

RISKS AT SEA
*Amsterdam insurance and
maritime Europe, 1766–1780*

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CHAPTER 1

Introduction

The history of marine insurance, *lato sensu*, has still to be written. This should not imply that one of the venerable forms of commercial protection has suffered from neglect, that scholars have passed the challenge of the subject. Rather the reverse, for the collections in libraries are eloquent and deal with many countries. A few names mentioned and the contribution becomes substantial. Classic authors such as Enrico Bensa and J.-M. Pardessus have a well-deserved reputation in the field.¹ And different countries have not been backward in producing a wealth of talent: Violet Barbour, P. J. Blok, E. L. G. den Dooren de Jong, J. E. Elias, W. H. A. Elink Schuurman, I. Schöffner, H. G. Schuddebeurs, Z. W. Sneller and J. P. Vergouwen for The Netherlands;² R. Ehrenberg, G. A. Kiesselbach, and J. F. Plass for Hamburg;³ C. Thorsen for

¹ Enrico Bensa, *Il contratto di assicurazione nel medio evo* (Genoa, 1884); J.-M. Pardessus, *Collection des lois maritimes antérieures au XVIIIe siècle* (6 vols., Paris, 1828–45).

² Violet Barbour, 'Marine risks and insurance in the seventeenth century', *Journal of Economic and Business History*, I (1928–29); P. J. Blok, 'Het plan tot oprichting eener Compagnie van Assurantie', *Bijdragen voor Vaderlandsche Geschiedenis en Oudheidkunde*, 4e. Reeks, I (1900); E. L. G. den Dooren de Jong, 'De praktijk der Amsterdamsche Zeeverzekering in de 17e. eeuw', *Het Verzekeersarchief*, VIII (1927); J. E. Elias, *Schetsen uit Geschiedenis van ons Zeewesen* (6 vols., The Hague, 1916–30), and *De Vlootbouw in Nederland in de eerste helft der 17e. eeuw, 1596–1655* (Amsterdam, 1933); W. H. A. Elink Schuurman, 'Korte aantekeningen betreffende verzekering in de dagen der Republiek', *EHJ*, III (1917); I. Schöffner, 'De vonnissen in averij-grosse van de Kamer van Assurantie en Avarij te Amsterdam in de 18e. eeuw', *EHJ*, XXVI (1956); H. G. Schuddebeurs, 'Het Nederlandsche verzekeersbedrijf gedurende de laatste twee eeuwen, voorsoover dit werd uitgeoefend door naamlooze vennootschappen', *EHJ*, XIV (1928), and 'Vier eeuwen verzekering in Nederland', *Het Verzekeersarchief*, XXX (1953); Z. W. Sneller, 'Die drie cargasoenen rogge van Daniel van der Meulen c.s. anno 1592 en hun verzekering', *Amstelodamum*, XXXI (1935); J. P. Vergouwen, *De geschiedenis der Makelaardij in Assurantiën hier te lande tot 1813* (The Hague, 1945).

³ R. Ehrenberg, 'Studien zur Entwicklungsgeschichte der Versicherung', *Zeitschrift für die gesamte Versicherungswissenschaft*, I (1901); G. A. Kiesselbach, *Die wirtschafts- und rechtsgeschichtliche Entwicklung der Seeversicherung in Hamburg* (Hamburg, 1901); J. F. Plass, *Geschichte der Assecuranz und der hanseatischen Seeversicherungsbörsen, Hamburg – Bremen – Lübeck* (Hamburg, 1902).

Denmark;⁴ Giuseppe Felloni, Jacques Heers, Federigo Melis, Giuseppe Stefani, C. Schwarzenberg, and Alberto Tenenti for Italy;⁵ L. A. Boiteux, J. Delumeau, and H. Lafosse for France;⁶ M. B. Amzalak, N. Arié, and J. Piedade for Portugal;⁷ A. H. John, F. Martin, J. Trenerry, C. Wright and C. E. Fayle for London;⁸ and across the Atlantic, H. E. Gillingham and S. S. Huebner for the United States.⁹ The on-going bibliography already has remarkable distinction and there is much more besides.¹⁰

