8 Risk, Return and Shipping Company Economics

A wise man will make more opportunities than he finds.

(Sir Francis Bacon, English author, courtier, and philosopher, 1561–1626)

The pessimist sees difficulty in every opportunity. The optimist sees the opportunity in every difficulty.

(Sir Winston Churchill, British prime minister)

8.1 THE PERFORMANCE OF SHIPPING INVESTMENTS

The shipping return paradox

In the early 1950s Aristotle Onassis, one of shipping's most colourful entrepreneurs, hatched a plan to take over the transport of Saudi Arabia's oil. On 20 January 1954 he signed the 'Jiddah Agreement' with the Saudi Finance Minister, establishing the Saudi Arabian Maritime Company (SAMCO) to ship Saudi oil. Initially Onassis was to supply 500,000 tons of tankers, and as the ARAMCO (the US-controlled Saudi oil concession) fleet became obsolete, SAMCO would replace their ships with its own. In May King Saud ratified the treaty and Onassis' biggest tanker, launched in Germany, was named the *Al Malik Saud Al-Awa* in his honour.

Needless to say, the oil companies did not welcome a private shipowner controlling this strategic oil resource, nor did the American government. ARAMCO turned away Onassis' tankers from its terminal and the US State Department pressed Saudi Arabia to drop the agreement. Onassis became the target of an FBI investigation and the coup became a disaster. As the shipping cycle turned down in the summer of 1956, Onassis's tanker fleet was laid up. Then he got lucky. On 25 July 1956 Egypt nationalized the Suez Canal, and in October Israel, Britain and France invaded Egypt to win back control. During this conflict Egypt blocked the Canal with 46 sunken ships and Middle East oil bound for the North Atlantic had to be shipped by the long route around the Cape of Good Hope. Tanker rates surged from $4 per ton to more than $60 per ton and Onassis was ideally placed to take advantage of the boom. In six months he made a profit of $75–80 million, equivalent to $1.5 billion at 2005 prices.[1]

This is the stuff of legends, and Onassis was not the only entrepreneur to make a fortune in shipowning. Livanos, Pao, Tung, Bergesen, Reconati, Niarchos, Onassis, Lemos, Haji-Ioannou, Ofer and Fredriksen are just a few of the families who have become fabulously wealthy in the shipping business during the last half century. But not everyone makes a fortune in shipping. As we saw in Chapter 3, shipping companies face endless recessions and average returns tend to be both low and risky in the sense that investors never know when the market will dive into recession. So why do they pour their money into the business? And how do fabulously wealthy shipowners like Aristotle Onassis and John Fredriksen fit into this business model? That is the shipping return paradox.

In explaining this paradox we turn to microeconomic theory to get a better understanding of what determines the behaviour of companies in the shipping market. First we will briefly review the industry's risk and return record to see what we are dealing with. Second, we will discuss how shipping companies make returns and work through an example; Third, we will discuss the microeconomic model to establish what determines 'normal' profits and the time-lags which contribute to the unpredictability of earnings; Finally, we will look in more detail at the part played by risk preference in pricing capital.

Profile of shipping returns in the twentieth century

We start with a brief review of the shipping industry's financial performance over the last century – it has to be said at the outset that it makes gloomy reading. A.W. Kirkaldy's review of fifty years of British shipping, published in 1914, observed that in 1911, 'the best year for a decade', the returns were no better than could be obtained by investing in first-class securities and that "at times shipping had to be run at a loss".[2]Another study, by the Tramp Shipping Administrative Committee, found that, between 1930 and 1935, 214 tramp shipping companies had a return on capital of 1.45% per annum.[3] Admittedly the 1930s was a bad spell, but in the 1950s, a much better decade for shipping, things were not much better. Between 1950 and 1957 the *Economist* shipping share index grew at only 10.3% per annum compared with 17.2% for the 'all companies' index, and in the 1960s things got even worse. Between 1958 and 1969, the *Economist* shipping share index returned only 3.2% per annum, compared with 13.6% for all companies. A detailed analysis of private and public shipping companies by the Rochdale Committee reported a return of 3.5% per annum for the period 1958–1969 and concluded that 'the return on capital employed over the period covered by our study was very low'.[4]

