

Adverse Selection and Institutional Change in Eighteenth Century Marine Insurance

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April 22, 2008

Abstract

This paper describes the institutional changes which occurred in the marine insurance industry during the eighteenth and early nineteenth centuries, and uses a game-theoretic model and contemporary evidence to substantiate the hypothesis that the industry was characterized by two different possible equilibrium sets of institutions, each of which, once selected, was stable. Institutional change in the industry is interpreted as a path-dependent process in which exogenous shocks caused by the various wars of the eighteenth century periodically disturbed these equilibria, leading in some cases to transitions to new equilibria, and in others to endogenous institutional changes which reinforced existing equilibria.

1 INTRODUCTION

One of the key puzzles regarding institutional change is the observed diversity of institutions which govern apparently similar transactions in different countries. Why do countries with less efficient institutions not copy the institutional structure of more successful ones? Is there a long-run tendency toward convergence to optimal institutions and an “end of history”? If not, why not? How does institutional change occur?

This paper describes and analyzes how the institutions which governed marine insurance transactions developed in Britain, America, France and Holland during the eighteenth and early nineteenth centuries. These countries all began the eighteenth century with similar marine insurance institutions (based on underwriting by private individuals), but over

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time the institutions developed in different directions. In the United States, France and Holland, the marine insurance industry ultimately came to be dominated by joint-stock corporations, whereas in Britain, it was dominated by a sophisticated marketplace for private underwriting, Lloyd's of London.

2 MARINE INSURANCE IN THE EIGHTEENTH CENTURY

Marine insurance originated in the medieval Italian city-states during the middle ages, from where it spread to other trading nations (de Roover 1945). Initially, the basic mode of doing business was similar in all these countries. Underwriting was carried out by private individuals. Anyone was free to act as an underwriter, but many underwriters were merchants who underwrote as a sideline to their main business, or who traded subscriptions on each others' policies. A merchant with a cargo or vessel (or both) to insure generally employed a broker to draw up a policy and find a set of underwriters willing to cover the risk. A premium was negotiated, the broker drew up the policy, and the underwriters underwrote their names on the policy along with the amount they were willing to cover. Depending on the size of the risk, policies might have anything from one or two to as many as sixty or seventy underwriters; but five to ten was perhaps typical.

These transactions were made problematic by a variety of agency problems on both sides of the market (Kingston 2007b). First, underwriters had to contend with the possibility of moral hazard on the part of the merchants. In some cases, merchants fraudulently attempted to insure ships which they already knew to have been lost, or conspired to deliberately sink insured vessels. More subtly, merchants (or their captains) whose vessels were insured might be more likely to take risks, such as sending an unseaworthy vessel to sea or attempting to run through a blockade. Because of the slow speed of communication, and the strong likelihood of unforeseen events - particularly in wartime - it was virtually impossible to guard against all such possibilities in the contract. Another possible source of fraud was deliberate over-insurance. In Britain, an "Office of Assurances" with a monopoly on the registration of insurance policies was established in 1575 to discourage fraud, but most merchants, preferring to keep their affairs private, failed to register their policies, and the

Office eventually became defunct.¹

Underwriters also faced serious adverse selection problems. Some aspects of the risk, such as the time of sailing and route, could be specified in the policy; others, such as the probability of storms, or the risk of war, could be taken into account by the underwriters when setting the premium. But merchants often had better information than underwriters about some aspects of the risk, such as the quality of the vessel or crew, or the latest information about their whereabouts, and had strong incentives to conceal negative information in order to try to keep the premium low. Thus, one underwriter, John Weskett, complained:

“Concealment of circumstances, in matters of insurance, especially in time of war, [is] constantly practiced; the temptations to it [are] great; and the impositions, indeed the robberies, to which insurers, in England, are thereby daily subject, [are] various and enormous...” (Weskett 1781, p.113)

Whenever suspicion arose, the onus was on the underwriter to prove that a fraud had occurred, which was frequently impossible, especially given that all the documentation and witnesses were generally under the control of the merchant:

“In almost all controversial cases between insurers and insureds, the latter have always greatly the advantage of the former, with respect to the power of bringing forth evidence; because generally all the facts, intelligence, papers, &c. which in any wise relate to such cases, and the several persons who may be able to prove those facts, &c. are in the knowledge and reach of the insureds or their agents, to produce or suppress, as may best suit their purpose.” (Weskett 1781: 211).

