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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

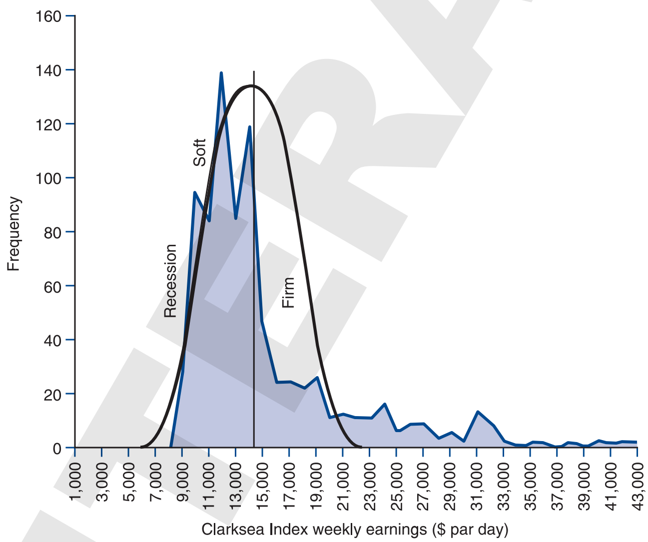


Figure 8.1
Distribution of shipping earnings, 1990–2005
Source: Martin Stopford, 2005 and Clarksons

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	Containership
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.

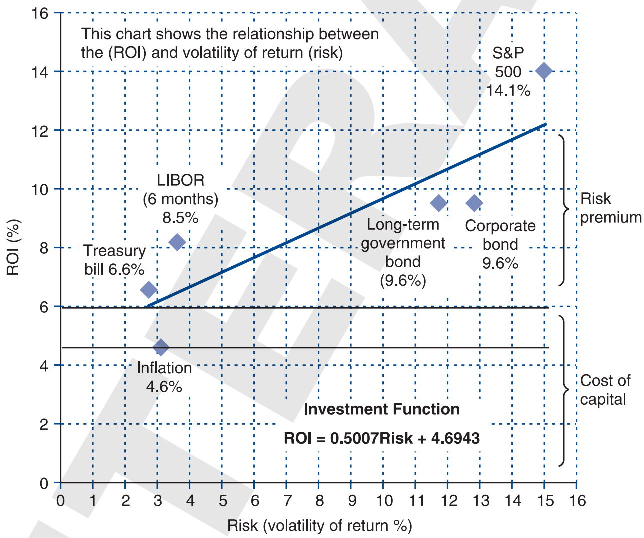


Figure 8.2
Risk pricing of various assets, 1975–2002
Source: Ibbotson, various

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.

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.

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).

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

Table 8.5 Perfect Shipping operating model

1	2	3	4	5	6	7	8	9
1. FLEET			2. VARIABLE COSTS			4. COST FUNCTIONS		
Fleet profile			Office	Operating costs		How costs develop as output expands		
				OPEX				
No. at sea	Book value $m/ ship	Age of ship years	Total costs in year	per ship of age in Col 1	for fleet of ships at sea	MC equals Col 5 + extra office cost	AVC Col 4 + Col 6 ÷ Col 1	ATC Cols 4 + 6 + 22.2 ÷ Col 1
1	20.0	1	3.1	1.10	1.1	1.10	4.15	26.36
2	19.2	2	3.1	1.15	2.2	1.20	2.67	13.78
3	18.4	3	3.2	1.20	3.4	1.25	2.20	9.60
4	17.6	4	3.2	1.25	4.7	1.30	1.97	7.52
5	16.8	5	3.3	1.30	6.0	1.35	1.85	6.29
6	16.0	6	3.3	1.35	7.3	1.40	1.77	5.47
7	15.2	7	3.4	1.40	8.7	1.45	1.72	4.90
8	14.4	8	3.4	1.45	10.2	1.50	1.70	4.47
9	13.6	9	3.5	1.50	11.7	1.55	1.68	4.15
10	12.8	10	3.5	1.55	13.2	1.60	1.67	3.89
11	12.0	11	3.6	1.60	14.8	1.65	1.67	3.69
12	11.2	12	3.6	1.65	16.4	1.70	1.67	3.52
13	10.4	13	3.7	1.70	18.1	1.75	1.68	3.38
14	9.6	14	3.7	1.75	19.9	1.80	1.68	3.27
15	8.8	15	3.8	1.80	21.7	1.85	1.70	3.18
16	8.0	16	3.8	1.85	23.5	1.90	1.71	3.10
17	7.2	14	3.9	1.90	25.4	1.95	1.72	3.03
18	6.4	16	3.9	1.95	27.4	2.00	1.74	2.97
19	5.6	18	4.0	2.00	29.4	2.05	1.75	2.92
20	3.6	20	4.0	2.05	31.4	2.10	1.77	2.88
Total	246.8		3.0	31.40				
Percent of costs								

