

# Marine Insurance in Britain and America, 1720-1844: A Comparative Institutional Analysis

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## Abstract

By the mid nineteenth century, the British marine insurance market was dominated by Lloyd's of London, a marketplace in which voyages were underwritten by private individuals on their own account. In contrast, marine insurance in other countries, including the United States, was carried out mainly by joint-stock corporations. This paper examines the historical evolution of the marine insurance industry in Britain and America during its critical formative period, focusing on the information and agency problems which were inherent to the technology of overseas trade at the time, and on the path-dependent manner in which the institutions which addressed these problems evolved. We argue that the regulatory environment of the UK's Bubble Act and the exogenous shocks caused by the Napoleonic wars combined to bring about a bifurcation of institutional structure, the effects of which persist to the present day.

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# 1 Introduction

A deeper understanding of the process of institutional change is a key goal of recent works on institutions in economics (Aoki, 2001) (North, 1990). This paper explores the nature of institutional change in the marine insurance industry during the eighteenth and early nineteenth centuries. Marine insurance played a vital role in facilitating the expansion of trade during this period, but the industry evolved in different ways in different countries. By the mid nineteenth century, the British marine insurance market was dominated by Lloyd's of London, a marketplace where private individuals risked their personal fortunes by insuring vessels and cargoes with unlimited liability. In contrast, in most other countries, including the United States, private underwriting had virtually disappeared, and marine insurance was predominantly carried out by joint-stock corporations which insured vessels on the surety of their capital stock. To account for the success of private underwriting in Britain and its demise in the United States, we will focus on the information and agency problems which were inherent to the technology of overseas trade at the time, how different kinds of institutions arose to address these problems, and how exogenous and endogenous changes in the political, legal and economic environment affected the evolution of these institutions over time.

Broadly, the argument is as follows. In eighteenth century Britain, the Bubble Act of 1720 temporarily prevented the development of marine insurance corporations, thereby enabling Lloyd's coffee house to develop as a center where private underwriting could flourish. Lloyd's became a hub for information about ships and their crews, trade routes and political developments, and the many other factors which would affect the riskiness of a voyage, and also for reputational information about trading partners, which helped partially overcome various agency problems inherent to marine insurance at the time. Over time, its role gradually evolved in the shadow of the Bubble Act as a variety of informal and later formal organizations, laws, specialized roles, and mechanisms for sharing information developed and were adapted to a market dominated by private underwriting. In particular, the extended period of heightened risk in international commerce resulting from the Napoleonic wars (1793-1815)<sup>1</sup> led to boom years in marine insurance, and a period of accelerated institutional development at Lloyd's. By the time the Bubble Act was repealed in 1824, enabling the numerous joint-stock corporations to enter the market, Lloyd's had gained an institutional sophistication which enabled

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<sup>1</sup>For simplicity, we will refer to the entire series of wars which took place between 1793 and 1815 as the Napoleonic wars.

it to survive the competition, and it remains an important center for marine insurance today.

In contrast, the American marine insurance market was freed from the Bubble Act's restrictions before the start of the Napoleonic wars, and private underwriting was rapidly extinguished as marine insurance corporations developed during the wars.

Thus, we argue that the timing of exogenous changes including American independence and the Napoleonic wars, together with the endogenous development of Lloyd's and its legal environment, gave rise to a path-dependent evolution of marine insurance institutions and a bifurcation of institutional structure between Britain and the rest of the world.

In the next section, we describe the relevant technological constraints facing marine insurance in the eighteenth century, which successful marine insurance institutions needed to try to overcome. Section 3 discusses the history of the British marine insurance market, and the emergence of Lloyd's as the dominant center, stressing its role as an information hub. Section 4 describes how the American market developed and the process by which corporations came to dominate marine insurance there. Section 5 builds a game-theoretic model to show how a lemons problem suffered by corporate underwriters in an environment dominated by private underwriters can explain many aspects of the development of the marine insurance industry. Section 6 concludes.

## **2 Marine Insurance: Information and Agency problems**

In a marine insurance contract, an insurer (“underwriter”) agrees to assume some portion of the marine risks on a vessel or cargo, or both, in exchange for a premium. The risks covered may include various risks at sea or in port, for a particular voyage or for a period of time. The inherent riskiness of maritime commerce in the eighteenth century made marine insurance a crucial input in the expansion of trade, and this impelled the development of increasingly complex institutional arrangements by which merchants could overcome the informational and agency problems involved in sharing marine risks. In the middle ages, contracts such as the “sea loan”, a loan which was to be repayed only following a successful voyage, had served a marine insurance function. By the late seventeenth century, modern, premium-based marine insurance had become familiar, and contractual forms had become relatively standardized, in the leading trading nations (Holland, Britain and France). However, marine insurance corporations had not yet emerged, and underwriting was still car-

ried out entirely by private individuals, frequently themselves merchants, who underwrote specific risks on an individual case-by-case basis (several private underwriters each taking small portions of a risk).

Marine insurers in the eighteenth century had to contend with numerous sources of uncertainty, and complex informational asymmetries, which created agency problems for both the insurer and the insured.<sup>2</sup> We can separate these information and agency problems into three main categories. Firstly, the probability of a ship or its cargo being lost or damaged (and therefore, the appropriate premium) depended on numerous risk factors including the distance, the route, the season, and the characteristics of the ship - its age and seaworthiness, and the quality of its crew and armament, as well as, in wartime, the possibility of capture by enemy privateers or cruisers, or of seizure in a foreign port. Some of these pieces of information were verifiable by the underwriter and were taken into account when determining the premium. Frequently, however, the merchants seeking insurance had a greater familiarity and/or better information than the underwriter about the precise nature of the risks, creating a potential adverse selection problem.

Second, there were many possibilities for moral hazard on the part of the insured. These ranged from concealing information about a ship or voyage, to excessive risk-taking, such as sending unseaworthy ships to sea, or attempting to bring goods to a blockaded port (where a blockade would have pushed up prices), to outright frauds, such as insuring for more than the ship or goods were worth, and then deliberately sinking or running the ship aground, or seeking to insure a ship already known to have been lost.

Thirdly, another set of agency problems had to do with the financial stability of the underwriters: would they have sufficient funds to cover their liabilities in the event of a loss? In the eighteenth century, this was a major concern for those buying insurance. Underwriters could and sometimes did fail, particularly after a major disaster such as the loss of an entire merchant convoy to the enemy, as occurred on several occasions. Underwriters vulnerability was further increased by the fact that many underwriters were themselves merchants, whose fortunes might rise or fall with the success or failure of a voyage. As a result, merchants were willing to pay higher premia to underwriters who were perceived as more financially secure.

All of these problems were exacerbated in wartime. Increased uncertainty arising from the risk of capture increased the demand for marine insurance and drove up premia, while the opportunities for profits and incentives for moral

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<sup>2</sup>In contrast, for example, the risks and the possibilities for opportunistic behavior in the case of fire insurance or life insurance were more easily identified and quantified.

hazard on the part of the insured increased. While many underwriters made huge profits from the increased wartime premia, others failed or dropped out of the market.

In the context of these ubiquitous informational asymmetries and agency problems, information was critical. In order to accurately assess the risk of a voyage, an underwriter had to have access to prompt and accurate intelligence on the movements and condition of particular ships, on political developments at home and abroad, and on the reliability and reputation of the merchant being insured and the captain of the vessel, as well as the experience to weigh this information correctly in order to determine what premium to charge. In the words of one contemporary underwriter,

An insurer ought to be constantly casting about for the earliest, the best, and the most circumstantial intelligence: - he ought to have a quick perception of the circumstances of the risque, and be able to reason well and instantly thereupon, in order to guard against concealments and misrepresentations; ... it is far more material to him to regard the *quality* than the *quantity* of the risques which he undertakes (Weskett, 1781, p.295).

Information, however, travelled slowly in the eighteenth century. Even from Scotland, information could take up to 2 weeks to arrive in London, and the latest news from foreign ports was frequently months old. Ships might disappear without a trace, and when a ship was lost or damaged, it was frequently costly, and sometimes impossible, to verify or disprove events which had occurred in distant ports or at sea.

Despite these difficulties, marine insurance provided crucial support for the expansion of trade throughout the eighteenth and nineteenth centuries. The market was able to function because institutions were created to mitigate the agency and information problems inherent to marine insurance at the time. Two distinct kinds of institutions emerged. In Britain, a unique marketplace (Lloyd's) in which wealthy individuals acted as private underwriters, came to dominate the market. In contrast, in the US and in continental Europe, marine insurance was carried out almost entirely by joint-stock corporations. What were the important characteristics of these distinct institutional forms, and how did they arise?

## 3 Marine insurance in the United Kingdom

### 3.1 Before 1720

In Britain, at the beginning of the eighteenth century, there were few specialist underwriters; many underwriters were merchants who wrote insurance on the side, but any wealthy individual willing to dabble could underwrite a policy. Merchants and ship-owners wishing to obtain insurance generally employed brokers to go around to coffee-shops and wherever else they might find wealthy individuals willing to underwrite. Although risks were usually shared among many underwriters, underwriters sometimes failed, either because of personal financial difficulties, or sometimes due to a more general catastrophe. For example, in 1693 many private underwriters had failed after 100 merchantmen in convoy were captured or destroyed in the Bay of Lagos by the French.<sup>3</sup>

The international character of marine insurance ensured that there was active international competition between underwriters. As the commercial strength of Britain increased, an increasing amount of marine insurance was carried out in London; however, insurance of British ships abroad, especially in Holland, was still very common in the early eighteenth century, mainly because Dutch insurers were often regarded as more financially secure.