The areas of enquiry have been no less extensive, particularly for the history of companies, institutions, and procedures of marine insurance: the evolution of legal forms, corporations, and concepts of property; the status and privileges of insurers, the types and conditions of ships, their personnel, cargoes and destinations; the capital investments, risks and claims for accidents and losses. All, or almost all, these aspects have passed under close scrutiny. Sometimes the range of information reflects the formation and direct interests of the scholars themselves; at other times, the haphazard survival of the documents has decided in advance the scope of conclusions reached. The nature of the transactions and the

⁴ C. Thorsen, *Det Kongelig Oktroierede Sø-Assurance Kompagni, 1726–1926: et Bidrag til dansk Søforsikrings Historie* (Copenhagen, 1926).

⁵ G. Felloni, 'Una fonte inesplorata per la storia dell' economia marittima in età moderna: i calcoli di avaria', in *Wirtschaftskräfte und Wirtschaftswege, Festschrift für Hermann Kellenbenz*, ed. Jürgen Schneider (5 vols., Nuremberg, 1978), II; J. Heers, *Gènes au XVe. siècle: activité économique et problèmes sociaux* (Paris, 1961); F. Melis, *I primi secoli delle assicurazione (sec. XIII–XVI)* (Rome, 1965); G. Stefani, *L'assicurazione a Venezia dalli origini alla fine della Serenissima* (2 vols., Trieste, 1956); C. Schwarzenberg, *Ricerche sull'assicurazione marittima a Venezia* (Rome/Milan, 1969); A. Tenenti, *Naufrages, corsaires et assurances maritimes à Venise (1592–1602)* (Paris, 1959), and English edition (London, 1967).

⁶ L. A. Boiteux, *L'assurance maritime à Paris sous le règne de Louis XIV* (Paris, 1945), *Cinq années d'assurances maritimes à Marseille (1631–1636)* (Sète, 1958), and *La fortune de la mer* (Paris, 1968); J. Delumeau, 'Exploitation d'un dossier d'assurances maritimes du XVIIIe. siècle', in *Mélanges en l'honneur de Fernand Braudel* (2 vols., Toulouse, 1973), I, pp. 135–163; H. Lafosse, *La juridiction consulaire de Rouen, 1556–1791* (Rouen, 1922).

⁷ M. B. Amzalak, *O tratado de seguros de Pedro de Santarém* (Lisbon, 1958); N. Arié and J. Piedade, 'The Portuguese contribution in the field of insurance', *Versicherungswissenschaftliches Archiv*, III (1957).

⁸ C. E. Fayle, 'Shipowning and marine insurance', in C. N. Parkinson (ed.), *The Trade Winds* (London, 1948); A. H. John, 'The London Assurance Company and the marine insurance market of the eighteenth century', *Economica*, XXV (1958); F. Martin, *History of Lloyd's and Marine Insurance in Great Britain* (London, 1876); J. Trenerry, *The Origin and Early History of Insurance* (London, 1926); C. Wright and C. E. Fayle, *A History of Lloyd's* (London, 1928).

⁹ H. E. Gillingham, *Marine Insurance in Philadelphia, 1721–1800* (Philadelphia, 1933); S. S. Huebner, *Marine Insurance* (New York, 1920).

¹⁰ Important introductions to the extensive bibliography in Stefani, *L'assicurazione a Venezia*; and J. Halpérin, *Le rôle des assurances dans les débuts du capitalisme moderne* (Neuchâtel, 1945); H. A. L. Cockerill and E. Green, *The British insurance business and guide to historical records in the United Kingdom* (London, 1976).

Introduction

regulations within which institutions functioned have exerted a decisive influence – especially for new types of high risk. Then, as now, decisions tended to rely pre-eminently on intuitions and experience rather than on manuals and theories of practice. Unlike fire and life protection where information analysed over long years has brought insurance operations to an actuarial science and calculated probabilities, marine insurance for centuries appears to have remained highly personal, guided by prudence. The keynote has been *caveat assecurator!* and it leaves scholars to take the subject from the twilight of history.