Underwriters attempted to protect themselves by making diligent efforts to stay informed about events and conditions which could affect the risks they underwrote, and by refusing to underwrite, or demanding high premia on risks about which they were doubtful for any reason:

¹See Leybourn (1693), Jones (1960), Barbour (1929), and “By the King, A Proclamation For the better Execution of the Office of making and Registring Policys of Assurances in London”, 30 April 1686, printed by Charles Bill, Henry Hills and Thomas Newcomb, Printers to the Kings Most Excellent Majesty, in 1687.

“It is . . . of the utmost consequence for underwriters to be constantly upon their guard, at the time of policies being presented to them for their subscription; and to make the most particular enquiries in regard to the *latest* dates of letters of advices, orders, &c. and even of such *verbal* informations, as may have been ultimately received by the assured; especially in time of *war*, or hostilities, and when the voyages, ships, goods, &c. meant to be insured, are in, or expected from, *remote* parts of the world :- for otherwise [they] will in too many instances find themselves egregiously deceived and defrauded”. (Weskett 1781: 164)

Yet despite these efforts, as Weskett complained, “with the keenest penetration and judgement, it will rarely happen that [the underwriter] is on an *equal* footing, as he ought to be, with the insured.” (Weskett 1781: 297)

For the merchant purchasing insurance, on the other hand, the solvency of the underwriters was a major concern. Any private individual could legally underwrite a policy as long as the merchant (or broker acting on his behalf) was willing to accept him as an underwriter; but the value of the policy ultimately depended on whether the underwriters would pay, and their financial stability was frequently uncertain, especially in wartime. When disaster struck, as when a French squadron intercepted a large convoy of merchantmen in the Bay of Lagos in 1693, many underwriters suffered heavy losses, and some failed.

Even if the underwriters proved solvent, collecting on a loss could be problematic because insurance contracts remained necessarily incomplete. Because of the uncertain timing of voyages in wind-driven vessels, deviations from a planned voyage were sometimes unavoidable, and because of the slow speed of communications, it was also advantageous to allow captains some discretion over the return cargo and route. However, deviations from the planned route might render a policy technically invalid, so underwriters often had opportunities to contest claims even when a merchant had acted in good faith. The merchant was therefore reliant on the good faith of the underwriter to pay promptly in case of a loss.

All of these agency problems were exacerbated in wartime. On the one hand, the disruption of commerce during wartime created tremendous opportunities for profit; but

commerce was exposed to the additional risk of enemy capture. While many merchants and underwriters found war highly profitable, for the unlucky or unskilful it frequently proved ruinous.² The variety of information required to accurately judge a risk also increased during wartime, yet information flows were disrupted; rumor and speculation were constant, and premia fluctuated in response.

The institutions which governed marine insurance transactions developed in part to help mitigate these informational asymmetries and agency problems. From the perspective of the underwriter, the key problem was knowing what premium to charge. In order to accurately assess the risk of a voyage, an underwriter had to have access to prompt and accurate information about the movements and condition of particular ships, on political developments at home and abroad, and on the character 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.

The key problem from the merchants' perspective was the security of the policy; because this depended on the financial security and "character" of the underwriter, merchants sought to avoid underwriters with a reputation for litigiousness, and were willing to pay higher premia to underwriters whom they perceived to be financially secure. A natural response was for underwriters to try to find ways to bolster the security of the policy and reduce the transaction costs of spreading the risk more widely, and they did this by forming various sorts of "companies", ranging from stable syndicates of private underwriters to large joint-stock corporations.