As described above, because of the information and agency problems inherent to marine insurance at the time, up to date and accurate information was of particular importance for those involved in the marine insurance business. Coffee-houses were important centers of social and business activity in London at the time, and different coffee-houses specialized in attracting particular clientele. In particular, merchants, underwriters, and others concerned with shipping tended to frequent several coffee houses around the Royal Exchange and near the Thames, where relevant news and gossip was exchanged, and marine business including ship auctions and marine insurance was transacted. In an era when newspapers were rudimentary, and the mail was slow and irregular - especially from distant ports - the coffee houses served as centers of information, primarily because of the news and gossip brought in by the customers themselves.

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<sup>3</sup>On the early history of marine insurance, see (Barbour, 1929), (de Roover, 1945). For British insurance generally, see (Cockrell and Green, 1994), (Raynes, 1964). On Lloyd's, see (Gibb, 1957), (Golding and King-Page, 1952), and especially (Wright and Fayle, 1928). (Supple, 1970), (Street, 1920) and (John, 1958) discuss the history of the chartered corporations. (Weskett, 1781) is the most comprehensive contemporary guide. (Select Committee on Marine Insurance, 1810) is also invaluable.

### 3.2 The Bubble Act of 1720

Prior to 1720, nothing prevented unincorporated companies from selling insurance, and in fact, although there were no companies involved in marine insurance in Britain, several were active in fire and life insurance. However, in 1717, at a time when many insurance and other joint-stock schemes were being promoted during the stock market boom which culminated in the “South Sea Bubble”, several groups of merchants and speculators began attempts to obtain charters for marine insurance corporations. The promoters of the proposed corporations argued that corporations would provide cheaper insurance than the existing system of private underwriters (because of lower transaction costs) and would be more secure (because it would be backed by a large capital fund). Incorporation required either a Royal Charter or an Act of Parliament, and was opposed by merchants and private underwriters in London and Bristol, who claimed that the existing system was adequate, and that a monopoly would harm trade. Both sides in the debate, however, shared the expectation that if charters were granted, the corporations would drive private underwriters out of the market.

The argument was finally settled when the two main groups of promoters offered a £600,000 bribe to the King (to pay off the debt on the civil list) in exchange for charters. Two joint stock corporations (the Royal Exchange Assurance and the London Assurance) were incorporated as part of what later became known as the “Bubble Act” of 1720. The Bubble Act outlawed all unincorporated joint-stock firms, so that thereafter, all joint-stock firms would require either a royal charter or an Act of Parliament. It was designed to protect the South Sea Company’s rise by putting an end to other joint-stock schemes, thus destroying its competition for investment funds. In all industries *except* marine insurance, however, partnerships (without limited liability), and other unincorporated companies were still allowed, and it has been argued that the Act had little long-term impact on business development in general (Harris, 2000). Because of the bribe payment, however, marine insurance was treated differently from all other industries: in marine insurance, besides the two chartered corporations formed by the Act, *all* firms and partnerships were outlawed. Apart from the two chartered corporations, only private individuals, acting purely on their own account and accepting unlimited personal liability for losses, were still allowed to underwrite. The Bubble Act therefore created an artificial corporate duopoly in marine insurance, which had a tremendous impact on the development of marine insurance in the UK until its repeal in 1824.<sup>4</sup>

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<sup>4</sup>The Bubble Act was repealed in 1825, but the clauses which governed marine insurance

### 3.3 Advantages of Corporations

Corporations had a number of potential advantages over private underwriters. Most importantly, they were perceived as more financially secure. Private underwriters might become bankrupt, die, emigrate or abscond before a claim could be made, and their financial stability was frequently uncertain, especially in wartime. Merchants who procured insurance from private underwriters through a broker sometimes had little idea whether these individuals would in fact be able to pay in case of loss, and it was not unknown for brokers to enter fictitious names on a policy, and keep the premium for themselves.

Corporations, in contrast, were potentially infinitely-lived, and could draw on a large fixed capital fund. Furthermore, because a corporation could sue and be sued in its corporate name, it would be easier for a merchant to recover losses, in the event of a claim, than if he had to recover losses from many individual underwriters separately. Because of its continuity, a corporation might also find it easier to establish a reputation for dealing with disputes fairly than individual underwriters would.

Corporations provided a convenient and flexible means of concentrating and controlling capital, and expanded the pool of available capital by creating a division of labor between investors and managers, so that even those without specialist knowledge of marine risks, or with relatively modest amounts of capital, could act as insurers by entrusting their underwriting decisions to experts.

For all these reasons, corporations might be able to provide cheaper and more secure insurance than private underwriters. Accordingly, it was widely expected that private underwriting would die out when faced with competition from corporations. In the US, and elsewhere, as we shall see, that is exactly what happened.

However, in Britain, despite the apparent advantages of corporations, private underwriting not only survived, but flourished after 1720. Except perhaps during their first few years of operation, the two chartered corporations, in fact, probably never did more than 10% of all marine insurance business. In 1810, at the height of the Napoleonic wars, it was estimated that the two corporations together accounted for less than 4% of total sums insured, and that “both [corporations] added together would not exceed what two of the most considerable individual underwriters would write in one year”<sup>5</sup>. Although some private underwriting occurred at Bristol, Liverpool, and other regional

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were repealed in 1824 (Harris, 1997).

<sup>5</sup>(Select Committee on Marine Insurance, 1810, evidence of Angerstein).

ports,<sup>6</sup> the vast majority of the British marine insurance market was concentrated at Lloyd's. Ultimately, rather than extinguishing private underwriting, the competitive pressure from the corporations appears to have provided an added impetus for it to become more organized, though the organization would remain entirely informal for decades.

Why, contrary to expectations, did the two chartered corporations fail to dominate the British marine insurance market? In section 5, we will build a model to show how a lemons problem faced by the corporations in a market dominated by private underwriters may explain how Lloyd's private underwriters managed to survive competition from corporations, and we will argue that an unfavorable start for the corporations may have pushed the British marine insurance market into such an equilibrium.

### **3.4 Development of private underwriting after 1720**

Edward Lloyd's coffee house had opened for business in the mid-1680s, and by the turn of the century, had become a center for ships news and other activity connected with shipping (Dawson, 1934). However, it is not known how much marine underwriting was done there prior to 1720. At most, it was only one of several venues in which marine insurance was carried out. But after 1720, Lloyd's gradually emerged as a focal meeting place for those involved in marine insurance. Merchants and shipowners, or brokers acting on their behalf, could get a policy underwritten there quickly and conveniently because of the number of underwriters in attendance, while underwriters in turn were lured there by the prospect of plentiful opportunities to underwrite. In this way, decades before it gave rise to any formal association for private underwriting, Lloyd's coffee house had become the center of the marine insurance market in London. By 1739, less than 20 years after the passage of the Bubble Act, over 90% of British marine underwriting was being done at Lloyd's.

In order to compete with the corporations, the private underwriters had to overcome the three kinds of informational problems discussed in section 2: collecting and interpreting the information (on the voyage, the ship and her crew, political developments, etc.) needed to determine the correct premium; overcoming moral hazard problems such as fraud on the part of the insured; and generating confidence in the financial security of the underwriter. Business practices at Lloyd's, which emerged and evolved gradually over an extended period of time, managed to partially overcome each of these difficulties. We will consider each in turn.

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<sup>6</sup>See, eg., (Downs, 2004) and (Jackson, 1971) on regional underwriters.

First, to meet his customer's needs for shipping news, Lloyd made a deliberate and systematic effort to gather and disseminate the most accurate and up-to-date information on ship movements, political developments, and all kinds of information relevant to shipping. As early as 1693, the Hudson's Bay company had made a gift to Edward Lloyd in acknowledgement of "his intelligence of the companies ships". Some of the news came from the customers themselves; but Lloyd also employed runners who went along the docks picking up news of arrivals, departures, losses, and other relevant gossip, and relaying this information to the coffee-house. He began to build up a network of correspondents in domestic and foreign ports, who were employed to send him shipping information, and he cultivated a special relationship with the post office, the headquarters of which was near the coffee-house. In exchange for a fixed annual fee, letters addressed to Lloyd's were carried free of postage, sorted specially and held for collection by a Lloyd's messenger. The combined effect of these efforts was to give Lloyd's a "practical monopoly of complete and up-to-date shipping intelligence" (Wright and Fayle, 1928, p.75)

As the news was brought in, it was announced publicly from a pulpit built for the purpose. Lloyd had also begun publishing *Lloyd's News*, a news-sheet of shipping and other news, in 1696, and although the regular publication was short-lived, he continued to print sporadic newsheets detailing ships arrivals and departures, political developments and any other news of shipping in response to his customers demand for shipping news. In 1734, regular publication was resumed as *Lloyd's List*, which has been published ever since.

By the early 1760s at the latest, and possibly much earlier, a committee of Lloyd's underwriters employed surveyors to assess the condition of ships, and this information was displayed in *Lloyd's Register*, giving underwriters access to information on any ships they had an opportunity to insure.