The following study does not intend to put such excellent work aside; but rather to pursue a line of enquiry from the stand-point of a well-established, focal market. It is possible to assess the handling of marine risks from the central tendency of prices and premiums, and then to pass beyond these to a much larger reality of navigation in the international economy. On this occasion the chosen market is Amsterdam and there is much in its favour. The explosive force unleashed by Spain and Portugal in opening the oceans soon transmitted itself to other countries, above all to The Netherlands. The golden age of the early Republic saw the Dam grow to astonishing wealth and prestige. Waves of fertile innovations created further opportunities in an expanding Atlantic economy. As decade followed decade, initiatives of enterprise ripened into a high summer of affluence – impressive, pervasive, rich in advantages, yet at the same time fraught with attendant tribulations. With the passing years fortunes accumulated like coral but became perhaps less mobile, more committed. By the eighteenth century the capital base of the Dam was broad and diversified in complex social structures, nourished by high propensities to save. Any attempt to assess the international economy of the *ancien régime* must take measure of the compelling advantages of Amsterdam. Long experience at the heart of affairs endowed it with institutions and refined techniques; business acumen and a sense of enterprise; a reputation which brought flows of reports in which Europe generally could actively share.

That multilateral flow of information has bequeathed a basis for the present study. The early regulation of the Amsterdam Bourse prescribed official price-lists, the famous *prijscouranten*, established by the sworn brokers. In time, these double-sided lists of commodity prices, regularly issued in print, came to include further sections for the means of settlement: money, exchanges, and insurance.¹¹ The important section of *Assurantiën* listed premiums for voyages to and from destinations in Europe and the West Indies. The price-lists circulated widely, they even

¹¹ W. P. Sautijn Kluit, *De Amsterdamsche Prijs-Courantiers in de 17e. en 18e. eeuw* (Amsterdam, 1872); Vergouwen, *De geschiedenis der Makelaardij*, pp. 48–49.

reached the Far East through the correspondence of the United East India Company.¹² Their survival in the archives has been uncertain, and scholars must be thankful for the enterprise of Nicolaas Posthumus in making the initial collection.¹³ Even now, the sequence of these lists is disappointing. As often happens, history and archives are not always of the same mind: *scribitur ad narrandum, non ad probandum*. However, as we shall see later, the years covered by this study, at first sight a random choice based on surviving documents, have in effect the exceptional advantage of coinciding with a pause, a stage in the long-term evolution of the insurance market.

Similar series exist, of course, for other commercial centres in Europe. There are the important *Preis-couranten* of Hamburg;¹⁴ but the great port of the Elbe won full independence, and attained to focal international prominence in the late eighteenth century, and that in time of war. The great archive of the Maatschappij van Assurantie, Discontering, en Beleening der stad Rotterdam,¹⁵ founded in 1720, has remarkable records of registered insurance, but such information is not precisely the same as the concerted quotations of an international market. *Lloyd's Lists* are another outstanding source for London, available from 1740,¹⁶ giving a wealth of information on ships' movements. But they are silent on premiums: these remained the highly personal enterprise of the underwriters, so that it is difficult to detect the concerted action of the market.

Amsterdam, nevertheless, retains the persuasive advantage of having an established position in the economy of Europe. Within the limits of the period 1766–80, the data provide an opportunity to contrast external peace, in the years following the close of the Seven Years' War (1756–63), with growing hostilities in North America after 1775 and in Europe after 1778, which finally embroiled The Netherlands in open

¹² N. W. Posthumus, *Inquiry into the History of Prices in Holland* (2 vols., Leiden, 1946–64), I, and esp. pp. xxv–xxviii.

¹³ The collection in the Economisch-Historisch Archief originally in The Hague and now in the Economisch-Historische Bibliotheek, Amsterdam. When I first worked on the series, a number of the lists seemed to have disappeared. A subsequent survey by post of archives in The Netherlands, Europe and Indonesia proved unsatisfactory, indeed, two letters to the State Archives in Jakarta went without reply. However, the series has now been extensively surveyed and established by the welcome research of J. J. McCusker and Cora Gravesteijn.

¹⁴ This remarkable series is in the Commerzbibliothek, Hamburg; and see E. Baasch, 'Aus der Entwicklungsgeschichte der Hamburger Kurszettels', *Bank-Archiv*, V (1905), and 'Geschichte der hamburgener Waren-Preiscourant', *Forschungen zur hamburgener Handelsgeschichte*, III, 3 (1902).

