *standalone structures*, set up for particular transactions. These include special purpose companies, limited partnerships such as Norwegian K/Ss or German KG, finance leases, operating leases, and securitization. Leasing offers the opportunity to reduce finance costs by transferring ownership of the vessel to a company which can use its depreciation to obtain a tax break.

The discussion was rounded up with a review of risk management issues, and the implications of financial structure for the volatile earnings flow in the shipping industry. We also reviewed a risk checklist and discussed the problems which confront a lender whose borrower has defaulted (workout). The conclusion is that ship finance, like everything else in shipping, moves with the times.

Finally, we reviewed the practical problems which arise when dealing with default. This is a difficult part of the business, made all the more challenging by the fact that it occurs infrequently.