Not only did Lloyd's have an efficient apparatus for gathering and diffusing information, it also had an advantage over corporations in its ability to use and interpret that information effectively. This arose from the presence of a wide variety of groups of underwriters at Lloyd's with specialist knowledge of particular routes. One broker explained:

If I have a cross risk to make, if it is from America, I go to a box where there are Americans to give me information; and so it is from the Baltic or any other part . . . they are the people who can begin the policy for me better than the others, and I can by that means get it done. It is of no use applying to a Baltic merchant [to underwrite] on an American risk; he does not do it, simply because he knows nothing about it . . . There are so many people frequenting the coffee-house, that, even if an underwriter does not himself understand a question, he soon procures

information, and makes me master of the subject at the same time.  
(Select Committee on Marine Insurance, 1810, evidence of Angerstein)

Once a policy had been begun by a “lead” underwriter with the appropriate expertise, other underwriters, despite lacking specific knowledge of the risk, would subsequently be more willing to underwrite at the same premium. This sort of expertise was particularly important on cross-risks (voyages between two foreign ports).

In contrast, the corporations were excluded from Lloyd’s news service,<sup>7</sup> and did not have access to the same level of expertise in every market and local knowledge that the private underwriters, collectively, had. Each of the corporations ultimately had to rely on the expertise of a single underwriter (known as the Sitting Director in the case of the Royal Exchange Assurance Co.) to make knowledgeable decisions about all proposals for marine insurance (Supple, 1970, p.200). After experiencing some cases of fraud, they became increasingly reluctant to cover cross risks, and the risk of capture in a foreign port. On most risks, their premia were generally 20-30% higher than at Lloyd’s. In section 5, we will show how the superior access to information of Lloyd’s underwriters may have created a lemons problem for the corporations which can help to explain their conservatism in underwriting.

Second, there was the problem of moral hazard on the part of the insured: deliberate sinking of a heavily insured ship, for example. Contemporary accounts suggest that the trust generated through repeated interaction between merchants and brokers, and between brokers and underwriters, helped to reduce (though not eliminate) this kind of fraud. Brokers frequently refused business from merchants and shipowners who they did not know. Likewise, reputable brokers had regular accounts with particular underwriters to whom they offered first refusal of their business, and could therefore get policies written more quickly, and at a lower premium, than brokers who were not well known and established, who found it more difficult to get underwriters to insure their policies.

Reputation also affected the settlement of accounts following a claim. Marine insurance contracts remained necessarily incomplete, due to the uncertain timing of voyages in wind-driven vessels, and because of fluctuating economic and political conditions, there were advantages to allowing captains some discretion in terms of the return cargo and route. As a result, underwriters often had opportunities to contest claims, yet they were generally regarded as very generous in settling claims where there had been an unanticipated

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<sup>7</sup>After 1814, Lloyd’s began to supply the two chartered corporations with shipping intelligence in exchange for an annual payment of £100 (Wright and Fayle, 1928, p.316).

change in the voyage, or a mistake which might have rendered the policy technically invalid. Their motivation for this generosity was straightforward: by maintaining a reputation for honest and open dealing with brokers and merchants whom they trusted, they would be offered future business and higher premiums. One of them testified, however, that “the private underwriters will settle the loss for a man of character, where they will not for a man whom they suspect”,<sup>8</sup> and brokers also testified that they preferred to confine their business whenever possible from men of “character”, who were prudent in their underwriting and not litigious in case of loss. Thus, all participants - merchants, brokers and underwriters - had an incentive to maintain a reputation for prudence, fair dealing and respectability.

The importance of these personal connections and reputation in constraining moral hazard gave Lloyd’s underwriters an advantage over the chartered corporations. All underwriters had to be constantly on guard against fraud (Weskett, 1781), but the corporations were particularly vulnerable, and this made them especially inflexible and cautious in their underwriting. Merchants complained that the companies would not insure large sums, and, despite the advantages of flexibility, imposed stringent conditions, for example on the route a vessel might take. In fact, reflecting the importance of personal connections in eighteenth century commercial life, a substantial part of the business done by the companies was done for, or brokered by, their directors and shareholders (John, 1958).

Thirdly, there was the problem of the underwriter’s security. Though private underwriters did sometimes fail. such failures were surprisingly rare, even during the Napoleonic wars when several calamitous events produced large claims. The explanation lay in the terms of credit granted to brokers in the collection of premia. Underwriters who suffered losses were bound to pay them within a month. However, underwriters generally granted brokers generous terms of credit, often over a year, to pay premia. In turn, the brokers often allowed credit to the merchants, so that in effect, the premium might not actually be paid until after the risk had been run. This meant that at any time underwriters had, in effect, two sources of capital: their own private fortune, with full unlimited liability; and a “premium capital” owed to them by the brokers for policies they had already underwritten. Even if an underwriter became insolvent, there would generally be sufficient funds available from the fund of premia owed by the brokers to pay off any claims which might arise on outstanding policies.<sup>9</sup>

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<sup>8</sup>(Select Committee on Marine Insurance, 1810, evidence of Angerstein)

<sup>9</sup>(Select Committee on Marine Insurance, 1810)

Underwriters willingness to grant such lenient terms of credit stemmed from the brokers' customary system of remuneration: brokers got 5% of the premium income, plus 12% of any net profits made by the underwriter on the account at the time accounts were settled. Therefore, it was in the underwriters interest to maintain a credit balance with the broker, so that if any losses should occur, in effect, 12% of the burden would fall on the broker.

Thus, by the time of the Napoleonic wars, Lloyds had evolved procedures which collected and made efficient use of shipping information, and offered underwriters some protection against fraud (though instances of fraud were still by no means uncommon), while protecting merchants and shipowners to an extent against the possibility of underwriters insolvency. Although this system had evolved largely without conscious design, it worked so well that not only British, but also many foreign merchants and shipowners chose to insure at Lloyd's. By the middle of the eighteenth century, London had become the most important center of marine insurance in Europe, and the vast majority of all business done in London was done at Lloyd's.

### **3.5 Institutionalization of Lloyd's**

Both Lloyd's as an institution, and the institutional environment in which it was embedded, gradually evolved during the period of the Bubble Act (1720-1824). In general, this evolution involved the creation of formal rules to systematize existing practices and respond to immediate needs, rather than deliberate innovation.

The evolving legal environment during the mid-eighteenth century both reflected and reinforced the dominance of Lloyd's. Until the mid eighteenth century, insurance cases had been decided for the most part in an unsystematic, ad-hoc way. However, Lord Mansfield, who was Chief Justice of the Court of King's Bench from 1756-1788, took major steps towards rationalizing and setting out legal principles of insurance. The principles and precedents established by Mansfield through his rulings on a large number of cases, which were generally derived from mercantile practice and custom, included the principle of "utmost good faith", according to which any misrepresentation or concealment of facts by the insured, or deviations from the planned voyage without reasonable cause, would void a policy. Mansfield also simplified legal procedure, in particular, by eliminating the necessity for an insured party to bring legal actions against each underwriter separately in the event of a disputed claim (the "Consolidation Rule"). This strengthened private underwriting by removing one of the major advantages of insurance corporations over private underwriters - the convenience of having to bring only one lawsuit to recover

a claim (Oldham, 1992).

The roles of the participants at Lloyd's also continued to evolve. In the early 1700s, there were few specialist underwriters; most underwriting was done by merchants or wealthy individuals who underwrote on the side, but whose main business was elsewhere. Many of those who acted as brokers were also underwriters or merchants. Over time, as the scale and variety of commercial risks grew, these roles became increasingly distinct and specialized.

Towards the end of the eighteenth century, a formal organization began to emerge at Lloyd's. The process began in 1769, when a group of frequenters of the coffee-house broke off from Lloyd's to form "New Lloyd's", and formed a society with an ad-hoc committee to find new premises. The rebellion was successful, and within a few years, "Old Lloyd's" had disappeared and "New Lloyd's" again became simply "Lloyd's". But although the committee's purpose had been completed by 1774, and no formal terms of reference for its functioning had been defined, it continued to meet sporadically to discuss any issues which arose from time to time, and eventually formed the basis for the future development of the organization.

The process of formal institutional development accelerated greatly as a result of the Napoleonic wars (1793-1815). The wars substantially increased the risks of international commerce, thereby increasing demand, raising premia, and creating opportunities for profit for both merchants and underwriters. On average, high premia more than compensated underwriters for the increased losses, and although some failed, many underwriters made a fortune. The two chartered corporations also prospered as their premium income grew, but they still commanded only a small fraction of the overall marine insurance market, which remained overwhelmingly concentrated at Lloyd's. The number of subscribers to the society of Lloyd's grew from less than 200 in 1775 to more than 2,000 by 1801.

This growth in business provided the impetus for substantial institutional changes at Lloyd's. In 1796, the existing ad-hoc committee began to hold regular meetings and to issue an annual report. In 1800, in response to overcrowding in the subscriber's rooms, a rule was introduced that candidates needed to be elected to join Lloyd's, and the exclusion of non-subscribers from the subscribers rooms was enforced.