¹⁵ The archives of the Maatschappij van Assurantie, Discontering, en Beleening der stad Rotterdam (hereafter cited as Maatschappij van Assurantie), in the Gemeentearchief, Rotterdam. Dr R. A. D. Renting, the Director, has been particularly generous in making material available.

¹⁶ *Lloyd's List*, begun in 1734, available in facsimile for the period 2 January 1740 to 29 December 1826, published Farnborough, 1969.

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conflict (1780). However, the first period of relative international peace was marked by serious upheavals at home: 1763 saw a severe financial crisis from which recovery was slow and arduous. Then came the bankruptcies of 1772–73 to interrupt the operations of the market. These two breaks, together with the involvement of The Netherlands in active war from December 1780, may be said to reflect a moment in the history of The Netherlands in general, and of Amsterdam in particular. That city of prestige had achieved so much in co-ordinating the trade and navigation of the continent. And yet, like other precocious pioneers, it was obliged to come to terms with a stern reality: competition from other markets in Europe.

★

My interest in marine insurance has developed over the years, from many influences and almost unintentionally, in the margin of my main research into monetary development; in part from spending some long spells at sea, of seeing the destructive force of gales and typhoons; and in part from a curiosity about the risks of transferring high-value cargoes from one market to another. For the latter, the margins of profit in the eighteenth century were often astonishingly narrow – as low as one-sixteenth percent on bullion dealings if we are to believe a report of August 1749. This, it should be noted, at a time when the insurance premium between Amsterdam and London was running at one and a half percent.¹⁷ If such conditions were typical of the period under study, then changes in the cost of protection at sea could pass on important costs to the consumer and inevitably set constraints on monetary and financial operations.

These interests grew with study in different universities. The Ecole Pratique des Hautes Etudes (VIe. Section) in Paris, under Lucien Febvre and Fernand Braudel, was active in the maritime history of early modern Europe. In 1955 in Chicago, I attended the lectures of Frank Knight, with his wide-ranging discussion of risk and profit, of Earl J. Hamilton and Milton Friedman; and later in New York, the Securities Research Department of Merrill Lynch. At Harvard, I was fortunate to be able to follow the teaching of Alexander Gerschenkron, Simon Kuznets, and Wassily Leontief. These were remarkable opportunities indeed; and I remain grateful for the ideas discussed and the perspectives opened.

In 1960, en route for the economic history conference in Stockholm, I went to survey documents in Amsterdam for a project on rates of interest, planned at that time by Earl J. Hamilton and T. S. Ashton. The scheme did not materialise; and instead of going to Stockholm, I continued to study the *prijscouranten*, then kept in The Hague.¹⁸ Long

¹⁷ ARA, *Generaliteits Muntkamer*, 21, fo. 208 vo.

¹⁸ See notes 12 and 13 above.

delays intervened, partly from a protracted attempt to find more price-lists in the archives; partly from other pressing work in the mainstream of my research; and partly from the inevitable procession of academic duties. The material was assembled and checked, and the series of data finally in place, the maps, graphs and tables ready. Then, in 1975 I decided to enlarge the sections on the uncertainties which disrupted the market in 1763, 1772–73, and the prologue to war in 1780.

At the outset, as in much research, the subject appeared to be simple enough. Here was a great market, in the late splendour of early prosperity, enjoying the fruits of a long and diverse expansion among the Atlantic economies. If some lines of its trade in the eighteenth century no longer passed without serious challenge from other centres of growth such as Hamburg and London, it nevertheless had the substantial assets and business ramifications won by creative enterprise. A broad stream of inherited wealth percolated the activity of the Dam, seeking or creating opportunities for investment. Refined techniques and established institutions served to encourage mutual risk-aversion, to shift risks and spread prospective losses: the traditional *rederij*, for example; the great commercial companies with shares quoted on the market; the Wisselbank and Bourse; the precocious system of puts and calls, of forward buying so accurately displayed by Don Josséph de la Vega (1688).¹⁹ These were powerful instruments to diversify finance and spread the risks of trading across the seas.

At the same time, the market was important for insurance in another direction. The payment of premiums created net risk capital – that is, the sum of premiums less management costs. These became part of the financial assets of the market, and generated a flow of funds ready for short-term investment. The insurance market was thus sensitive to both long- and short-term factors.