In the French port of Rouen, for example, private underwriting through brokers had been practiced since the sixteenth century. Gradually, these brokerages evolved into insurance offices with regular syndicates or "chambres" of underwriters, which raised a capital fund which was held in trust until all risks had expired. Dawson (1931) describes the operation of one such syndicate of twelve merchants in Rouen between 1727-1742, whose members

²"We see not a few instances even of tradesmen, shopkeepers, &c. lured by the golden, but delusive bait of premiums, especially in time of war, drawn like Gudgeons, into the vortex of this perilous abyss, Insurance; from which they can, rarely, afterwards extricate themselves" (Weskett 1781: xxiii).

were jointly and severally liable for the policies they underwrote. To reduce their exposure to the risk of underwriters' bankruptcy, merchants often obtained insurance at several ports, including in Britain and Holland, where it was generally cheaper. For example, in 1745 Robert Dugard of Rouen obtained insurance for a return voyage from Martinique at London, Marseilles, Bayonne, La Rochelle, Nantes, St. Malo, Amsterdam, Cadiz, and Pantaleo, Italy (Miquelon 1978: 123).

In the 1750s, two large corporations were chartered in Paris (Bosher, 1979). For a time, the regional companies and the Paris corporations (operating through local agents in the ports) 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, for reasons we will explore later, the increased risks during wartime tended over time to drive the individual underwriters from the market, and companies gradually took over (Clark 1978; Dawson 1931). The Paris corporations were primarily run by non-merchants (Bosher, 1979), and despite their size, they were unable to monopolize the market, perhaps because of their disadvantage relative to local underwriters when it came to evaluating risks:

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.”³

Similarly, in Holland, private underwriting gradually gave way to insurance by companies, and as in France, the transition was catalyzed by war. In Amsterdam, which was

³The Bordeaux magistrate Montesquieu in 1750, quoted by Bosher (1979).

the main center for marine insurance in Holland, the first joint-stock corporation was not formed until 1771.⁴ Heavy wartime losses in 1780-1 drove many private underwriters from the market, and companies increasingly began to dominate. By 1786, there were four companies writing marine insurance in Amsterdam, and in that year, political instability induced a third of Amsterdam's private underwriters to cease underwriting (Spooner 1983: 29, 41). There were still some private underwriters in Amsterdam as late as 1851, but by then the business was firmly in the hands of companies, including as many as 70 Amsterdam-based companies as well as agencies of companies based in other cities and abroad (Spooner 1983, ch. 2).

In the United States, as will be discussed in more detail in section 4.1, joint-stock marine insurance corporations rapidly replaced private underwriting during the Revolutionary and Napoleonic Wars.

In Britain the legal basis of the contract, and a standard form of policy, gradually became established during the seventeenth century (Leybourn 1693, Barbour 1929, Jones 1960). However, the marine insurance marketplace remained largely disorganized, and speculation and fraud were rampant. As a result, most trade went uninsured, particularly in peacetime; and many English ships were insured in Holland, although the premium rates were slightly higher, because the Dutch underwriters were perceived as more secure and reputable (likely to pay in the event of a loss).

In the eighteenth century, London became the world's leading center for marine insurance. Two joint-stock marine insurance companies were founded during the wave of stock market speculation which gave led to the "South Sea bubble". The Bubble Act of 1720 granted corporate charters to these two companies, but made it illegal for any other firm or partnership to underwrite marine insurance (though private underwriting by individuals was still allowed). These corporations had a number of advantages over the private underwriters. They reduced the transactions costs of spreading risk more widely, including expanding the pool of capital available for underwriting by enabling those who had no specific knowl-

⁴A company had begun writing marine insurance (among other activities) in Rotterdam in 1720.

edge of maritime affairs to, in effect, entrust their underwriting decisions to experts. Most importantly, because their underwriting was backed by a large capital fund, their policies were widely viewed as more secure than those of the private underwriters. Because of these advantages, it was widely expected that the private underwriters would soon be driven out of business.