Prompt and accurate shipping, political and military news was more important than ever. At the start of the Napoleonic wars, Lloyd's news-gathering service was already far more efficient than anything the government possessed. Until 1804, Lloyd's correspondence was handled by the coffee-house masters, but as the volume of correspondence grew, this arrangement became unsatisfactory, so a secretary was appointed to manage it. The secretary

further developed and extended Lloyd's' intelligence gathering apparatus, for example, by appointing new correspondents abroad and subscribing to foreign newspapers.

In 1811, a dispute arose over losses in the Baltic, and it became clear that the lack of clear regulations governing the operations of the committee and the use of information were the root cause of the problem. In response, a Trust Deed was drawn up which turned the committee from an ad-hoc into an established body with 12 elected members, gave it control of the subscription funds, and bound subscribers to obey its regulations. The committee took over formal responsibility for the general supervision of the intelligence system, and for supervising who was to be allowed to become a subscriber, and it was empowered to appoint agents to act on behalf of the underwriters as a group. 269 agents had been appointed by 1820 (Wright and Fayle, 1928, p.383).

Thus, in response to temporary needs caused by the increase in marine insurance during the Napoleonic wars, Lloyd's had developed a formal structure, and had gained commercial and institutional strength. There were limits to this evolution, in particular there was no formal attempt to ensure the financial security of underwriters, and insurance business continued to be conducted strictly on an individual basis with unlimited liability.

In 1824, the relevant sections of the Bubble Act were repealed, paving the way for an influx of new joint-stock corporations in the British marine insurance market. As in 1720, it was widely expected that this competition would mean the end of private underwriting. One contemporary underwriter, for example, believed that "if companies are sanctioned, individual underwriting must cease, as has been proved by the example of all other countries, more particularly by the recent example of America" (Marryat, 1810, p.265).

By the 1820s, however, the boom years were over, premia were low, the number of subscribers at Lloyd's was in decline, and the shipping industry was depressed for the next several decades. Whereas the Royal Exchange Assurance corporation, for example, had averaged profits of £32,500 per year during the turbulent years from 1793-1813, it made an average loss of £20,000 during the next 20 years from 1814-34. The REA's annual premia, which had risen from about £20,000 in the 1770s to over £500,000 at their peak in 1814, fell back to around £20,000 in 1821-5 (Supple, 1970, p.201). The experience of the London Assurance was similar (John, 1958, p.130). In this inhospitable environment, many of the new companies failed, but several managed to survive and compete effectively with Lloyd's (Palmer, 1984). After the 1844 Company Act enabled the formation of joint-stock companies simply by registration, more than 300 Insurance companies were formed in the next 9 years, substantially increasing the degree of competition. Growing trade vol-

umes, and later, the American Civil War, made the 1850s and 60s better years for marine insurers, but again, many of the new companies failed. Lloyd's, however, although it continued to evolve in significant ways in response to competition from the companies, weathered the competition and remained the major commercial force in the marine insurance market.

## 4 Marine insurance in America

In the US, as in Britain, the Napoleonic wars had a huge and lasting effect on the development of the marine insurance industry. However, in contrast to the UK, private underwriting had virtually disappeared in America by 1815, and instead the business was carried on almost entirely by joint-stock marine insurance corporations.<sup>10</sup>

### 4.1 Colonial America

In the mid-eighteenth century, marine insurance in the colonies was carried on on an individual basis much as it had been in Britain before 1720: merchants met in coffee-houses and taverns where they shared news and insured each others ventures; some of these merchants also brokered policies for their correspondents in other ports, and there were specialist brokers also. Local underwriters had the advantage of proximity which enabled quick payment in case of loss, and facilitated resolution of disputes. However, the security obtainable in the colonies could not match that available in London, and the size of the London market ensured that insurance was cheaper there. As a result, colonial American merchants frequently obtained insurance in London, despite the considerable inconvenience and problems which could result. For example, orders for insurance in London were often sent on ships expected to arrive before the ship being insured. If the goods arrived before the ship carrying the order for insurance, then the premium was saved. However, this could be precarious, as was illustrated by the case of one London agent who received an order to insure a consignment of tobacco only an hour before news arrived that the ship had been lost, leaving the tobacco uninsured.<sup>11</sup>

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<sup>10</sup>On the history of marine insurance in America, see (Huebner, 1922). On the American position during the Napoleonic wars, see (Clauder, 1932), (Phillips and Reede, 1936). On the formation of corporations in general, see (Davis, 1917). On marine insurance corporations see, eg., (Ruwel, 1993), (Fowler, 1997), (Gillingham, 1933), (Montgomery, 1885).

<sup>11</sup>Joshua Johnson's letterbook (Price, 1979, p.120). The Beekman's letters (White, 1956) contain further examples of this practice.

The Bubble Act, which prohibited any joint-stock companies or partnerships (other than the two chartered corporations in London) from providing marine insurance, was extended to the American colonies in 1741.<sup>12</sup>

America had no major marine insurance marketplace that could compare with Lloyd's, but there were several active centers for private underwriting, such as the City Tavern in Philadelphia, which was frequented by about 50 underwriters in the years after the American revolution. As ships brought news from London and elsewhere, this information was posted together with details of arrivals, departures and losses. Similarly in New York in 1759, there were two Coffee houses which functioned as meeting places for marine business (Harrington, 1935, p.154).

With Independence from Britain, the Bubble Act restrictions on joint-stock companies were removed, and the newly-formed American states became free to charter corporations for marine insurance and other purposes. In the late 1780s and early 1790s, they began exercising this freedom with increasing frequency, granting charters for various purposes. In 1792, a group of Philadelphia merchants began attempts to obtain a charter for a marine insurance corporation. And in February 1793, war broke out between Britain and France.

## 4.2 The Napoleonic wars and growth of corporations

The Napoleonic wars created enormous risks and opportunities for American merchants. England's maritime superiority effectively closed off direct communications between France and its colonies (Clauder, 1932), so at the outbreak of war, the French opened their colonies, including their West Indian colonies and the important entrepots at Ile de France and Bourbon, to trade with American vessels, which were to pay no higher duties than French vessels. This enabled the Americans to carry on an indirect trade, in which goods were imported from French, Spanish and Dutch colonies to the United States, where they would pay customs duties, thus enabling them to enjoy neutral status so that they could be re-exported to France and the continent; while in

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<sup>12</sup>On occasion, however, individual underwriters would join together to share risks in ad-hoc "companies". For example, in 1757, Thomas Willing and five other prominent Philadelphia merchants formed a company, each agreeing to underwrite one sixth of risks, but without assuming joint liability (which was prohibited). In essence, therefore, the "company" was in reality merely a syndicate designed to reduce the transaction costs of individual underwriting. The arrangement was renewed annually for several years, though the identities of the underwriters involved changed from time to time as individuals joined or left the group. Similar companies were later formed in Boston and elsewhere.

the reverse direction, European goods flowed to the colonies via the US.

As a result of these new opportunities, and of protective tariffs and regulations which had been introduced by Congress in 1789, American shipping tonnage grew rapidly. In 1789, US imports and exports totalled 123,000 tons, of which 23% was carried in American ships. By 1792, total tonnage had more than tripled to 411,000 tons, of which 64% was carried in American ships; and by 1796, had reached 576,000 tons, of which 92% was carried in American ships (Gibson and Donovan, 2000). In the words of one contemporary American observer,

The affairs of Europe are certainly of less and less consequence to us in a political point of view; in a commercial, they rain riches upon us; and it is as much as we can do to find dishes to catch the golden shower (1795, quoted by (Smith and Cole, 1935, p.15))

At the same time, this growing trade was subject to considerable risk as a result of the wars. Although America was neutral, both belligerents employed their navies and commissioned privateers to seize food bound from America for the other, and to seize enemy property carried in American vessels. For example, 600 American vessels bound for the ports of the enemy were seized or detained in British ports in a five month period between November 6 1793 and March 28 1794 alone (Huebner, , p.436). The decrees issued by the belligerents changed with sometimes extraordinary frequency, and in any case were not always carefully observed.

The growth in trade, and the uncertainty involved in that trade, greatly increased American's demand for marine insurance. Many American voyages continued to be insured in London despite the considerable inconvenience which resulted. By insuring in the US, merchants could recover their losses more quickly, and avoid the necessity to rely on an agent to represent their interests. Crucially, by law, British insurers were not liable for losses on American ships captured by British ships, and at various times during the Napoleonic wars, American ships were at risk of capture by British privateers and the Royal Navy.

All of these factors created the conditions for a rapid expansion of the American marine insurance market. This expansion took the form of an explosive growth in corporate rather than private underwriting. The first American marine insurance corporation, the Insurance Company of North America (ICNA), was formed in Philadelphia in 1792 and chartered in 1794. The President and Directors were all leading underwriters who had previously attended the City Tavern, and most of the board were Philadelphia merchants. Philadelphia's remaining private underwriters initially opposed the INCA charter, but

having observed the early success of the ICNA, they founded the rival Insurance Company of the State of Pennsylvania, which was also chartered in 1794. The Philadelphia corporations proved highly profitable, and more charters followed in other states. In contrast to London, where the two chartered corporations held a monopoly, in the US no monopoly was sought, and at least ten corporations were in business by 1800 (Huebner, 1922, p.254).