However, the problems of insurance were not just those of a working market, closed on itself, concerned with domestic activity. Marine insurance belonged implicitly to the international economy. Navigation followed expected utility preferences, similar to those which John von Neumann and Oscar Morgenstern discerned in the theory of games. In one sense, maritime trade was a continuum of income – exports of goods and the repatriation of profits, providing a progressive addition of value realised in the final sales in markets and to consumer. The prospect of losing cargoes which progressively appreciated as they approached market, but carried in ships which depreciated on the voyage, was not

¹⁹ Don Josséph de la Vega, *Confusión de Confusiones* (1688), ed. M. F. J. Smith and trans. G. J. Geers (The Hague, 1939); see also the excellent Introduction by H. Kellenbenz, Publication no. 13, *Kress Library of Business and Economics* (Cambridge, 1957).

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easy to countenance in early modern Europe.²⁰ At least, this could be assumed if all the consignments of merchandise came sailing home on the flood, or the lines of trade moved in direct voyages from Amsterdam to their destinations. The reality was much more complex: ships often dropped in from port to port – Balthazar-Marie Emerigon referred to this as *la caravane*;²¹ tramp shipping would be a convenient but anachronistic term. And so preconceived notions of continuous functions became mixed with discontinuities. Each of the major lines of trade to the regions of Europe – the Mediterranean, Portugal and Spain, the British Isles, the Baltic, Scandinavia, and the North – enjoyed varying income expectations and probabilities. Colonial transactions, especially with America and the West Indies, relied on their highly favourable land-labour ratios – at least by comparison with Europe – and were exceptional examples. Nevertheless, a central theme of this study is that insurance operations reveal a *leitmotif* of continuity. The multilateral system found expression in the rôle of Amsterdam as a central market co-ordinating a through-put of commodities. It is a problem germane to any analysis of insurance, and of those risks and uncertainties which confronted maritime trade in pre-industrial Europe.

How, then, to take stock of the complex trading patterns of Amsterdam? One approach – and it does not exclude other possible methods – can start with the array of trade as an input–output matrix, a transactions table for commercial flows to and from the different regions of Europe, and indeed the world. The insurance sections of the *prijscouranten* in the 1760s listed twenty groups of destinations for Europe and two for the West Indies,²² and so – at least formally – were heavily biased in favour of navigation about the continent. Such a matrix offers a point of departure to discuss the performance of Amsterdam at two levels: on the one hand, considering *structural risks*; and on the other hand, *event uncertainties*.²³ I prefer to use the term *structural risks* since this can group marine risks into packages which seem to have conformed at the time to appraisals of conventional probabilities. Shipowners and merchants were in the market for protection in their dealings ranging to the frontiers of speculation, with a prime objective to maximise average income and minimise variations in that income. The assumption underlying the

²⁰ Original publication in 1722; references in this study to J.-P. Ricard, *Le Négoce d'Amsterdam, contenant tout ce que doivent savoir les Marchands et Banquiers, tant ceux qui sont établis à Amsterdam, que ceux des Pays étrangers* (Rouen, 1723), p. 268.

²¹ B.-M. Emerigon, *Traité des Assurances et des Contrats à la Grosse* (2 vols., Marseilles, 1783), II, p. 20. Shippers usually insured for part of the *caravane*, taking out further insurance as the occasion arose.

²² See below, Chapter 6, p. 165.

²³ For an excellent survey of the problems and bibliography, see J. Hirschliefer and J. G. Riley, 'The analytics of uncertainty and information – an expository survey', *Journal of Economic Literature*, XVII (1979).

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concept of structural risks is that from experience and business acumen, insurance dealers could base their portfolios of policies and short-term investments, not on random variables but on average values. The scalars derived from long acquaintance with the frequency and volume of claims on different routes of navigation. In this study, I have concentrated on two major packages which emerge from the data. They are the dynamic seasonal movement, and the linearity of distance on the high seas. Such a formulation of the theory of risk – such as it existed – may be said to point to a closed system of transactions concerned with factors endogenous to the market.