3. CAPITAL COSTS

The fleet's total annual capital cost is

	£ mill
Interest at 5% p.a.	12.3
Depreciation at 4% pa	9.9
Total capital cost per annum	22.2

Definition of the 4 sections in this table

1. Fleet shows a fleet of 20 ships with one ship of each age 1–20 years; **2. Variable Costs** show how ship specific costs vary for each age of ship; **3. Capital** is the fixed cost of $22.2 m which must be paid however many ships are at sea; 4. Cost functions show how the company's cost per ship changes depending on the number of ships at sea, which is shown in Column 1

must be paid regardless of whether or not the ship is trading, it falls from a massive $26.36 million with one ship at sea to $2.88 million per annum with 20 ships at sea. The ATC curve in Figure 8.3 is plotted using the data from Col 9 of Table 8.5.

The graphical illustration of these three curves in Figure 8.3 summarizes the financial position on which Perfect Shipping bases its operating decisions. The AVC line shows the non-capital break-even point for the business during recessions (depending on the number

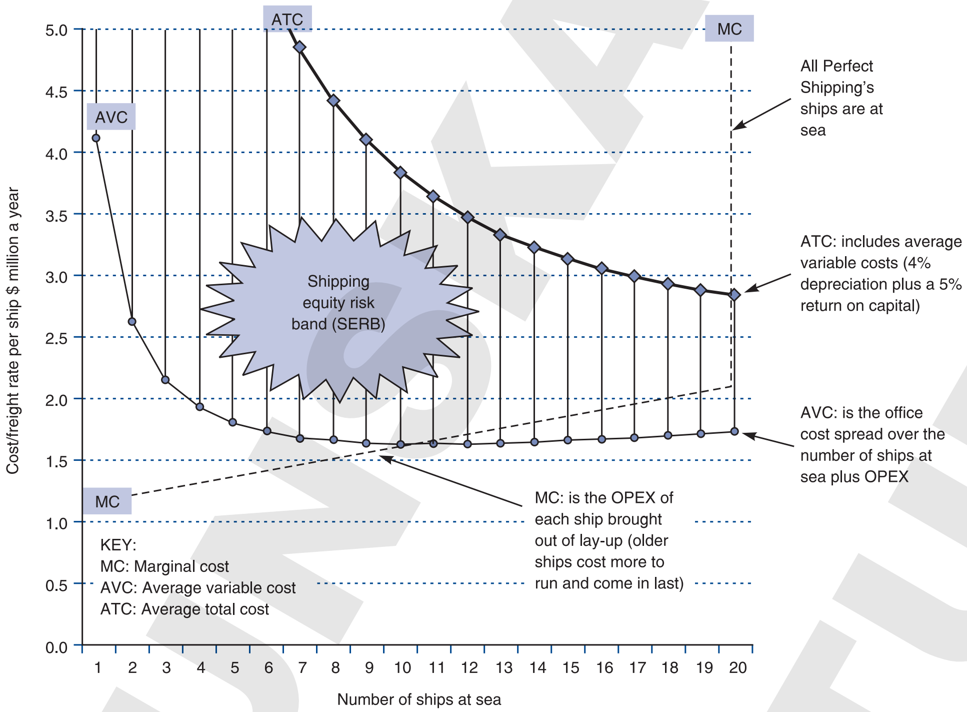


Figure 8.3
The perfect competition model MC, AVC and ATC curves

of ships at sea). But if we include the nominal allowance for capital, the relevant curve is the ATC line, that tells a very different story. At all output levels the break-even point is much higher. We will refer to the shaded area between these two curves as the shipping equity risk band (SERB), and the central issue for Perfect Shipping is how to finance this dominant element of its costs. The choice of debt or equity determines the business's break-even cashflow. If the SERB is financed mainly with debt the shipping company needs to invest less of its own capital, leveraging up its returns, but it is committed to a debt repayment schedule. For example, with nine ships at sea Perfect Shipping can survive on average earnings of $1.62 million a year, but if it is financed with 100% debt it must earn $4.09 million a year per ship to meet its obligations. So the company (and its bankers) must decide how much of the SERB can safely be financed by equity and how much by financial instruments involving fixed payment schedules.

Freight revenue and the short-term cyclical adjustment process

If we introduce freight rates into the analysis (Figure 8.4), we see why the financial structure is so important. Four different levels of freight rates are represented by the horizontal lines labelled P_1–P_4. These freight rates are determined by supply and demand (see Chapter 5) but all Perfect Shipping sees is a horizontal price line which does not change, regardless of how many ships the company offers for hire.