In Maryland, two corporations were chartered in 1795. In New York, two charters were granted in 1798. In Massachusetts, where two well-developed unincorporated “companies” of private underwriters had been doing most of the marine insurance in Boston since the early 1780s, the first marine insurance charters were not granted until January 1799. Within 5 years, however, at least 17 additional marine insurance companies were formed in Massachusetts alone (Fowler, 1997, p.172). In Providence, another major port, the first marine insurance corporation was also chartered in January 1799, and more followed soon thereafter in Providence, Newport and other Rhode Island towns (Roelker and Collins, 1949). Connecticut’s first marine insurance corporation was chartered in 1797, and several others followed in the early 1800s (Woodward, 1897). The first marine insurance corporation in Maine was chartered in 1800. By 1810 private underwriting had virtually disappeared in the US, and it was reported in Britain that “in every part of America the Insurances are done by incorporate companies”<sup>13</sup>.

Why did corporations quickly come to dominate marine insurance in the United States? Why did private underwriting disappear? Certainly, the increased demand for marine insurance in the US initially made the corporations highly profitable due to high wartime premium rates, but as we have seen, this was equally true for the private underwriters at Lloyd’s, so the increase in demand, by itself, cannot explain the demise of private underwriting in the US.

Equally clearly, we cannot look for any explanation based on technology, because the technology of trade was common to both Britain and America at this time, and in any case changed little during the eighteenth century. Nor was there a lack of awareness of the potential for a system of private underwriting; American merchants were very familiar with Lloyd’s.

The broader political and ideological context clearly played a role; the movement to form marine insurance corporations was part of a broad movement of incorporation in the US which saw several hundred banks, turnpike companies, canals, manufacturing and other companies receive corporate charters during the 1790s. Historians have debated the reasons for this tide of in-

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<sup>13</sup>(Select Committee on Marine Insurance, 1810, p.11)

corporation without arriving at a definitive conclusion. One hypothesis (Maier, 1993) is that the corporation was “a child of the American Revolution” (p.84), reflecting the efforts of a society actively involved in constitution-building to adapt an English institution to American needs by re-creating the corporation “as an agent of opportunity rather than a recipient of privilege”. At any rate, the constitutional, legal and ideological changes which made incorporation *possible* at that time can be regarded as exogenous from the point of view of the marine insurance industry. Yet, as we have seen, in Britain, after the Bubble Act was repealed, enabling the formation of numerous marine insurance corporations, private underwriting survived, so this still does not explain why private underwriting disappeared in America.

Perhaps the development of a private underwriting institution similar to Lloyd’s was hindered by the lack of a “London” in America: unlike in Britain, maritime commerce in the US was not dominated by a single major port, but rather there were several major ports and numerous minor ports, so that the American marine insurance market was really a fragmented collection of local markets. However, merchants corresponded freely all along the east coast, engaged in joint ventures, and insured each others voyages. New York merchant Gerard Beekman, for example, frequently brokered policies for Rhode Island merchants in New York in the 1750s, and in turn he sometimes insured his own voyages in Philadelphia, where he found the premia lower than in New York (White, 1956, p.227). So, it is at least conceivable that the several centers for private underwriting which existed in several cities might have grown into more developed institutions for private underwriting, given time.

The most plausible explanation for the failure of an American Lloyd’s to appear is probably that the formation of joint-stock corporations became possible at a time when American private underwriting was still at a comparatively early stage of development. An intelligence-gathering apparatus such as that created by Lloyd’s, and the institutional structures which enabled private underwriters at Lloyd’s to deal with the agency problems inherent in marine insurance, took time to evolve. Because of the heightened uncertainty associated with wartime, and lacking well-developed institutions, private underwriting could not compete with corporations, and rapidly disappeared.

## 5 Model: A lemons problem

### 5.1 Introduction

Asymmetric information was a pervasive feature of marine insurance contracts in the eighteenth century. Merchants were generally much better informed than underwriters about the probability of a loss on a voyage, and had strong incentives to conceal information which, if known, would raise the premium, and to represent other facts so as to reduce the premium. Thus, one underwriter complained that

Intelligence, the most speedy and circumstantial information, is indispensably necessary to an insurer; and yet after all, and with the keenest penetration and judgement, it will rarely happen that he is on an *equal* footing, as he ought to be, with the insured (Weskett, 1781, p.297).

This model explores the consequences of the resulting agency problems, in a way which can explain both the dominance of private underwriting in Britain and its virtual disappearance in the US.

The key features of the model, motivated by the historical evidence, are as follows: there are many merchants who can purchase insurance from two kinds of underwriters: private underwriters, and corporations. Corporations have an advantage in that they are perceived by merchants as more financially secure. However, if many merchants insure with private underwriters, then (because of network effects) these private underwriters may gain an advantage in assessing risks. This creates a lemons problem for the corporations: the very best risks will be offered favorable rates by private underwriters, leaving the corporations with a disproportionately poor selection of risks, which forces them to raise their premia, which in turn drives more of the better risks to insure with private underwriters. Thus, there may be multiple equilibria: one in which all marine insurance is done by corporations, and another in which the better risks are insured by private underwriters at low premia, while the corporations charge high premia and receive business only from the worst risks.

### 5.2 Model

There are three kinds of players in this model: merchants, private underwriters, and corporate underwriters.

*Merchants.* Merchants undertake voyages which either succeed, yielding income  $I$ , or fail, yielding 0 (for simplicity, we ignore the possibility of partial losses). Merchants have initial wealth  $W$ , and identical continuously differentiable VNM utility functions  $u(\cdot)$  defined over non-negative values of income,

such that  $u'(\cdot) > 0$  and  $u''(\cdot) < 0$ . The probability of success for merchant  $i$ 's voyage is  $\theta_i$ , which is uniformly distributed on the interval  $[\underline{\theta}, \bar{\theta}]$ , where  $0 < \underline{\theta} < \bar{\theta} < 1$ . The distribution of  $\theta$  is common knowledge. Since  $\theta$  is private information, we will refer to  $\theta$  as the merchant's "type".

*Underwriters.* There are a large number of private underwriters, and at least two insurance corporations. All underwriters are risk-neutral and act competitively. A marine insurance contract is one in which an underwriter agrees to indemnify a merchant by paying them  $I$  in case of loss, in exchange for a premium payment  $pI$ , where  $p$  is the rate of premium charged.

Play in this one-shot game proceeds as follows. First, the corporations announce their premia,  $p_c$  (because the corporations are unable to learn the merchant's type,  $p_c$  is the same for all merchants). Bertrand competition between corporations is assumed to drive  $p_c$  down to a level (to be determined endogenously) which leads to zero expected profits for the firm. Next, merchants learn their types,  $\theta$ . Then all merchants simultaneously decide whether to apply to corporate or private underwriters. If merchant  $i$  chooses to insure with a corporation he chooses the corporation which has set the lowest premium. If instead he chooses private underwriters, then those underwriters learn his type,  $\theta_i$ , with probability  $\sigma$ , where  $\sigma$  is the proportion of merchants who purchase insurance from private underwriters. The premium charged by private underwriters will depend on the information available to them. If they learn the merchant's type, then competition will lead them to offer insurance at the actuarially fair premium,  $\theta_i$ . Otherwise, they offer a premium  $p_p$ , where  $p_p$  (to be determined endogenously) is driven by competition to a level which yields zero expected profits to the private underwriters. Finally, private underwriters fail with probability  $\phi$ . If a private underwriter fails, any insurance contracts he has made are void, and neither premium nor indemnity is paid.

Let  $u_p(\theta)$  and  $u_c(\theta)$  denote the expected utility obtained by a merchant of type  $\theta$  by choosing private and corporate underwriters, respectively.

**Lemma 5.1.** *For any given values of  $p_p$ ,  $\phi$  and  $\sigma$ , the payoff to choosing private underwriting,  $u_p(\theta)$ , is strictly decreasing in  $\theta$ ; for any value of  $p_c$ , the payoff to choosing corporate underwriting,  $u_c(\theta)$ , is independent of  $\theta$ .*

*Proof.* The expected payoff to insuring with a private underwriter is

$$u_p(\theta) = (1-\phi)[\sigma u(W-\theta I) + (1-\sigma)u(W-p^p I)] + \phi[\theta u(W-I) + (1-\theta)u(W)] \quad (1)$$