Naturally, it is necessary to look beyond these packages to the interdependence of risks deriving from a number of profound *states* of the world. I use the conventional term *state* to simplify the explanation, but few historians alert to structural history would wish to ignore the slowly changing realities of human ecology. At the forefront of preoccupations at the time were the perils of the sea. For those who went down to the sea in ships, eyes could rarely leave the weather-vane and the quarter of the wind, the clouds forming in the sky, the capriciousness of the waves. Waiting on weather was an immemorial concern, and W.O.W. still remains a laconic label for a harsh reality when oilmen drill at sea. With a brusque change in weather, there were treacherous shoals and sandbanks to strand a ship – such as the *Pampus* at the entrance to Amsterdam, or the *Goodwins* in the Channel – and uncharted rocks or ice-floes to break the hulls. Navigation was thus a dialogue with the adjacent land. Perils of landfall, perils of the sea. For the navigator there were choices in finding the correct course, dead-reckoning on the high seas and cautious observation in coastal waters. If an example is required, we have only to turn to Willem Janz. Blaeu's *Het Licht der Zeevaart* (1620). There the dichotomy is set out with clarity on the title page: two figures – the stylish mariner with his cross-staff and chart, and the practical seaman with his lead and line. Much of the sailing around Europe was 'in soundings' and more than a vestige of an immemorial navigation survived in the reliance on testing the sea-bed. 'Vada co lo scandallio' was a precept of *Lo Compasso da Navigare* (c. 1250)²⁴ and after half a millenium the advice held good. Such perils were a mariner's heritage, uncertain at first sight but in sum exercising a latent control of navigation.

That dichotomy was not precisely the same for the insurer. Leaving harbour and sailing close inshore set problems different from those of

²⁴ For a discussion of the early techniques, see E. G. R. Taylor, *The haven-finding art* (London, 1956), esp. pp. 104–108. Fra Mauro (1450) noted the problem in the case of the Baltic, P. Dollinger, *The German Hansa* (London, 1970), p. 145.

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the oceans. 'Brouwershaven', it was said in Rotterdam, 'lies half-way to Java.'²⁵ It is part of the discussion in this study that a ship had to overcome the risk-trap of entering and leaving port before attaining to the continuity of the high seas.

Another *state* was technology, or the arts if we return to the convenient phrase of classical economists. The perils of the sea were one thing; the construction, condition, and management of ships to cope with them were another, and of an entirely different complexion. Some related to the ship and the conduct on board. The techniques of sailing, the going information in maps and tables were one aspect of the problem. So, too, were the skills, training, and probity of the crew, not least when it came to jettison cargo and fittings, or when ill-secured stores were taken by the sea in flotsam; or when there was conniving in barratry . . . Innovation in ocean navigation brought potential for growth – and for stagnation – and concerned directly the adoption of 'best-practice techniques'.²⁶ There was the quality of design, construction, and equipment, for every hour in the water subjected the hull to stresses ranging from the buffeting of the seas to the attrition of rotting timbers.²⁷ Cost-effective shipping played a crucial rôle in early modern Europe. However, the eighteenth century was a phase of inflation, and rising costs brought pressures to use cheaper materials. Design could have its say. The Netherlands had made a substantial contribution to economical navigation: the famous *fluit* showed this at its best in the seventeenth century.²⁸ But as the years passed, such novelties gathered the patina of vintage procedures. If anything, sea-navigation under the *ancien régime* tended to a limit, settling for a stage in materials, design and ship-handling,²⁹ which only industrialisation could fundamentally change. There were, to be sure, signs here and there of improvement, but for our general purpose it may be said that the system in the late eighteenth century assumed many of the characteristics of conformity.

If these were some of the perils from the ships themselves and the conduct on board, there were others arising outside. These constituted

²⁵ P. D. J. van Iterson, 'Havens', in G. Asaert, Ph. M. Bosscher, J. R. Bruijn, W. J. Hoboken (eds.), *Maritieme geschiedenis der Nederlanden* (4 vols., Bussum, 1976–), III, p. 72.

²⁶ The theoretical concepts of best-practice techniques can be found in W. E. G. Salter, *Productivity and Technical Change*, 2nd edn (Cambridge, 1966).

²⁷ R. C. Albion, *Forests and Seapower* (Cambridge, Mass., 1926), esp. pp. 161–162.