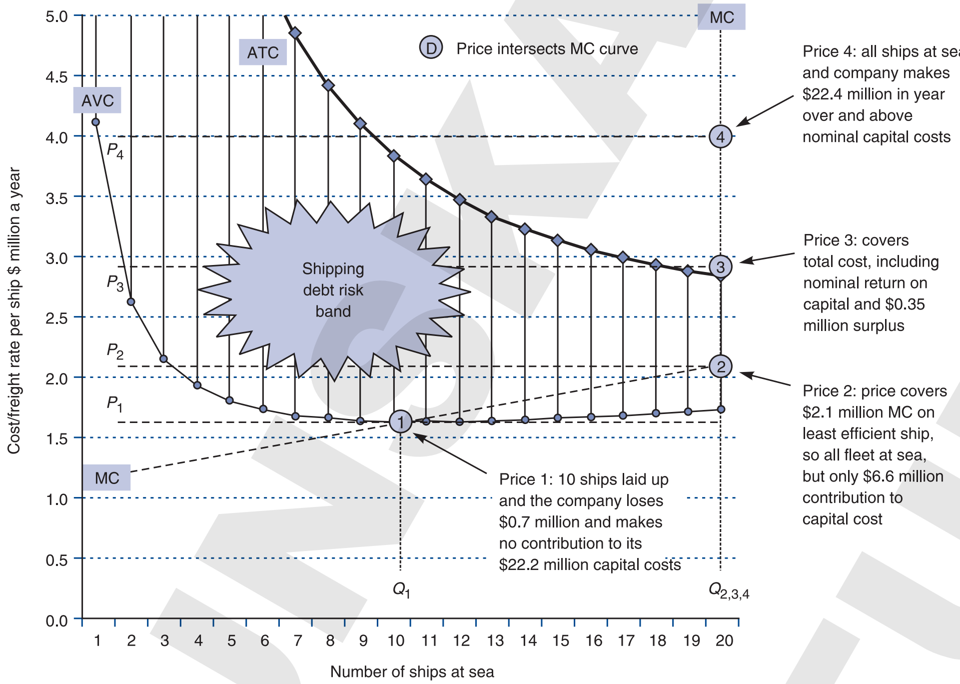


Figure 8.4
The perfect competition model with prices

The perfect competition model tells us that Perfect Shipping will maximize its profit (or minimize its loss) by producing at the level where its marginal cost equals the freight *rate*. At price P_1, which is $1.6 million per ship per annum, it should operate 10 ships because at that operating level its marginal cost of $1.6 million per annum equals the price. The economic logic is obvious. If it puts ten ships to sea, then the 11th ship costs $1.65 million to operate, so it loses $50,000 a year. Conversely if it puts only nine ships to sea, it loses the $50,000 revenue contribution obtained by trading ship 10. That is the basic decision process of companies operating in a perfect market – produce to a level at which marginal cost equals price.

With ten ships at sea, the AVC is $1.67 million per annum and the revenue is $1.6 million per ship, so the company loses a total of $ 0.7 million on the 10 ships at sea and makes no contribution to its $22.21 nominal capital cost. If the company is financed with equity there is no problem, but if any of the SERB capital is financed with debt, it cannot make its payments to the bank. If the payments are not made, a second decision-maker enters the market, Perfect Shipping's banker (a situation rather like the one faced by Perfect Shipping in 1977 in Table 8.4). This illustrates the position in recessions when the financial strength of shipping companies is tested and only the strongest survive. If the low rates persist the weak companies may end up selling their ships to the financially strong at distress prices, a game of pure Darwinian economics.

Moving on to P_2 in Figure 8.4, revenue increases to $2.1 million per ship, which equals the MC of the oldest ship, so the company puts all its ships to sea. Perfect Shipping can now pay all its fixed and variable costs, but it only makes $6.6 million contribution to its $22.2 million nominal capital costs. It could probably pay some interest, but not repay principal, a situation the bank is unlikely to tolerate. At P_3 the earnings rise to $2.9 million per ship, so the company finally covers its nominal capital costs, whilst at P_4 the freight of $4 million per ship locks in a $22.4 million bonus profit for shareholders. Economists sometimes refer to this element of profit as 'rent'. At this point any leveraging pays off, since the owner or equity investor keeps this profit. As the money pours in the company is desperate to increase its earnings by expanding the fleet, and it has the funds to do it. Initially it bids for second-hand ships which can trade immediately, but eventually these become so expensive that newbuildings look more attractive. As the orderbook is delivered the market achieves its aim – capacity expands and earnings fall.

Since the financial structure determines a company's tolerance to freight cycles, this links their financial strategy to their view of the market. For example, companies which believe there will be no significant market disruption in the coming years may decide to cover a large proportion of their SERB with debt. If they are right, the owners will make big profits while companies taking a more conservative view will pay for their conservatism in low returns. If their shareholders become disillusioned, they might end up being bought out by their more aggressively financed competitors, or exiting the business. But if there is a market crisis, their conservative financial structure will let them survive and they may even be able to buy out their over-leveraged competitors. So shipping companies are differentiated and their financial strategy puts them in competition with each other as they make their way through the cycles. From this perspective shipping is more like poker, a game between the players.