In the 1990s, a period of expansion in the stock market generally, the Oslo Shipping Shares Index hardly increased and the return on capital employed by six public tanker owning companies published in 2001 showed an average return on equity of only 6.3%.[5] Another analysis of 12 shipping companies during the period 1988–97 concluded that the return on capital of six bulk shipping companies was 7% per annum, whilst six liner and specialized companies averaged 8% return on capital. It concluded that these returns were 'in most cases inadequate to recover capital at a prudent rate and retain sufficient earnings to support asset replacement and expansion'.[6] However, in 2003 the whole picture changed, revealing a very different side to the business. The boom of 2003–8 turned out to be an oasis in a desert of indifferent returns, and as earnings increased and asset values more than doubled it became, as we saw in Chapter 3, one of the most profitable markets in shipping history with investors trebling their capital in five years.

Shipping risk and the capital asset pricing model

However there is more to the paradox than low returns. The capital asset pricing (CAP) model used by most investment analysts equates volatility with risk (we discuss the CAP model in Section 8.4), and shipping returns are very volatile. The sort of revenue volatility shipowners face is illustrated in Figure 8.1, which shows the earnings distribution for a shipping index covering the average earnings of tankers, bulk carriers, container-ships and LPG tankers. During the 820 weeks between 1990 and 2005 earnings averaged $14,600 per day but varied between $9,000 per day and $ 42,000 per day with a standard deviation of $5,900 per day. That is a very wide range. Extending the analysis to individual ship types, Table 8.1 compares the volatility of the monthly spot earnings of eight different types of bulk vessels using the standard deviation as a percentage of the mean earnings. This ratio ranges from 52% for a products tanker to 75% for a Capesize bulk carrier, and is extraordinarily high when compared with most businesses, where a month-to-month volatility of 10% would be considered extreme. To put it into perspective, if the average earnings are the revenue stream needed to run the business and make a normal profit (an issue we return to later in the chapter), shipping companies often earn 50% more or less than is required.

This volatility ripples through all the markets, producing a close correlation between the freight rate movements in different shipping market sectors. This point is illustrated by the correlation analysis in Table 8.2, which demonstrates the close correlation between the earnings of nine ship types. For example, the correlation between the earnings of a Panamax bulk carrier and a Capesize bulk carrier is 84%, so investing in Capesizes brings similar revenue risks

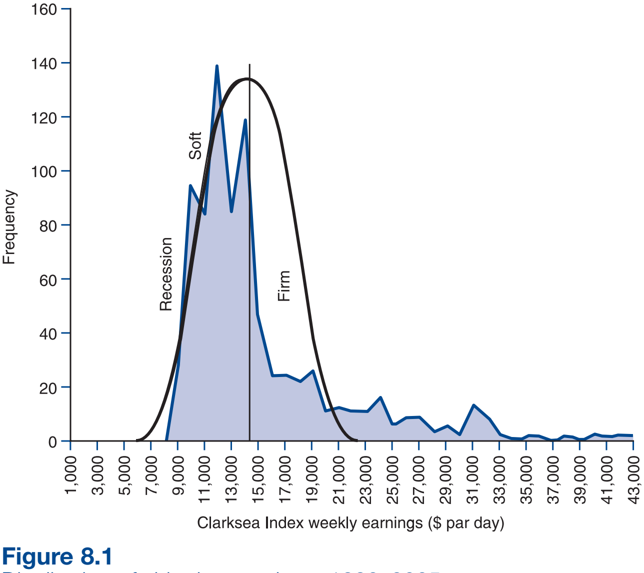

Figure 8.1
Distribution of shipping earnings, 1990–2005
Source: Martin Stopford, 2005 and Clarksons

Table 8.1 Shipping earnings volatility by market sector, 1990–2005

	Mean	Standard deviation	
	$/day	$/day	% mean
Capesize bulk carrier	20,323	15,265	75%
Suezmax tanker	25,257	17,479	69%
VLCC tanker (diesel)	33,754	22,820	68%
Panamax bulk carrier	11,552	7,485	65%
ULCC tanker (turbine)	25,074	15,960	64%
Aframax tanker	22,223	13,339	60%
Handymax bulk carrier	11,435	6,853	60%
Clean products tanker	15,403	8,048	52%
Average	20,628	13,406	65%

Source: Analysis based on CRSL data

to investing in Panamaxes. However, for some other ship types the revenue correlation is much lower. For example, VLCCs and Handymax bulk carriers have a correlation coefficient of −11% so their revenue fluctuations have tended to move in opposite directions. There is also a negative correlation between offshore and containerships. In theory shipowners can reduce the volatility of their earnings by incorporating ships with low or negative correlations in their fleet. But investors may prefer not to reduce their volatility risk, since all that does is to lock in a low return, – a clue, perhaps, to how shipping investors view the business.