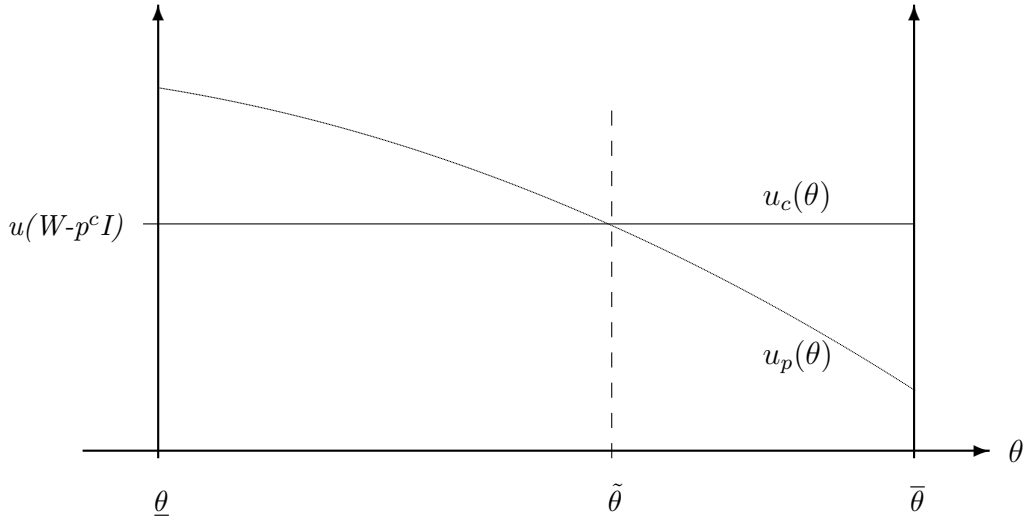
The term in the first square bracket shows the payoffs obtained in the case where the private underwriter does not fail. The second square bracket shows the expected payoff if the underwriter does fail, leaving the merchant uninsured. Both terms are strictly decreasing in  $\theta$ . The payoff to using a corporate

underwriter is

$$u_c(\theta) = u(W - p_c I) \quad (2)$$

□

Lemma 5.1 ensures that in searching for equilibria of this game, we have only three possible cases to consider: pooling equilibria in which all types of merchants choose private underwriters and  $u_p(\theta) \geq u_c(\theta) \forall \theta$ ; pooling equilibria in which all types of merchants choose corporate underwriters and  $u_p(\theta) \leq u_c(\theta) \forall \theta$ ; and equilibria in which there is some critical value of  $\theta$ ,  $\tilde{\theta}$ , such that merchants with  $\theta < \tilde{\theta}$  choose private underwriters and those with  $\theta > \tilde{\theta}$  choose corporate underwriters (and those with  $\theta = \tilde{\theta}$  are indifferent). The following diagram depicts the choices faced by merchants for some given value of  $p_c$ ,  $p_p$  and  $\sigma$  in the third case. However, in equilibrium,  $p_c$ ,  $p_p$  and  $\sigma$  are determined



endogenously. When we take this into account, we find that there are generally two possible equilibria, as Proposition 1 shows.

**Proposition 1.** (i) *There is no pooling perfect Bayesian equilibrium (PBE) in which all types of merchants insure with private underwriters. (ii) However, there is a pooling PBE in which all types of merchants insure with corporations. (iii) For sufficiently small values of  $\phi$ , there exists a “lemons” PBE, in which some merchants insure with private underwriters, and some with corporations, and in which the merchants who insure with private underwriters are of better types (lower  $\theta$ ) than those which insure with corporations.*

*Proof.* See Appendix. □

Proposition 1 shows that two kinds of equilibria are possible in this game. If nobody expects any merchants to apply to private underwriters, then the private underwriters will have no informational advantage, and given the insecurity of private underwriting, all merchants would indeed prefer to insure with the corporations. Thus we have an equilibrium in which all merchants choose corporate underwriters. However, if it is expected that some merchants will insure with private underwriters, then low-risk (good type) merchants might prefer private underwriters, since if the private underwriters observe their type, they will pay lower premia. But then, the merchants who apply to the corporations tend to be bad types, so the corporations must raise their premia to break even. As they do so, more of the better risks will move to private underwriting; and so on, until the corporations are left with only the very worst risks, who no longer care that by choosing corporate underwriters they reveal their bad type, since the private underwriters would likely discover this anyway.

### 5.3 Discussion of Assumptions

Our model differs from screening models of insurance such as (Rothschild and Stiglitz, 1976), which rely crucially on the assumption that customers can buy only one insurance contract, so that firms can induce customers to reveal their type by offering a menu of price-quantity contracts (less risky customers will be willing to buy lower quantities of insurance at lower premia). This is appropriate in many contexts, but not for the marine insurance market during the eighteenth century, when it was quite usual for merchants to insure with multiple insurers, and insurers could not limit the total amount of insurance purchased (though, to control moral hazard, a merchant could not legally recover from insurers more than the value lost).<sup>14</sup>

A more serious problem is that we assumed that all merchants inelastically purchase full insurance. In general, at any given premium, good risks

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<sup>14</sup>In the event of inadvertent over-insurance (for example, if the value of the cargo had been overestimated), generally whichever insurance was made first was effective, the later insurances being responsible for only that portion of the risk not covered by the earlier policies (Weskett, 1781). Frauds did occur, and could be difficult to detect. One instance was the case of the *Friends*, of Glasgow, in which a shipowner took out several policies with different brokers in London, Hull, Glasgow, and Dundee to insure goods worth about £1000 for £3745. The ship was then deliberately sunk after some of the cargo had been secretly removed (the fraud was discovered, and the merchant narrowly escaped a death sentence) (Jackson, 1971).

would wish to insure less than bad risks (eg., (Rothschild and Stiglitz, 1976)). The historical record confirms that, as we would expect, merchants sometimes chose not to insure voyages, particularly if they had a relatively small amount of merchandise travelling on a particular ship.<sup>15</sup> However, although this is a strong and unrealistic assumption, it substantially simplifies the analysis without affecting the qualitative conclusions. Relaxing this assumption would add another twist to the lemons problem: not only will the corporations get the worst risks, but within that group, the worse the risks are, the more insurance they will purchase.

Finally, we treated the interaction between merchant and underwriter as a one-shot game. This is also a strong and potentially problematic assumption for both theoretical and empirical reasons. The theory of repeated games has shown that repeated interaction can be an important means of overcoming agency problems, and the historical evidence also clearly shows that both private and corporate underwriters strove to build up “a connection” with merchants, so that by engaging in repeated business they could reduce the degree of uncertainty and the danger of opportunism involved in their transactions. At Lloyd’s, and elsewhere where private underwriting was practiced, insurance brokers facilitated this trust by acting as middlemen engaged in repeated transactions with both underwriters and merchants.

However, repeated interaction would not substantively change our conclusions. In fact, although we have treated the merchant’s “type” as a measure of exogenous risk, an alternative interpretation is that the “type” could reflect a merchant’s reputation. If a reputation mechanism based on repeated interaction, such as that at Lloyd’s, helps private underwriters to overcome moral hazard, then a corporate underwriter, without access to this reputation mechanism, is handicapped because it cannot observe a merchant’s reputation or use the threat of gossip to constrain a merchant’s behavior as easily as private underwriters can.

## 5.4 Equilibrium Selection

Proposition 1 reveals the potential for multiple equilibria in the marine insurance market, which may help to explain both the success of marine insurance corporations in the US after 1792, and the persistence of private underwriting in Britain after 1720. However, to evaluate the relevance of the model, and to see how these different equilibria were arrived at, we must turn to the

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<sup>15</sup>For example, American merchant Henry Laurens instructed his agents in London that when his goods were shipped “by a good vessel and master” they should not insure values below £100, and only  $\frac{3}{4}$  of the value of larger shipments (Hamer, 2003, 7<sup>th</sup> Jan 1796).

historical record.

In Philadelphia in 1792-4, the new corporations proved highly profitable, and were accused of undercutting the market in a deliberate attempt to drive private underwriters out of business (Montgomery, 1885, p.40). Since many of the most prominent merchants joined the corporations, they suffered no disadvantage relative to private underwriters in terms of information. They also arrived at a highly favorable time for marine insurers, and they indeed came to dominate the market in the space of little more than a decade.

Likewise, in Britain, in the period before they obtained their charters (1718-20), the companies which were to become the chartered corporations did a large amount of business, and were accused of undercutting the market in order to drive private underwriters out of business (Supple, 1970, p.20). However, the bursting of the South Sea Bubble left the corporations in financial difficulties, partly from the cost of raising the £600,000 bribe payment owed to the King's civil list, and partly because many of their subscribers, who had paid in only a fraction of the nominal value of their stock, were themselves in financial trouble following the collapse of the South Sea bubble. As a result, the corporations began with little capital, plunging share prices, and low public confidence. The bribe ultimately could not be paid and was halved, and the London Assurance was forced to borrow money to survive. Within a few years they were doing only a small proportion of the total marine insurance business and charging premia that were considerably higher than those charged by private underwriters on similar routes.

Thus, market conditions at the time of their entry into the market may explain why different equilibria were selected in the two countries.

## 5.5 Evidence on the Lemons Problem

The lemons problem provides one possible explanation for the chartered corporations failure to dominate the British marine insurance market, and can also explain why they charged higher premia than the private underwriters *on similar voyages*, yet were not able to (or did not wish to) expand by lowering their premia. We next consider some alternative hypotheses.

One possibility is that the two chartered corporations were just not big enough, in terms of their capital stock, to dominate the British marine insurance market. However, this hypothesis does not fit the facts. Firstly, both corporations were able to substantially increase their underwriting activity during wartime, despite the higher risks. For example, the premium income of the two corporations increased more than tenfold in a few years at the start of the Napoleonic wars. Even then, witnesses for both corporations at a parlia-

mentary inquiry in 1810 stated that the corporations would have liked to have done even more business if it were offered to them. Both corporations were also engaged in fire and life insurance, so they could have scaled back their activities in those markets to concentrate on marine insurance if capital had been a constraint. Even in 1810, the Royal Exchange had a paid-up capital of only £680,000, although it had the right to call up to £1.5 million from its shareholders. Clearly, a lack of capital was not a binding constraint on the corporations underwriting. Besides, British merchants also had the option of insuring with corporations overseas, yet most British merchants and brokers, and increasing numbers of foreign merchants and shipowners, remained content to insure at Lloyd's.