The long-term adjustment process

As the cashflow of the company swings from –$22.9 million at P_1 to $22.4 million at P_4, Perfect Shipping has to average out the good years with the bad. This is where the longer-term adjustment mechanism comes into play. Companies go on ordering ships as long as they can make a normal profit. If the freight rate moves above the ATC, companies will order more ships. Conversely if the rates stay below the ATC too long, investors become disillusioned and underinvest, cutting back on newbuilding and scrapping old ships. In this way the market squeezes out the inefficient ships and as the supply falls, earnings are driven up and a more cost-effective fleet moves into the upswing. Taking one cycle with another, the profits average out at the level which keeps investors coming back for more, and, given the structure of companies like Perfect Shipping, the idea that the normal profit settles at about the cost of borrowing plus a small margin is quite plausible.

The link between the macroeconomic and microeconomic models

The link between the microeconomic and macroeconomic models is illustrated by the graphs in Figure 8.5. Figure 8.5(a) shows three prices being generated by the interaction of supply and demand at a macroeconomic level. Price 1 is determined by the intersection

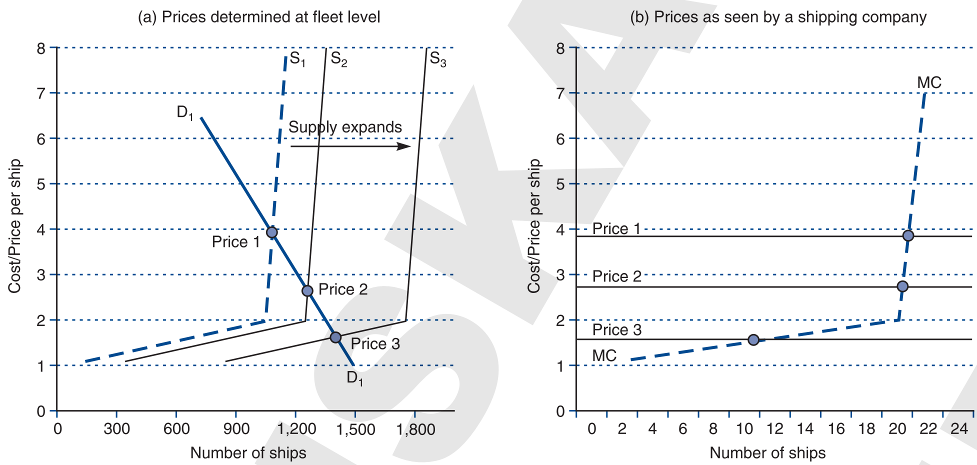


Figure 8.5
The long-term return ratchet

of D_1 and S_1, but as more supply is added in response to the high price, the supply curve moves to the right, generating price 2 at S_2 and price 3 at S_3. This process was discussed in Chapter 5. Figure 8.5(b) shows how this generates the market prices faced by the individual firm in Figure 8.4.

However, in practice the adjustment mechanism is not as clear-cut as the foregoing analysis suggests. At prices below P_2 the marginal benefit of laying a ship up is so small in relation to other costs the shipowner faces, the rational response is to keep all the fleet in service, just in case an unexpected surge in freight rates produces a spike. In these circumstances the process of selecting the ships to marginalize is left to charterers who take the best ships first and when there is surplus capacity, as there is at prices below P_2, leave the rest hanging around for a cargo. But that is not a great loss when rates are so close to operating costs. In these circumstances the shipping firm's position is like a poker player struggling with a bad run of cards and figuring out when to raise the bet and when to quit. On this analogy the 'normal' profit is the statistical margin that a professional gambler calculates he can win in the long run, and this is what determines whether he carries on gambling. But not all gamblers are strictly rational and the same probably applies to shipping investors, especially if there is a chance of getting $22.4 million on the next upswing.

The cobweb theorem and the difficulty of defining returns

The market model in Figure 8.5 is static, so it does not show the time dimension that plays such an important part in the process of adjustment. The combination of unpredictable changes in demand and time-lags as supply responds, adds another dimension to the complexity facing firms in the shipping market. In Section 4.5 we defined three time-related equilibrium points: the *momentary* equilibrium which is only concerned with the ships in the loading zone; the *short run* in which ships can move in and out of lay-up; and the *long run* where new ships are built and delivered. The same lags operate at a microeconomic level, and the 'cobweb model' is often used by economists to describe the dynamic adjustment process when there is a time-lag in the response to supply and demand changes.[13]

The way the cobweb theorem works is illustrated in Figure 8.6. This figure is divided into two parts; Figure 8.6(a) shows the adjustment process for an individual company and Figure 8.6(b) shows what happens at industry level. The freight rate is in thousands of dollars per day on the vertical axis and the number of ships ordered or scrapped on the horizontal axis. We start with the market in equilibrium at P_e, a freight rate of \$22,500 per day. At this freight rate demand equals supply and owners neither scrap nor order ships (i.e. it equates to P_3 in Figure 8.4, which just covers ATC). Then for some reason the price shoots up to P_1 (\$30,000/day). At this profitable price level the supply curve shows that owners will rush to the shipyards and order four new ships (see point B on graph). But when the four ships are delivered the supply increases by four ships and the owners find they have to drop their price to \$15,000 per day to get them all chartered (see intersection with demand curve at point C). With rates down at \$15,000 a day the owners decide to scrap three ships (see supply curve at point D), reducing the fleet. But with three fewer ships available freight rates rise to \$30,000 a day at point A! The owners order four ships … and so it continues.