Comparison of shipping with financial investments

This combination of volatile earnings and low returns distinguishes shipping from other investments. For example, the return on investment (ROI) summary over the period

Table 8.2 Correlation matrix for monthly earnings of shipping market segments, 1990–2002

	VLCC	Aframax	Products	Capesize	Panamax	Handymax	LPG	MPP 16kdwt	Container-ship
VLCC	100%								
Aframax	84%	100%							
Products	59%	80%	100%						
Capesize	30%	39%	27%	100%					
Panamax	7%	18%	17%	84%	100%				
Handymax	–11%	4%	8%	70%	86%	100%			
LPG	36%	32%	33%	33%	15%	–2%	100%		
MPP 16kdwt	–26%	–22%	–7%	52%	75%	84%	–2%	100%	
Containership	–9%	9%	14%	59%	68%	71%	14%	68%	100%

Table 8.3 Annual rate of return on various investments since 1975

	Period	ROI (%)	Standard deviation (%)
Inflation	1975–2001	4.6	3.1
Treasury bills	1975–2001	6.6	2.7
LIBOR (6 months)	1975–2004	8.5	3.9
Long-term gov bonds	1975–2001	9.6	12.8
Corporate bonds	1975–2001	9.6	11.7
S&P 500	1975–2001	14.1	15.1
Bulk shipping	1975–2004	7.2	40
Tanker shipping	1975–2002	4.9	70.4

Source: Ibbotson Associates

1975–2002 in Table 8.3 shows that Treasury bills, the safest investment, paid 6.6% per annum, whilst LIBOR (the London interbank offered rate), the eurodollar base rate used to finance most shipping loans, averaged 8.5% with a standard deviation of 3.9%. Corporate bonds paid 9.6%, but with a much higher standard deviation of 11.7%, and government bonds were much the same. By far the highest ROI was for the S&P 500 stock market index, which paid 14.1%. Shipping, as we have seen, is a very different story, with bulk carriers earning only 7.2%, with a standard deviation of 40%, making them twice as risky as the S&P 500. We will discuss how this return is calculated in the next section.

Because most investment is managed by financial institutions such as pension funds (see Chapter 7), the pricing of capital reflects the demand for the type of assets they invest in. The usual approach is to measure risk by volatility, using the standard deviation of the historic returns of the asset. They expect a higher return on volatile assets and a lower return on investments which are stable and predictable. To illustrate this point, Figure 8.2 plots the ROI against risk, measured by the standard deviation of the return over the period 1975–2002, on the horizontal axis and average return on the vertical axis.