²⁸ R. W. Unger, *Dutch Shipbuilding before 1800* (Assen, 1978), pp. 36–38; J. van Beylen, 'Scheepstypen', in G. Asaert et al., *Maritieme geschiedenis der Nederlanden*, II, pp. 28–32; H. J. Koenen, *Voorlezingen over de geschiedenis van scheepsbouw en zeevaart* (Amsterdam, 1854), pp. 160–161.

²⁹ G. M. Walton, 'Obstacles to technical diffusion in ocean shipping, 1675–1775', *Explorations in Economic History*, XX (1967).

another *state* of pervading importance, and fell within the scope of government protection. The geopolity of Europe combined climatic zones, resources, endowments, aptitudes, and not least spheres of domination and influence. Between the founding of the Amsterdam Bourse (1611) and Adam Smith's *Wealth of Nations* (1776), western Europe – and it was still predominantly an agrarian Europe – looked to the seas. Navigation offered access to more land and more resources. Nations with access to the Atlantic hotly pursued territorial gain outside the continent, and as the colonial world emerged even trading companies turned slowly from trade to settlement. No less prompt were the claims to territorial waters, the ambitions to define the political and legal constraints of marine frontiers. That competence slowly declared itself, for a direct application of the law of the land to harbours and estuaries left the law of pursuit to hold sway on the high seas. The issues were clear enough in England where the frontier was the sea: the common law courts ruled on the first but the Admiralty court on the second.³⁰ In The Netherlands, the definition of concepts was crucial, projected into debate in 1609 with the *Mare liberum* of Hugo Grotius (de Groot), and notably advanced in the *De dominio maris dissertatio* of Cornelis van Bynkershoek (1703 and 1744),³¹ which set guidelines for posterity. Disputes in the Zuiderzee, for example, would come under the courts of Holland, those 'beyond the dunes' under the *admiraliteiten*.³² The high seas opened opportunities for profit with the linear freedom of distance. In contrast, coastal waters raised sharply the lines of political dependence and obligation. Taken together, high seas and territorial waters combined into a complex of claims and pressures, formal in exercising control near the coasts, informal in the display of naval power across the oceans and the bids for colonial empire.

Structural risks, such as they were, imply that eighteenth-century Europe approached another mathematical moment in economic development – that is, an inflexion point rather than stability or equipoise – as one phase or epoch marked the close of an agrarian world and another launched the destiny of industrialisation.³³ A part of the concern of this study is the degree to which insurance dealings in Amsterdam settled

³⁰ C. Molloy, *De Jure Maritimo et Navali* (London, 1676), p. 197.

³¹ H. Grotius, *Mare liberum* (Leiden, 1609); C. van Bynkershoek, *De dominio maris dissertatio* (The Hague, 1703), and 2nd edn (Leiden, 1744, repr. New York, 1923); for an ample discussion of these problems of sovereignty and territorial waters, see J. K. Oudendijk, *Status and extent of adjacent waters* (Leiden, 1970).

³² A. Korthals Altes has kindly clarified the relevant issues for me; see his *Prijs ter zee* (Zwolle, 1973). For the negotiations over the Scheldt (1785), B. Vitányi, *The international régime of river navigation* (Alphen aan den Rijn, 1979), pp. 170–171.

³³ S. Kuznets, *Modern economic growth* (New Haven, Conn., 1967), pp. 2–3.

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into a pattern, and came to terms with the economic ecology of the *ancien régime*.

As for the second panel of the diptych, the category of event uncertainties considers the system of transactions as open and relating to exogenous and other stochastic variables. They derive from unforeseen disturbances, ruptures, and catastrophes outside the normal sequence of events. Our concern is to review the effects on the market. Prudent seafarers had to contend with the 'acts of God', the sudden disasters to ship and cargo: the gale to put vessels on the rocks, a hurricane to devastate warehouses, ruin return consignments, 'shift' the cargoes loaded in the holds. Claims under general average – such as those which came for settlement before the *Kamer van Assurantie en Avarij* in Amsterdam – naturally reshaped expectations of income. At another level, the financiers, insurance agents, and insurers could fall into disarray during a financial upheaval or liquidity crisis. Bankruptcies disrupted the system of mutual risk-aversion. A third and major event uncertainty was political decision. A declaration of war, for example, at once defined loyalties and hardened obligations. But the path to war was littered with minor calamities for international trade: the blockade of a port, the seizure of ships, the raising of tariffs and harbour dues, the long law-suits from which there seemed to be no redress. In the formalities of the *ancien régime*, the games of governments introduced an element of uncertainty which filled the gazettes and troubled the well-laid plans of merchants and financiers.