The graph in Figure 8.6(b) shows how these actions by individual shipping companies affect the general market balance (note that this chart is not really to scale). On the down stroke when the new ships are being delivered and supply is expanding, the extra ships move the supply curve to the right from S_1 to S_2, driving down rates. Then as the low rates force some old ships out of the market, the supply curve moves left from S_2 to S_1 pushing freight rates up from P_2 to P_1. This pumps money into shipowners' bank accounts, motivating the new orders. Because it takes a couple of years for the ships to arrive the boom is extended and many orders are likely to be placed. As all these new ships are delivered, the supply curve moves forward again to S_2, driving the price back

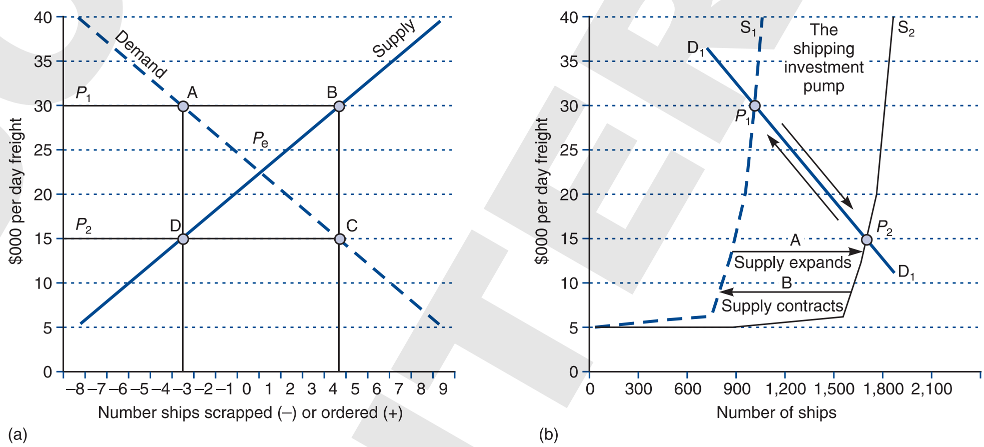


Figure 8.6
The cobweb model for the shipping market: (a) at company level; (b) at industry level

down to P_2. It may take owners a while to make the decision to scrap old ships, during which the recession drags on. In this way the investment pump manages fleet replacement, alternately sucking in the new ships and driving out the old ones.

But while this sub-plot of fleet replacement is going on, the market also has to deal with unpredictable changes in demand. In the example in Figure 8.6(b) the demand curve does not change – the adjustment is entirely driven by the supply mechanism. But in the real world the demand curve moves left and right in response to trade growth and business cycle recessions. This adds a second layer of complexity to the decision facing investors. Where will the demand curve be when the new ships are delivered? As we saw in Chapter 5, it is a mind-numbing calculation in which expectations play a major part. If all the old ships are scrapped as soon as rates fall, the cycle soon turns up. But if owners hang on in the hope of a demand-driven upturn, the recession drags on until a demand-driven recovery takes place. Pity the poor forecaster trying to reproduce this model, a cross between three-dimensional chess and stud poker.

Finally, we can note that the shipping supply curve is not just driven by freight rates, investor sentiment is also important. During a recession investors may decide the time is right for some counter-cyclical ordering, or they may panic and sell their older ships for scrap. Two very different freight scenarios would result, another reason why shipping cycles are so difficult to predict. However, one thing is clear. All the time the capacity pump is thumping away in the background, and since its pumping speed determines the ROSI we cannot expect the 'normal' profit to be consistent or well defined. All we know is that returns are sometimes very big, sometimes very small, and over the years there has never been a shortage of shipping investors willing to settle for these fuzzy terms.

Returns earned in imperfect shipping markets

We noted at the beginning of this section that in the specialized and liner segments the requirements for perfect competition are not always met because product differentiation and barriers to entry exist to a greater or lesser extent in these sectors. So the foregoing analysis does not necessarily apply. Recent developments in microeconomics help bridge the gap between the perfectly competitive market, of which bulk shipping is an example, and the more complex oligopolistic world of specialized shipping companies. According to Porter, in any industry, whether it is domestic or international, the nature of competition and the return on capital are driven by five competitive forces: the threat of new entrants; the threat of substitute products or services; the bargaining power of suppliers; the bargaining power of buyers; and the rivalry among the existing competitors.[14] Porter argues that the strength of the five forces varies from industry to industry and determines long-term industry profitability. In industries in which the five forces are favourable, competitors are able to earn attractive returns on invested capital. Industries in which pressure from one or more of the forces is intense are those where few firms are very profitable for long periods.