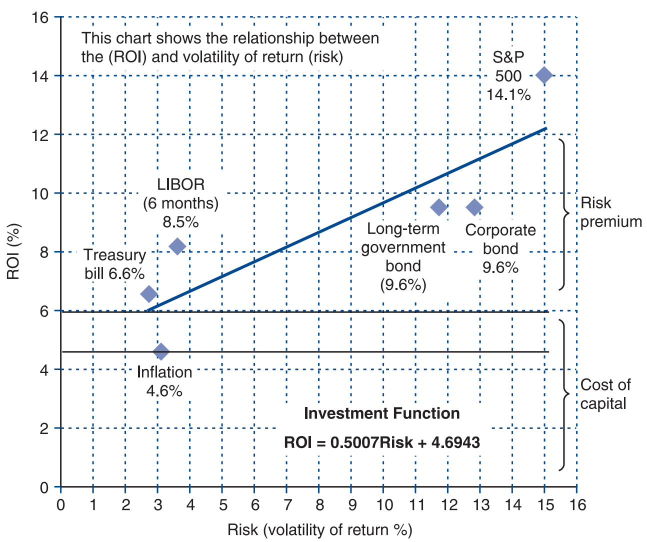

Figure 8.2
Risk pricing of various assets, 1975–2002
Source: Ibbotson, various

There is clearly a relationship. Treasury bills, with a volatility of only 3%, paid 6.6%, a premium 2% above the rate of inflation. That could be taken as the basic remuneration on a safe investment. As the volatility increases, so does the ROI, reaching 15% for the S&P 500, providing a risk premium of about 8% over inflation. A regression equation fitted to the points on the chart provides an estimate of the investment function over this period. On average the ROI increases by 0.5% for each 1% increase in volatility. If this model holds for shipping, a bulk carrier investment, with a volatility of 35%, should pay a return of about 22% (i.e. 6.6% cost of capital plus 17% risk premium). However, as we saw earlier in this section, it only paid 7.2%.

8.2 THE SHIPPING COMPANY INVESTMENT MODEL

The shipping company's split persona

If investors can make 6.6% on safe Treasury bills and 15% on the S&P 500 (an index of US stocks), why should they invest in shipping, which offers a similar return but has 40% volatility? Generations of shipowners and their bankers must have seen something in the business, even in the hard times, and sure enough when we examine the microeconomic structure of the shipping market, we do indeed find an answer. In classical economics there is no 'right' level of profit. The 'normal profit' is whatever the participants in the market are prepared to settle for.

In many ways shipping companies are very similar to the 'firms' which classical economists had in mind when they developed their theory of perfect competition. In classical economic theory a firm is 'a technical unit in which commodities are produced. Its entrepreneur (owner and manager) decides how much of, and how, one or more commodities will be produced, and gains the profit or bears the loss which results from his decision'.[7] In other words, the firm transforms inputs into output and the owner pockets the profits or makes good the losses, and shipping remains this sort of business. Over 5,000 companies [8] compete fiercely in a market place where barriers to free competition such as tariffs, transport costs and product branding hardly exist.[9] Owning an average of only five ships, many of these companies bear an uncanny resemblance to Joseph Schumpeter's description of a typical firm operating in the market place of classical economics:

> The unit of the private property economy was the firm of medium size. Its typical legal form was the private partnership. Barring the 'sleeping' partner, it was typically managed by the owner or owners, a fact that it is important to keep in mind in any effort to understand 'classic' economics.[10]

This description fits many of the Greek, Norwegian and Asian shipping companies operating in the bulk shipping market in recent decades. Admittedly the specialized markets (see Chapter 12) and the liner business (see Chapter 13) do not fit this description so well, but bulk shipping certainly fits the classical economic model.

But the perfect competition model does not tell us how much that profit will be, just that it will tend towards the 'normal' level for the industry. This normal profit is the return needed to keep supply and demand in balance, and that means keeping investors in the business long term.[11] When supply and demand are out of line, the return moves temporarily above or below the normal profit for the business, and the market responds by correcting the imbalance. In the long run the normal profit earned by a specific company will average out of a level which reflects the company's performance in three aspects of the business: remuneration for the use of capital; the return for good management: and the risk taken (see Box 8.1).

BOX 8.1 THE THREE RS OF PROFIT

- **Remuneration** for the use of capital. Between 1975 and 2001 US Treasury bonds averaged 6.6% p.a. (Table 8.3) and inflation was 4.6% p.a. so the real return on capital was about 2% p.a.
- **Return** for good management e.g. by reducing costs; using ships better and innovation to increase efficiency and improve cargo performance. These are important aspects of the business, but the returns are likely to be quite small, perhaps 1–2% p.a.
- **Risk premium.** A venture capitalist whose whole investment could be lost might demand 20–30% return if the project succeeds. Because the shipping business is so volatile the rewards for playing the cycle correctly can be even larger if things go well.

Capital dominates the shipping business. In the classical model, entrepreneurs buy materials (factors of production) and add value to them. In shipping the factors of production are ships, and operating expenses and capital dominate the business, with operating expenses accounting for a small proportion of the cost of transport. So although the company's primary task is to provide transport, capital management dominates the business. The company might save a few hundred thousand dollars a year by careful ship management, but the value of a single ship can change by that amount in a few days. So a shipping company is really like Siamese twins - a sober transport provider twin joined at the hip to a high-rolling hedge fund twin who manages the capital portfolio. They are hard to separate and entrepreneurs who can do both jobs simultaneously are rare – many who succeed have a twin tucked away in the backroom running the business. This idiosyncratic combination probably accounts for the persistence of small business units in the shipping industry and its highly focused management style.