In effect, event uncertainties faced insurance dealers with exceptional situations in which small changes provoked augmented turbulence in the spectrum of risks. The imperfections of the system, the shortcomings in information, and the inadequacies of scientific knowledge left the market in general and dealers in particular ill-equipped to predict the incidence or even handle the scale of resulting losses. They found themselves unable to meet claims or even continue to write policies. The underwriting losses in 1780–81 were a case in point.³⁴ These had powerful effects on the supply side of the insurance market and imposed abrupt shifts away from the central tendency. The crux of the matter in event uncertainties was an inability to assign fixed probabilities. Ultimately, there could be 'no market'.

It would be attractive indeed to isolate the commercial system of Amsterdam into dualities of transactions both open and closed. However, in the larger perspective of explanation it is necessary to underline the interaction of structural and event uncertainties, to concentrate on the dominant characteristics of continuity and interdependence. Catastrophe

³⁴ See below, Chapter 2, Graph 3.

theory formulated by René Thom³⁵ could, perhaps, provide an apt synthesis: the forms of structural stability and interdependence of the system of navigation countenance the *formes informes* of events either unstable and 'chaotic' in themselves or composed of a few elements in mutual contradiction and disharmony. Under such conditions, small changes could provoke violent turbulence. As a market, Amsterdam was not necessarily perfect in the sense that it always cleared, but dealers were able to combine packages of credit, freight, and insurance³⁶ which strengthened opportunities for risk-aversion. Its function as a staple for the inter-regional flows of goods can be seen in the insurance quotations in the *prijscouranten* for twenty-two groups of destinations. And these were only part of the panorama of trade. Colonial produce from the West Indies found markets in Germany and the Baltic. Grain from Danzig sailed direct to cover shortages in the Mediterranean. These were lines in a well-founded commercial web, but insurance premiums quoted now for one region, now for another, were inter-related through the market.

This pervasive interdependence contended with a spatial problem. Europe represented a complex of climatic zones, which imposed their necessities. In the hierarchy of priorities, The Netherlands concentrated on the Baltic and the strategic commodities from that inclement sea: food, naval stores, metals. In many respects, the timetable of coastal navigation in Europe conformed to the special requirements of the North, where hard winters and the freeze transformed patterns of risk for the rest of the continent. In order to enter the Baltic and northern waters during the propitious months of the summer and complete deals before the onset of winter when ice-floes closed the ports, cargoes were often despatched from the temperate South in the less-favourable months of winter and early spring. In this we can again see structural interdependence between different lines of inter-regional trade. Minimising risks in the Baltic trade imposed more than minimal risks in trade with other

³⁵ R. Thom, *Stabilité structurelle et morphogénèse* (Reading, Mass., 1972), esp. pp. 29–32, 55–70, 108–116; for the cusp catastrophe and the problem of finding single mathematical concepts for market instabilities and crashes under modern conditions, see E. C. Zeeman, 'On the unstable behaviour of stock exchanges', *Journal of Mathematical Economics*, I (1974), 39–40, 47–48; 'Catastrophe theory', in draft (Warwick, 1976), pp. 1–2, 28–31, and in *Scientific American*, CCXXXIV (April, 1976), p. 65. For a remarkable critique of the debate on catastrophe theory, see the review by S. Smale of E. C. Zeeman, *Catastrophe theory: selected papers, 1972–77* (London, 1977), in *Bulletin of the American Mathematical Society*, LXXXIV (November, 1978), 1362–1368. I am grateful to Tom Willmore for his friendly and unstinted advice on this extensive field.

³⁶ S. Ricard, *Traité générale du commerce* (3 vols., Paris, An 7/1799–1800), esp. I, pp. 80–82, 440–448. Published in Amsterdam in 1781, a further edition appeared in Paris during the Revolution. References are to the latter.