The five competitive forces determine the industry profitability because they shape the prices firms can charge, the costs they have to bear and the investment required to compete in the industry. In industries such as soft drinks, pharmaceuticals, and cosmetics, Porter argues that the five forces are positive, allowing many competitors to earn attractive returns on invested capital. In others such as fabricated metal, aluminium and semiconductors the alignment of the five forces is unfavourable and profitability is weak. In effect, Porter's approach adapts the general principles of the perfect competition model to modern business. The threat of new entrants limits the overall profit potential because new entrants bring new capacity and seek market share, pushing down margins, whilst powerful buyers or suppliers bargain away the profits for themselves. The presence of close substitute products limits the price competitors can charge without inducing substitution. Industries which have some degree of protection from these five competitive elements are likely to have higher profits. This protection may take the form of barriers to entry, strong brand recognition, weak buyers and a degree of monopoly power. When none of these protective factors exist, the industry reverts to the classic perfect competition model.

Although specialized and liner shipping do not conform to the perfect competition model, they are vulnerable to similar competitive forces. Anyone who has studied the shipping market knows how vulnerable it is in these respects. Entry to even the most specialized services is relatively easy, requiring capital and expertise which can usually be acquired fairly easily. Customers are often large corporations importing cargo, who ruthlessly pursue any advantage. Admittedly there is no substitute for deep-sea service, but that is hardly a significant factor because the market place is very competitive. When we add the fact that many specialized shipping companies are privately owned, and thus the industry has a rather different yardstick for measuring profit from multinational corporations, the case is made.

8.4 PRICING SHIPPING RISK

Differences in 'risk preference'

Shipping entrepreneurs are famous for taking risks, and during booms brokers' reports are full of comments about over-ordering which seem to suggest that the industry is run by irrational speculators who make the same overinvestment mistakes generation after generation. Can shipowners really be so irrational? Put so bluntly, it does not sound a very plausible theory, though there may be an element of truth in it. At the top of cycles investment sometimes gets out of hand, as it does in other markets, not least the stock markets. Taken to extremes that is bad because, as Keynes put it, 'When the capital development … becomes a by-product of the activities of a casino, the job is likely to be ill done'.[15] But there is no clear line between gambling and taking economic risks, making it difficult to separate good luck from good judgement. However, economic progress relies on investors building ships which are not always needed,[16] and despite the occasional spectacular misjudgement such as the 1970s tanker bubble, there is little long-term evidence that in shipping the job has been 'ill done'. On the contrary, the history of shipping in Chapter 1 shows how effective the industry's risk taking has been in a world where nobody really knows what will happen next.

Shipping investors need to take risks and the world needs them to. In the sixteenth century when investors clubbed together to send ships to trade in distant lands it was an extremely risky investment which no prudent maritime economist would have dreamt of taking. Often the ship did not return and the investors lost everything. But sometimes it docked with a cargo worth many times the cost of the venture. These risk takers opened up the global economy and today's shipping investors are their direct descendants. Although it is easy to focus on Aristotle Onassis's good fortune in the 1956 Suez boom, remember how he earned the money. Without his ships the oil shortages in Europe would have been far more severe, and if Onassis had not had a taste for risk, his ships would not have been laid up in the first place. Freight rates shot up in 1956 because the ships were indispensable. Another example is illustrated in Figure 8.7 by the one-year time-charter rate distribution for a Panamax bulk carrier between 1990 and September 2002 shown. The charter rate averaged $9,571 per day and the standard deviation was $2,339 per day, so statistically we can be 99% certain that earnings would not exceed $16,588 per day.[17] Despite this unrewarding history, during the 1999 recession many new Panamax bulk carriers were ordered for delivery in 2002. But by the time they were delivered spot earnings were only $5,500 per day and it looked like a disaster. However, just two years later in 2004 the average one-year time-charter rate for a Panamax bulk carrier was $34,323 per day, and by 2007 it had reached $51,000 per day. So those seemingly irrational orders placed in 1999, some times at prices as low as $19 million, turned out to be inspired. In 2007 the ship could have earned $16.5 million in a single year, and where would the Asian economies have been without them?

In short, risk taking is the explosive that clears the path for economic progress, and like nitroglycerine it needs to be handled carefully! Not all investors are conservative pension funds – some are entrepreneurs who actually enjoy the thrill of handling high explosives and do not really mind losing the odd arm or leg! This provides a clue as to where we should look for the explanation in shipping's unusual risk–return profile. The explanation is that shipping entrepreneurs have different *risk preferences* from financial institutions, so they price investments differently.