The return on shipping investment model (ROSI)

The distinction between ship management and asset management is important because the shipping company Siamese twins are likely to produce very different financial returns. The transport provider twin who focuses only on transport, funded by equity, should expect low returns because the business is not very risky. But the hedge fund twin who focuses on asset management is in a very different business, offering very large returns to successful players prepared to take risks. It follows that the company's risk is determined by its business strategy, not the shipping cycle. Of course most companies face this sort of issue to some extent, but shipping is an extreme case because capital is so dominant and so liquid. The best way to illustrate the point is work through a practical example.

The return shipping investment (ROSI) can be split into four components and defined as follows:

$$ROSI_t = \frac{EVA_t}{NAV_t} = \frac{EBID_t - DEP_t + CAPP_t}{NAV_t} \times 100 \qquad (8.1)$$

where *NAV* is the net asset value of the fleet at the end of accounting period and *EVA* is the economic value added. To obtain the economic value added we take earnings before interest and depreciation (*EBID*), which is the cash flow earned trading on the spot market or time-charter market after deducting operating expenses, subtract depreciation (*DEP*) to reflect the fact that during the year the company's ships age, reducing their value, and add capital appreciation (*CAPP*), the change in the company's asset value during the year. Capital appreciation in the hedge fund twin's territory; everything else is the realm of the transport provider twin. Multiplying by 100 expresses the return as a percentage.

To illustrate how this works in practice, Table 8.4 shows the calculation of ROSI for a hypothetical shipping company, Perfect Shipping, trading between 1975 and 2006. Since this includes the 1980s recession and the 2003–6 boom it illustrates how the company performed in extremely good and bad markets. In December 1975 the company bought a fleet of 20 bulk carriers for \$162 million and traded them through to December 2006, by which time the fleet had a market value of \$740 million. To keep things simple, the fleet purchases in 1975 included one ship of each age from 1 to 20 years, and each year Perfect Shipping sells its oldest ship for scrap and orders a new replacement. This deals with the tricky depreciation issue because it owns a fleet of 20 ships with an average age of 10 years throughout the period. Between 1976 and 2006 the ROSI, calculated by the internal rate of return method, is 7.3% per annum (see column 13 - the IRR calculation is shown at the bottom) and the volatility is 40%, so it was a high-risk, low-return investment. For comparison, between 1980 and 2006 the average value of the 6-month LIBOR interest rate was 6.9%, so the return was about the same as putting the funds on deposit.

However, when we examine the three components of this return, EBID (column 4), depreciation (column 7) and capital gain (column 10) we get some very interesting insights into the risk profile of the company. If by 'risky' we mean the chance of losing the investment, Perfect Shipping is not nearly as risky as the volatility suggests.

Earnings before interest and depreciation (EBID)

The starting point is the EBID calculation shown in Table 8.4, column 4. This takes the earnings per day in column 2 and deducts operating expenses (OPEX) in column 3 to calculate EBID in millions of dollars per year. Over the period the company generated \$1180 million but the cashflow was very volatile, swinging wildly from virtually nothing