Another possible hypothesis is that the corporations higher prices reflected the exercise of monopoly power. Although this may well have been a goal of those who petitioned for the corporate charters in 1720, the corporations were simply too small a part of the overall market as it actually evolved to make this claim plausible, and later statements make clear that this was not how they were perceived. Besides, although the corporations generally found marine underwriting profitable, their profits were not extraordinary. For example, we might compare their premium income and underwriting profits with those of William Braund, described as “a steady but by no means a great underwriter” active in the 1750s-70s (Sutherland, 1933, p.65) who, like many underwriters, had begun his career as a merchant. During 1761-65, Braund made average annual underwriting profits of about £1,700 on premium income of between £4,000 and £9,000 annually (*ibid*, p. 74-77). In comparison, the Royal Exchange Assurance Company achieved average profits in the same years of about £6,100 on annual premia which averaged £36,600 (Supple, 1970, p.62). This also supports the claim that the corporations faced a lemons problem: their marine underwriting profits, as a percentage of their premium income, do not appear significantly higher than Braund's, *despite their charging higher premia on apparently similar voyages*.<sup>16</sup> Finally, if the corporations higher premia had reflected their exercise of monopoly power, one would also expect Lloyd's to be overwhelmed by competition from the influx of competitive marine insurance corporations after 1824, which it was not.

Other evidence also adds weight to the lemons interpretation of events in the UK. As the eighteenth century wore on, the corporations became increasingly conservative in their underwriting, putting stringent restrictions on deviations from the planned voyage, refusing to cover large amounts on a sin-

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<sup>16</sup>It is hard to draw a clean comparison, however, because, as one would expect, there is considerable fluctuation over time.

gle voyage, and refusing to write cross risks, or cover the risk of seizure in a foreign port. For many merchants, it was this restrictiveness, even more than the high premia, which induced them to insure at Lloyd's instead. In 1771, an American merchant resident in London wrote to his partners in Maryland explaining that

“I have not made it [insurance] in a public office [ie., a corporation]. The reason why I did not was their particularity; they must know who you are and a deal of that; then again you are plagued more than little enough before you can get the money after a loss and everybody prefer making theirs at Lloyds for that reason.”<sup>17</sup>

Another stated that

If I could do all my business at the public offices I should undoubtedly prefer doing it with them... In all risks that they will take, they in my opinion are preferable to Lloyd's Coffee house; in the first place, I feel myself perfectly insured, I feel that my property is safely insured . . . I do not think that I can state properly that they are of little service on account of the difference in premiums; I think it is in the amount that they take; they limit themselves in so small an amount that it is impossible to do risks where property is so much enhanced in value; instead of having a sum that they will do on one risk, it is three, four or five times as much as they will take. (Select Committee on Marine Insurance, 1810)

However, the corporations' caution can be explained as a rational response to their lemons problem. Recognizing their disadvantage in evaluating risks, they attempted to confine their underwriting as far as possible to relatively predictable voyages. After experiencing numerous instances of fraud in the early eighteenth century, they ceased to insure cross risks, and refused to cover the risk of seizure in a foreign port: both risks for which a specialist knowledge of local circumstances was of vital importance and the corporations disadvantage was therefore particularly acute. The American corporations did not face this lemons problem. Indeed it was the superior access to information enjoyed by Lloyd's underwriters which *created* the British corporations' lemons problem.

That the corporations were aware of their lemons problem is clear from testimony given by the chief clerk in the marine insurance department of the Royal Exchange to a British parliamentary select committee in 1810. He stated

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<sup>17</sup>Joshua Johnson's letterbook (Price, 1979, p.8)

that although the company often refused to insure merchants who they did not know well, it would have liked to do more business than it did, and that “if insurances were tendered fairly I think many insurances rejected would be taken”. He went on to explain that the company’s practice of underwriting a maximum of £5-10,000 on any one ship in the West India or Baltic fleets resulted from the fact that it usually was only offered the opportunity to insure about one tenth of the ships in the fleet. If it had the opportunity to insure all the ships in the fleet, he claimed, it would “have no hesitation” in insuring £20-25,000 on each ship, “because it would be playing a more equal game” (Select Committee on Marine Insurance, 1810, evidence of J. Holland).

## 5.6 France and Holland

In the other major maritime nations, as in the US, individual underwriting gave way to joint-stock corporations, which came to dominate the marine insurance market.

France, like the US, lacked a single center for marine insurance. Initially, as in other countries, most underwriting was done by individual underwriters in the ports. Insurance on a single voyage was often effected at several ports, and some insurance was also obtained abroad in Britain and Holland. As the business grew, local joint-stock insurance companies were also formed in major ports, and in the 1750s, two large corporations were chartered in Paris. The regional underwriters were able to compete with the large Paris corporations because of their advantages in overcoming agency problems. The Paris corporations were primarily run by non-merchants (Bosher, 1979), and as one commentator observed,

In the seaports a company of merchants gathers together to underwrite insurance. They know their work and inform each other; they know whether the ship they are insuring is good or bad, whether the crew is good or bad, whether the captain is experienced and wise or ignorant and confused, whether the shippers are suspect, of good reputation or likely to be dishonest, whether the voyage is to be long, whether the season is beginning well or not; they know everything because everyone makes it his business to find out. In Paris they know nothing and for the Company to know all that, it would lose as much in the cost of postal charges and correspondence as it would earn in premiums.” (quoted by (Bosher, 1979))

For a time, these companies shared the market with individual underwriters. As late as the 1780s, individual underwriters still did about half the

marine insurance in the medium-sized French port of La Rochelle. However, as in the US, the increased risks during wartime tended to drive individual underwriters from the market. By the 1780s, companies in the larger ports and in Paris controlled a large and increasing part of the French insurance business (Clark, 1978)(Dawson, 1931).

Similarly, in Amsterdam, which was the main center for marine insurance in Holland, private underwriters and partnerships held sway until the 1760s-70s, although companies had been formed in other Dutch cities as early as 1720. The first joint-stock corporation in Amsterdam was formed in 1771. Heavy losses in 1780-1 and political instability in 1786 drove many private insurers from the market, and corporations increasingly began to dominate. By the mid-nineteenth century, although some private underwriters survived, there were as many as 70 Amsterdam-based companies writing marine insurance, and many companies based elsewhere also had agencies in Amsterdam (Spooner, 1983).

## 6 Conclusion

We have argued that in Britain, where the Bubble act prevented partnerships or companies (other than the two chartered corporations) from providing marine insurance, the information shared by the private underwriters who gathered at Lloyd's created a lemons problem for the corporations which prevented them from coming to dominate the market. The challenges and opportunities created by the Napoleonic wars strengthened the system of private underwriting at Lloyd's, enabling it to survive competition from corporations after the Bubble Act was repealed. In the US, in contrast, where the protection of the Bubble Act had been removed by American independence prior to the wars, private underwriting was quickly displaced by joint-stock corporations.

(Aoki, 2001, p.243) has argued that institutional change often involves short, turbulent periods of deliberate experimentation, interspersed with longer periods during which these experiments are weeded out through a gradual, evolutionary process. The development of the marine insurance business in the eighteenth century appears to fit this pattern. Exogenous events, including the South Sea Bubble, American Independence, and the Napoleonic wars, brought about important institutional innovations at particular points in time, and the timing of these shocks appears to have played an important role in determining the subsequent bifurcation in institutional structure between Britain and the United States.

In the periods between these exogenous shocks, endogenous processes

gradually altered the rules of the game. The gradual evolution of business practices at Lloyd's, and the complementary evolution of insurance law in Britain, generated relatively effective institutions without centralized direction and despite considerable inertia which resulted from the public-goods nature of institutional innovation.

(North, 1990) has emphasized the role of learning as a source of endogenous institutional change: agents' experiences in the context of existing institutions can alter their perceived choice set of available institutions, and institutional "entrepreneurs" may then attempt to bring about deliberate changes in formal rules. Learning played an important role in the formation of marine insurance corporations in the US after 1792, insofar as many of the corporations chartered in other states appear to have been encouraged by the success of the pioneering "mutation" of the ICNA in Philadelphia - a mutation facilitated by Philadelphians' recent experiences of constitution-building. Ideological differences derived from past experiences also played an important role at times, for example in the hostility to joint-stock corporations following the South Sea Bubble in Britain, which contrasted with the American willingness to adopt the corporate form after 1789. The true role of ideology is sometimes unclear, however, because even those with pragmatic motives often found it expedient to couch their arguments in terms of convenient ideologies.

The efficiency properties of institutional change are another central concern. Some have argued that there is a tendency for convergence towards efficient institutions, while others have viewed the process as a path-dependent one in which inefficient institutions can persist for long periods of time. Since Britain and America evolved quite different marine insurance institutions, one might conjecture that path-dependence caused an inefficient arrangement to persist in one or the other of the two countries. This would be all the more surprising since both countries were in close commercial contact and had a long history of "institutional transplants". It is not clear, however, whether either arrangement was more efficient in any meaningful sense. Both had drawbacks: under the Lloyd's system, even careful underwriters might occasionally be unable to meet their obligations if they suffered a run of bad luck. The corporate system in the US, however, lacked Lloyd's ability to gather and efficiently use information.