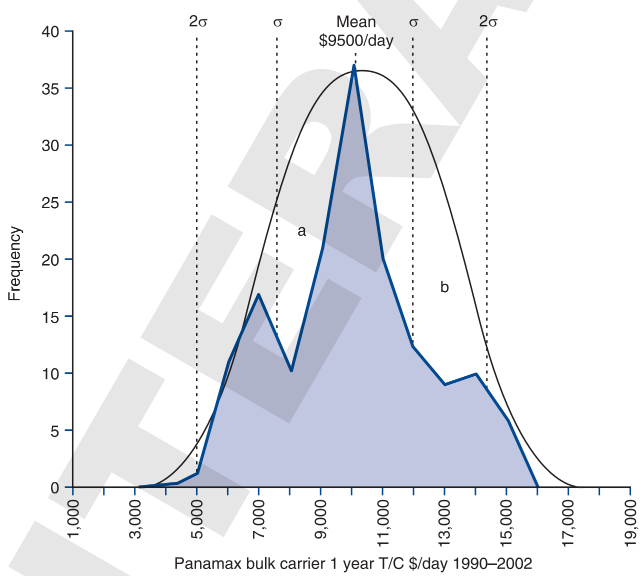
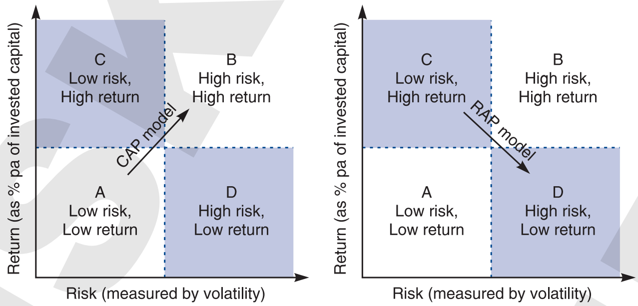


Figure 8.7
Risk profile of Panamax bulk carrier

The capital asset pricing model

To clarify this point Figure 8.8(a) shows that most financial institutions approach risk by concentrating on the relationship between risk and return and require more volatile investments to pay higher returns. Risk, measured by the volatility of the investment, is shown on the horizontal axis, return on the vertical axis, and the graph is split into four risk/return 'options' –A (low risk, low return), B (high risk, high return), C (low risk, high return) and D (high risk, low return).



(a) In the CAP model institutional investors value the predictability offered by stable investments

(b) In the RAP model entrepreneurs value the opportunities offered by volatile investments

Figure 8.8
Risk, reward options, showing CAP and RAP models

Most conventional investments are priced along the diagonal shown by the arrow, between options A and B. This is known as the *capital asset pricing* (CAP) model, and it postulates that the more volatile the return on a stock, the higher its average return should be. Financial analysts use the relationship between volatility and return to price securities, calculating the value of a company share by comparing its return and volatility with a reference market index such as the S&P 500. Stocks with a bigger standard deviation are expected to pay a higher return and vice versa. For example an IT stock with a standard deviation of 35%, more than twice as high as the S&P 500, would be expected to pay a much higher average return.

Risky asset pricing model

Shipping investors have different risk preferences, and we can introduce a new model to describe it. Working across the other diagonal from C to D, shown by the arrow in Figure 8.8 (b) the returns are negatively correlated with volatility, and we will call it the *risky asset pricing* (RAP) model. Shipping entrepreneurs are attracted to the high-risk and low-return option D by the opportunities offered by the volatility of the shipping cycles and its other characteristics, especially the liquid market for shipping assets which means that once in a while they can make fabulous profits. For example, a Panamax bulk carrier ordered in April 2003 for $23.5 million was resold on delivery in April 2005 for $55 million, a $52.5 million return on the $2.5 million deposit the owner paid when the ship was ordered. Investors choosing option D get a ticket to the big game and a few become billionaires.

But what about low risk, high return investments (option C)? The pricing in this box reflects the price of giving up the volatility. If a shipowner charters his ship for 10 years all he gets is the agreed charter hire. So naturally he might demand a higher return to compensate for the loss of flexibility and giving up his ticket to the big game. From this perspective the model makes perfect sense.

Shipping investors are not the only ones are willing to adopt the RAP model. Adam Smith pointed out that where the potential rewards are very great, 'the chance of loss by most men is under-valued'.[18] In other words, if there is a chance of getting really rich, a below average return may be acceptable. He gave the success of lotteries as evidence that 'the soberest people scarce look upon it as folly to pay a small sum for the chance of gaining ten or twenty thousand pounds; though they know that the small sum is perhaps twenty or thirty percent more than the chance is worth'.[19] And profit is not the only motivator. Risky trades in which there is an element of excitement often become so overcrowded that returns are lower than if there were no risks to be run. Alfred Marshall picked up this theme a century later, commenting that 'an adventurous occupation, such as gold mining, has special attractions for some people: the deterrent force of risks of loss in it is less than the attractive force of chances of great gain, even when the value of the latter estimated on the actuarial principle is much less a matter of the former'.[20] So there is nothing mysterious about shipping investors choosing the RAP model. After all volatility does not mean you lose your investment, it just means you are not sure when or how much you will be paid.