Table 8.4 Return on shipping investment for Perfect Shipping

	1	2	3	4	5	6	7	8	9	10	11	12	13
		EBID			Depreciation (DEP) $ mill			Capital gain (CAPP) $ m.			Return (ROSI)		
					Cost of replacing 1 ship								
	Core fleet	Spot Earnings $/day	less OPEX $/day/ship	EBID $ mill	New ship	Scrap sale	Total	Price of 10-year-old ship	Value of fleet	Capital gain (loss)	EVA $ m.	Net asset value	ROSI% col 11 + col 12
t		F_t	$OPEX_t$	$EBID_t$	NP_t	S_t	DEP_t	P_t	(P_tN_t)	CAP_t	4+7+10	*NAV*	$ROSI_t$
1975	20	*memo:* purchase price of the fleet Dec 1975 →							162.0		(162)	162	
1976	20	4,964	3,494	**9.2**	16.0	1.3	(14.7)	6.0	120.0	–42	(47)	115	–40%
1977	20	3,814	3,984	–2.4	16.0	1.3	(14.7)	4.1	82.7	–37	(54)	60	–66%
1978	20	4,759	4,589	–0.2	19.0	1.4	(17.6)	6.7	133.3	**51**	33	93	25%
1979	20	9,888	5,079	**32.1**	26.0	2.3	(23.7)	10.8	216.0	**83**	91	184	42%
1980	20	12,534	5,499	**47.6**	30.0	2.6	(27.4)	13.7	273.3	**57**	78	262	28%
1981	20	11,540	5,152	**43.2**	29.0	1.8	(27.2)	8.7	173.3	–100	(84)	178	–48%
1982	20	5,121	4,586	**2.4**	19.0	1.4	(17.6)	4.3	86.7	–87	(102)	76	–118%
1983	20	5,129	4,406	**3.7**	18.0	1.5	(16.5)	5.2	104.0	**17**	5	80	4%
1984	20	6,493	3,847	**17.4**	16.6	1.7	(14.9)	5.8	116.0	**12**	14	95	12%
1985	20	5,803	3,409	**15.7**	15.0	1.6	(13.4)	4.1	81.3	–35	(32)	62	–40%
1986	20	4,389	3,409	**5.8**	16.5	1.6	(14.9)	5.2	104.0	**23**	14	76	13%
1987	20	6,727	3,519	**21.4**	21.0	2.2	(18.8)	8.7	173.3	**69**	72	148	42%
1988	20	12,463	3,646	**60.6**	26.0	3.2	(22.8)	11.3	226.7	**53**	91	239	40%
1989	20	13,175	3,865	**64.0**	29.0	3.3	(25.7)	14.0	280.0	**53**	92	331	33%
1990	20	10,997	4,080	**47.2**	29.0	3.1	(25.9)	12.0	240.0	–40	(19)	312	–8%
1991	20	12,161	4,950	**49.0**	34.0	2.3	(31.7)	16.0	320.0	**80**	97	409	30%
1992	20	8,243	4,031	**28.3**	28.0	1.8	(26.2)	12.5	250.0	–70	(68)	342	–27%
1993	20	9,702	4,413	**35.7**	28.5	2.0	(26.5)	13.0	260.0	**10**	19	361	7%
1994	20	9,607	4,351	**35.5**	28.0	2.1	(25.9)	14.0	280.0	**20**	30	390	11%
1995	20	13,934	4,654	**63.6**	28.5	2.3	(26.2)	14.3	286.7	**7**	44	434	15%
1996	20	7,881	5,229	**17.0**	26.5	2.5	(24.0)	13.0	260.0	–27	(34)	401	–13%
1997	20	8,307	5,377	**18.9**	27.0	2.0	(25.0)	15.8	316.0	**56**	50	451	16%
1998	20	5,663	4,987	**3.2**	20.0	1.4	(18.6)	9.8	196.0	–120	(135)	315	–69%
1999	20	6,370	5,000	**8.1**	22.0	1.9	(20.1)	12.0	240.0	**44**	32	347	13%
2000	20	10,800	5,100	**38.4**	22.5	2.1	(20.4)	11.8	236.0	–4	14	361	6%
2001	20	8,826	5,202	**23.8**	20.5	1.7	(18.8)	9.5	190.0	–46	(41)	320	–22%
2002	20	6,308	5,306	**5.4**	21.0	2.0	(19.0)	11.5	230.0	**40**	26	347	11%
2003	20	17,451	5,412	**82.6**	27.0	3.4	(23.6)	20.0	400.0	**170**	229	576	57%
2004	20	31,681	5,520	**181.5**	36.0	4.9	(31.1)	31.0	620.0	**220**	370	946	60%
2005	20	22,931	6,000	**116.7**	36.0	4.3	(31.7)	24.0	480.0	–140	(55)	891	–11%
2006	20	21,427	6,200	**104.7**	40.0	5.0	(35.0)	37.0	740.0	**260**	330	1221	45%
Number years		31		*memo:* closing value of the fleet ↗					*memo:* closing NAV ↗				
Total $ mill		2,234	1,053	180	772	72	(700)			578	1059		