Over time, both systems attempted to resolve these defects. In the 1860s, Lloyd's began to accept deposits from underwriters as a guarantee of security to the assured, and in 1871, it was incorporated, not as a joint-stock corporation, but as a Society with the power to make bye-laws to regulate itself as a marine insurance marketplace. Lloyd's marine intelligence service continued to be of great importance for both private underwriters and British joint-stock

corporations, and following the American Civil War, British firms invaded the American market so successfully that they achieved a “virtual monopoly” of the American hull insurance market which lasted until World War I (Mitchell, 1970).

Individual American corporations had their own networks of correspondents, but they had nothing like the advanced information-gathering apparatus of Lloyd’s. However, in response to the invasion of their market by British insurers, they belatedly addressed their need for effective shipping intelligence, by forming in 1881 the National Association of American Underwriters to unify their practices and maintain a single network of correspondents worldwide.

## Appendix: Proof of Proposition 1.

(i) First suppose all merchants expected others to insure with private underwriters. We will show that this cannot occur in equilibrium. Because all insure with private underwriters,  $\sigma = 1$ , so, from (1) the expected payoff to a merchant of type  $\bar{\theta}$  from insuring with a private underwriter is

$$\begin{aligned} u_p(\bar{\theta}) &= (1 - \phi)[u(W - \bar{\theta}I) + \phi[\bar{\theta}u(W - I) + (1 - \bar{\theta})u(W)]] \\ &< (1 - \phi)[u(W - \bar{\theta}I)] + \phi[u(W - \bar{\theta}I)] && \text{(by risk aversion)} \\ &= u(W - \bar{\theta}I) \end{aligned}$$

Therefore, by offering a premium of  $\bar{\theta}$ , a corporation can profitably attract some of the worst risks (those with types close to  $\bar{\theta}$ ). Offering this premium is rational for the corporation no matter what its beliefs are about the distribution of the types of merchants who would accept the offer. Therefore there is no PBE in which all merchants insure with private underwriters.

(ii) Suppose instead that merchants expect all other merchants to insure with corporations. Then competition between corporations will ensure that  $p_c = (\bar{\theta} + \underline{\theta})/2$ , and the private underwriters will have no information advantage ( $\sigma = 0$ ), so

$$u_p(\theta) = (1 - \phi)[u(W - p_p I)] + \phi[\theta u(W - I) + (1 - \theta)u(W)]$$

whereas

$$u_c(\theta) = u(W - (\bar{\theta} + \underline{\theta})I/2)$$

By insuring with private underwriters, merchants run the risk ( $\phi$ ) of being uninsured. Nevertheless, if the premium that private underwriters would charge without any information,  $p_p$ , were sufficiently low, some merchants

might be willing to take this risk. It all depends on  $p_p$ , which depends on the private underwriters beliefs off the path of play. We can construct a PBE by specifying that private underwriters believe that merchants that apply to them for insurance have types randomly drawn from the population. Then,  $p_p = p_c = (\bar{\theta} + \underline{\theta})/2$ , so, given the insecurity of private underwriting, all merchants strictly prefer corporate underwriters.<sup>18,19</sup>

(iii) In any equilibrium, merchants take  $\sigma$ ,  $p_c$  and  $p_p$  as given. However, in equilibrium, if  $u_p(\tilde{\theta}) = u_c(\tilde{\theta})$  for some  $\tilde{\theta} \in (\underline{\theta}, \bar{\theta})$ , then the following must hold:

$$p_p = \frac{\tilde{\theta} + \underline{\theta}}{2} \quad (3)$$

$$p_c = \frac{\tilde{\theta} + \bar{\theta}}{2} \quad (4)$$

$$\sigma = \frac{\tilde{\theta} - \underline{\theta}}{\bar{\theta} - \underline{\theta}} \quad (5)$$

(3) and (4) hold because competition among private underwriters and among corporate underwriters must drive the premium charged by either kind of underwriter towards the expected value of  $\theta$  for those underwriters who choose private or corporate underwriting respectively. Define

$$\begin{aligned} \tilde{u}^p(\tilde{\theta}) &= (1 - \phi) \left[ \left( \frac{\tilde{\theta} - \underline{\theta}}{\bar{\theta} - \underline{\theta}} \right) u(W - \tilde{\theta}I) + \left( \frac{\bar{\theta} - \tilde{\theta}}{\bar{\theta} - \underline{\theta}} \right) u\left(W - \left(\frac{\tilde{\theta} + \underline{\theta}}{2}\right)I\right) \right] \\ &\quad + \phi \left[ \tilde{\theta}u(W - I) + (1 - \tilde{\theta})u(W) \right] \end{aligned}$$

$$\text{and } \tilde{u}^c(\tilde{\theta}) = u\left(W - \left(\frac{\tilde{\theta} + \bar{\theta}}{2}\right)I\right)$$

(these are the payoffs to a merchant of type  $\tilde{\theta}$ , assuming that he is the critical type, and that  $p_p$ ,  $p_c$  and  $\sigma$  reflect this).

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<sup>18</sup>We assumed that all merchants inelastically demand full insurance. If we allow merchants to remain uninsured, then this equilibrium will only survive if  $u(W - (\bar{\theta} + \underline{\theta})I/2) > \underline{\theta}u(W - I) + (1 - \underline{\theta})u(W)$ : that is, if the best type of merchant is willing to buy insurance at the rate of premium which is “fair” for the average type of merchant.

<sup>19</sup>Since private underwriters have no information, they must offer the same premium to all types. For some parameter configurations, however, this perfect Bayesian equilibrium does not survive the Cho-Kreps intuitive criterion: good type underwriters would be willing to accept a premium only slightly lower than the premium offered by the corporations, because they are not as worried about underwriters insolvency due to the low likelihood of a loss; whereas bad type merchants would not be willing to accept the same premium. By restricting attention to PBE, I sidestep this issue (I find the application of the Cho-Kreps refinement intuitively implausible in this context).

Since  $u(\cdot)$  is continuous and differentiable, so are  $\tilde{u}^p(\cdot)$  and  $\tilde{u}^c(\cdot)$ . Therefore we can establish the existence of a crossing point  $\tilde{\theta}$  such that  $\tilde{u}^p(\tilde{\theta}) = \tilde{u}^c(\tilde{\theta})$  by showing that  $\tilde{u}^p(\theta) < \tilde{u}^c(\theta)$  as  $\theta \rightarrow \bar{\theta}$  and  $\tilde{u}^p(\theta) > \tilde{u}^c(\theta)$  as  $\theta \rightarrow \underline{\theta}$ . The first inequality always holds since

$$(1 - \phi) \left[ \left( \frac{\bar{\theta} - \underline{\theta}}{\bar{\theta} - \underline{\theta}} \right) u(W - \bar{\theta}I) + \left( \frac{\bar{\theta} - \bar{\theta}}{\bar{\theta} - \underline{\theta}} \right) u\left(W - \left(\frac{\bar{\theta} + \underline{\theta}}{2}\right)I\right) \right] \\ + \phi [\bar{\theta}u(W - I) + (1 - \bar{\theta})u(W)]$$

$$= (1 - \phi)u(W - \bar{\theta}I) + \phi [\bar{\theta}u(W - I) + (1 - \bar{\theta})u(W)] < u(W - \bar{\theta}I)$$

because of risk aversion (the worst type of merchant would prefer safe insurance with a corporation at an actuarially fair rate of premium than insecure insurance with well-informed private underwriters at the same rate). The second inequality holds if

$$(1 - \phi) \left[ \left( \frac{\underline{\theta} - \underline{\theta}}{\bar{\theta} - \underline{\theta}} \right) u(W - \underline{\theta}I) + \left( \frac{\bar{\theta} - \underline{\theta}}{\bar{\theta} - \underline{\theta}} \right) u\left(W - \left(\frac{\underline{\theta} + \bar{\theta}}{2}\right)I\right) \right] \\ + \phi [\underline{\theta}u(W - I) + (1 - \underline{\theta})u(W)] > u\left(W - \left(\frac{\underline{\theta} + \bar{\theta}}{2}\right)I\right)$$

or

$$(1 - \phi) [u(W - \underline{\theta}I)] + \phi [\underline{\theta}u(W - I) + (1 - \underline{\theta})u(W)] > u\left(W - \left(\frac{\underline{\theta} + \bar{\theta}}{2}\right)I\right) \quad (6)$$

which holds for sufficiently small  $\phi$ . Intuitively, (6) shows that unless private underwriters are so financially insecure that even the best type of merchant (type  $\underline{\theta}$ ) prefers safe insurance at a premium of  $\frac{\underline{\theta} + \bar{\theta}}{2}$  (the actuarially fair premium rate for the overall population) to unsafe insurance at a fair rate of premium ( $\underline{\theta}$ ), there exists a  $\tilde{\theta}$  such that  $\tilde{u}^p(\tilde{\theta}) = \tilde{u}^c(\tilde{\theta})$ . If such a  $\tilde{\theta}$  exists, then we have multiple equilibria: one in which all merchants choose corporate underwriters, and one in which some choose private underwriters and the corporations face a “lemons” problem: merchants with types  $\theta < \tilde{\theta}$  choose private underwriters and those with types  $\theta > \tilde{\theta}$  choose corporate underwriters.  $\square$

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