Shipping fits the RAP model pretty well, offering a few successful shipowners wealth beyond the dreams of lottery winners, whilst the less fortunate majority earn enough to survive and pay their bankers. In effect the market "sells" them the volatility which the institutional investors do not want because they cannot use it. But shipping entrepreneurs can and as the excitement of the poker table hooks investors, competition continually drives down the return on capital. This difference in risk pricing can be seen, for example, in the pricing of shares in publicly listed shipping companies which often trade at a discount to net asset value calculated on the basis of prevailing second-hand ship values. In other words given the same economic outlook, institutional investors are prepared to pay less for the assets than private shipowners buying the assets themselves.

And, of course, they like the business. Farmers are just the same, accepting a low return on the capital tied up in their farms because they value the way of life. It is a living and what would they do with the capital if they sold up? Many shipowners feel the same way. If you have $200 million in the business, what difference does it make if you make $10 million or $20 million in a year? And if you sell out, what do you do with the money? Where's the fun in owning stocks or a chain of supermarkets? Viewed in this way it is easy to see why the risk preferences of shipping investors are so different from those of fund managers. If they want to operate in box D, they are free to do so and history proves there is always a supply of investors ready to take their chances – if the supply dries up, the market just throws in a boom to kick-start the process.

But the last word goes to JP Morgan. Asked whether longshoremen were paid enough he replied: 'If that's all he can get, and he takes it, I should say it's enough'.[21] The same applies to shipping investors. A good outcome for consumers, which is exactly what market economics is about.

8.5 SUMMARY

In this chapter we have tackled the tricky issue of the return on capital. We started with the paradox that shipping is famous for its wealthy shipowners, but historically returns for such a volatile business have been low. Shipping investors often earned lower returns than, for example, the stock market. We called this the 'shipping return paradox' and set out to explain it.

The return on shipping investment (ROSI) model has four key components: EBID, CAPP, DEP and NAV. The core cashflow of any shipping company comes from earnings before interest and depreciation (EBID), but capital in the form of depreciation, capital appreciation and the net asset value of the fleet plays a dominant part in the financial performance of the business.

We used Perfect Shipping, a hypothetical shipping company which traded from 1975 to 2006 to illustrate the ROSI model. Over the 31-year period Perfect Shipping's annual ROSI was 7.3%, and its earnings were very volatile, even by equity standards, so this result is consistent with the history of low shipping returns. But we made a striking discovery. Despite the volatility of its earnings, Perfect Shipping was a very safe investment. There were only two years in 30 when its EBID was negative. Depreciation, which was dealt with by replacing one ship each year, could easily be deferred; the company's portfolio of real assets was a hedge against inflation; and sea transport is a core economic activity; so what more could an investor want? If we are concerned with the risk of loss, and can cope with a volatile revenue stream, Perfect Shipping is a pretty solid, if boring, investment.

We then discussed how the returns are determined. Although few modern industries conform to the famous perfect competition model developed by the classical economists in the nineteenth century, it fits shipping like a glove. With its many small companies, easy entry and exit, and flat medium-term supply curve, the shipping market operates like a pump, alternately sucking new ships in and pushing old ships out. The 'normal' profit is the lubricant needed to keep the pump operating efficiently. Basically companies keep investing until marginal cost equals price and in the long term marginal cost is the cost of capital. Interestingly, over the last fifty years, ROSI has fluctuated around the cost of interest.

Given the nature of the ROSI model, shipowners who want to make super-profits must be more adventurous than Perfect Shipping, and the ROSI model offers many opportunities for doing this. If they wish, shipowners can lead a Jekyll and Hyde existence. Dr Jekyll operates his fleet safely and efficiently, earning the normal profit, which is just sufficient to replace the fleet as it ages and pay a very modest return on capital. But the capital intensity of shipping provides Mr Hyde, the alter ego, with an ideal platform to operate as a speculator and entrepreneur, improving the EBID return by taking leveraged positions on time-charters or COA markets, and making capital gains through buying and selling ships on the side. Net asset value can be dramatically reduced by using old ships with low capital costs, but only if the shipowner can operate these old ships cost-effectively. Or the ships can be sold and chartered back, making the shipowner an operator.

This dual life is possible because the ROSI model offers the option to trade speculatively. Once shipowners go down this route their risk increases, but so do the potential profits. The problem is that as companies grow in size it becomes increasingly difficult to find attractive speculative opportunities of sufficient size to affect the company's bottom line, and the normal profits look unattractive. As a result, successful shipping companies often diversify into other industries, a tendency which keeps the size of shipping companies small!

In conclusion, shipping is as risky as the management make it and shipping investors enjoy one of the most exciting businesses in the world, whilst giving consumers a pretty good deal on their transport, so in the end everyone wins. But it is not a business for the faint-hearted!