Notes on methodology

1. Number of ships in fleet
2. Average 1 year time-charter rate until 1989 and average weekly earnings for 10-year-old ship thereafter (all CRSL data)
3. Operating costs. 1976 to 1988 from Clarkson Research database. 1989 to 1998 from company records.
4. EBID is ((Col 2 × 350) – (Col 3 × 365) × Col 1) ÷ 1,000,000
5. Newbuilding price at year end. Should be lagged to take account of the delivery schedule, but for simplicity taken in year.
6. Shows the disposal value of one ship each year based on lightweight of 12,900 tons
8. 2nd hand price of 10-year-old vessel (year end). Until 1997 estimated from 5-year-old Panamax price.
10. Change in the value of total fleet during the year in $ million
11. Economic value added (EVA) Col 4 + Col 7 + Col 10
12. Net asset value is the current value of the fleet + EBID – DEP

in some years to over $50 million in others. But over the 31 years there were only two years when EBID was negative: $2.4 million in 1977 and $0.2 million in 1978. So with $3 million working capital, Perfect Shipping could have met its obligations every year, even in the appalling recession of the 1980s, which satisfies at least one of the criteria of an investment-grade credit rating – it could meet its obligations in all foreseeable circumstances, provided it was financed by equity and its only obligations are the operating costs.

Depreciation

The reason why the company's trading cashflow cover is so strong is that a large proportion of its costs are capital. Normally depreciation is a non-cash item, but in this example replacement is dealt with out of cashflow. The fleet was bought for cash and each year a new ship is bought for cash at current market prices and the oldest ship is sold for scrap. Over the 31 years the replacement cost totalled $700 million, soaking up 59% of the company's $1180 million EBID. There are two points to make about this aspect of the model. First, the fleet retains exactly the same size and age profile over the period, so it is a true reflection of economic depreciation. Second, replacement is not necessarily a fixed cost and can be varied to fit with the company's cashflow. When cash is tight, replacement can be deferred and the oldest ships traded on for a few years. There were nine years when Perfect Shipping might have done this because trading cashflow did not cover replacement. During booms, when cash is plentiful, more ships can be ordered. This flexibility gives the company financial security.

Capital gain

Finally, there is capital appreciation. By 2006 the fleet purchased for $162 million in 1975 had increased in value to $740 million. The fleet's asset value is calculated in Table 8.4 by multiplying the number of ships in the core fleet (column 1) by the market price of a 10-year-old ship (column 8) and the gain or loss each year is shown in column 10. It was a bumpy ride, with the fleet losing $100 million in 1981, gaining $220 million in 2004, losing $140 million in 2005 and gaining $260 million in 2006. But for Perfect Shipping this increase in asset values is not a true appreciation because the replacement cost of its fleet has also increased and the company has exactly the same physical assets it started with.

Financial performance of Perfect Shipping

In summary, Perfect Shipping earned $1180 million before interest and depreciation (EBID). It spent $700 million cash replacing ships (i.e. the depreciation), leaving $480 million dollars free cashflow. The fleet increased in value to $740 million, an increase of $578 million, so the total economic value added was $1059 million and the net asset value increased from $162 million to $1221 million (column 12).

By capital markets standards it is a strange investment. The return of 7.3% IRR was very low compared with the other investments reviewed earlier in the chapter (see Table 8.3) and not much more than the dollars would have earned on deposit. The returns were unreliable. Earnings had a standard deviation of 40%, and 10 years into the investment in 1985 the NAV had halved to $76 million (column 12). It was not until 1987 that the original investment of $162 million was exceeded, so it needed very patient investors. These uneven returns over long periods would make shipping unsuitable as a pension investment, but it is surprisingly safe. The EBID was positive every year except 1977–8, and $3 million working capital would have covered that. There was no debt, and although there were years when replacement investment could not be funded from cashflow, that could be deferred allowing Perfect Shipping to navigate through recessions without running out of cash. In the past many shipping investors have adopted this sort of strategy of not borrowing. For example, after their experiences in the recessions which dominated the first half of the twentieth century, in the 1950s and 1960s many British shipping companies were very risk-averse, financing their investment mainly from cashflow,[12] and some Greek tramp owners followed the same sort of strategy.

But the redeeming feature of this idiosyncratic investment is the opportunity it presents to smart entrepreneurs. Perfect Shipping ended up with assets of over $1 billion, but it could be run by an owner, a couple of managers and 20–30 staff. Most businesses employing this amount of capital have thousands of staff and a large management structure to go with it. Slim returns by capital market standards are a small fortune for a single proprietor and the control of a business with all these assets presents endless opportunities. One obvious example is speculating in ships. If the company had bought five ships at the bottom of each cycle and sold them at the top it would have generated an extra $414 million over the period. Or if it had managed to make its ships last 25 years instead of 20, without spending more on maintenance, it would have made an additional $120 million. It could also have used the ships as collateral to borrow and enlarge the fleet. Then there is the cargo side – the opportunity to take cargo contracts and charter in ships to operate them at a profit. These activities do not require armies of managers; they call for an individual with a gift for spotting what to do next and the skill, luck and capital to do it.

So the reason for investing in a low-return, high-risk business is that owning a shipping company offers entrepreneurs a unique opportunity to put their talents to work. Proprietors and family investors in shipping companies who value security over ROI can play it safe, but ambitious shipowners can use their skills to trade the volatility of freight rates and ship prices. In doing so they add value by making shipping supply more responsive to economic trends – exactly what the market wants. If they get it right the market makes them rich – if not, there's always another cycle. So the ROSI model offers low return and low risk or high return and high risk. That, briefly, is the explanation of the *shipping return paradox*.

8.3 COMPETITION THEORY AND THE 'NORMAL' PROFIT

Our next task is to explore the economic trade-off between risk and return for shipping companies. In Chapter 5 we discussed the macroeconomic model and saw that the flow of cash is regulated by supply and demand which drives freight rates up and down. But that analysis did not tell us where freight rates and profits average out, nor did it discuss the risks of, for example, leveraging. So in this section we will apply the microeconomic theory to the firms in the shipping market to answer these questions.

The Shipping company microeconomic model

Continuing with the Perfect Shipping case study, we will focus on the company's costs and revenues at a point in time. The business profile in Table 8.5 shows a fleet of 20 ships (column 1) with a book value of $246.8 million (the total of column 2). As before, the youngest ship is 1 year old and the oldest 20 years (column 3). Perfect Shipping's *variable costs* are shown in columns 4–6. Its office costs $3 million per annum to run, increasing to $4 million when all 20 ships are at sea (column 4). Operating costs (column 5) increase with ship age, almost doubling from $1.1 million per annum for the youngest ship to $2.05 million per annum for the oldest ship. The cumulative operating cost (column 6) reaches $31.4 million per annum when all 20 ships are in service. Since the older ships cost more to run, when freight rates are below variable costs the company can reduce its costs by laying up the least efficient ships. The *capital costs* of the business are summarized in section 3 at the bottom of Table 8.5. The annual cost of financing the $246.8 million fleet is $22.2 million, which assumes 5% interest and 4% depreciation, which must be paid regardless of how many ships are at sea.

On a day-to-day basis Perfect Shipping's main operating decision is whether to trade all its ships or move some of them into lay-up. It bases its decisions on two variables, the cost profile of its fleet and the level of freight rates. In Table 8.5, columns 7–9 show three cost functions which describe the company's cost profile, the marginal cost (MC) in column 8; the average variable cost (AVC) in column 9; and the average total cost (ATC) in column 10. These curves are illustrated graphically in Figure 8.3.

- The MC curve represents the cost of putting one more ship to sea. It is shown in column 7 of Table 8.5 and includes two items. The first is the cost per annum of each of the 20 ships, ranging from the cheapest, which costs $1.1 million per annum to run to the most expensive, which costs $2.05 million (Col 6). The second is the small increase in office costs as more ships are brought into service (calculated from the change in Col 4 as the fleet increases by one ship). In Figure 8.3 the MC curve is plotted using the MC data shown in Col 7 of Table 8.5. It appears as a straight line increasing from $1.1 million a year with only the cheapest ship at sea to $2.1 million a year when the least efficient ship is activated. When all 20 ships are at sea, the MC curve becomes vertical because the company has no more ships.
- The AVC is the average cost of the ships at sea, as shown in Col 8 of Table 8.5. It is the sum of office costs for the number of ships at sea (Col 4) and the total OPEX of those ships (Col 6) divided by the number of ships at sea. It falls from $4.15 million with one ship at sea to $1.77 million with 20 ships at sea, as plotted in Figure 8.3.
- The ATC is the sum of office costs, operating costs and capital costs, which are shown at the bottom of Table 8.5 divided by the number of ships at sea. Because capital costs