Yet private underwriting survived in Britain, and an association of private underwriters, centered at Lloyd's of London, became the dominant force in the marine insurance industry. I have told this story in detail elsewhere (Kingston 2007b). In summary, the bursting of the South Sea bubble temporarily prevented the corporations from expanding their business and taking over the market from private underwriters. In the interim, Lloyd's coffee house emerged as a center for private underwriting, becoming a hub for information about ships and their crews, political and economic developments, and the many other factors affecting the risk of a voyage. In part, this was a result of entrepreneurial activity of Edward Lloyd himself: he made a systematic effort to gather marine information for the use of his customers, including building up a network of correspondents abroad and employing runners to gather the latest information from ships arriving at the docks and relay that information to the coffee-house, where it was publicly announced. But a great deal of the news came from the customers themselves. A network effect took hold, as merchants, brokers and underwriters wishing to conduct marine insurance business found that they could find trading partners more easily at Lloyd's than anywhere else; and because of the variety of people with expertise in different branches of trade, it was always possible to find someone qualified to evaluate any particular risk. The repeated interaction within this community enabled the development of a reputation mechanism which helped to constrain opportunism.

Kingston (2007b) argues that the network of merchants and underwriters at Lloyd's, and the mechanisms they developed to share and interpret a constantly-changing flow of information, ultimately created a lemons problem for London's marine insurance corporations. Because of their inferior access to information, the corporations were at a disadvantage in evaluating risks, and this can explain their failure to take over the market despite their

advantages. The model developed below formalizes this argument.

3 MODEL

During the eighteenth century, despite similar institutional starting points, two distinctly different institutional structures had developed in different countries. These countries shared similar technology, and the merchants and underwriters in all these countries were very familiar with the modes of doing business in the others; so why did these differences develop and persist? In this section, I present a model which explores the theoretical possibility that the eighteenth century marine insurance market may have been characterized by multiple equilibria: that is, that there were different kinds of institutions (viewed as equilibrium patterns of behavior), each of which, once established, could persist. In subsequent sections I further substantiate this hypothesis by examining the process of equilibrium selection and episodes of institutional stability and change.

The key features of the model, motivated by the historical evidence, are as follows: merchants can choose between two kinds of underwriters: private underwriters and corporations. Corporations are perceived as more financially secure than private underwriters. Underwriters (of both kinds) face an adverse selection problem: merchants may have better information than underwriters about the true level of the risk on a voyage. However, if many merchants insure with private underwriters, then because of network effects, these private underwriters gain an advantage in assessing risks.

There are many merchants, who undertake voyages which either succeed, yielding income I , or fail, yielding 0. All losses are verifiable. Merchants have initial wealth W , and identical continuous and differentiable VNM utility functions $u(\cdot)$ defined over non-negative values of wealth, such that $u'(\cdot) > 0$, $u''(\cdot) < 0$ and $u(\cdot)$ is continuously differentiable. The probability of a loss on merchant i 's voyage is θ_i , where θ_i is uniformly distributed on the interval $[\underline{\theta}, \bar{\theta}] \subset (0, 1)$. The distribution of θ is common knowledge, but its realization, θ_i is observed only by merchant i . Since θ_i is private information, we will refer to θ_i as merchant i 's "type".

There are many private underwriters, and at least two insurance corporations. All

underwriters are risk-neutral and act (Bertrand) competitively. A marine insurance contract is one in which an underwriter agrees to indemnify a merchant by paying him $(1-p)I$ in case of loss, in exchange for a premium payment pI in case of success. Contracts are complete and costlessly enforceable.

This is a one-shot game. Play 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.⁵ 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, θ . Then all merchants simultaneously decide whether to apply to corporate or private underwriters. For simplicity, we assume that all merchants inelastically purchase full insurance (this will not affect our qualitative conclusions; see discussion below).

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, θ_i , with probability σ , where σ is the proportion of merchants who choose to 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, θ_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. Finally, private underwriters fail with probability ϕ . 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 θ by choosing private and corporate underwriters, respectively.

Lemma 1. *For any given values of p_p , ϕ and σ , $u_p(\theta)$ is strictly decreasing in θ ; for any given value of p_c , $u_c(\theta)$ is independent of θ .*

⁵The assumption that the corporations have *no* information is clearly extreme, but is made for analytical simplicity. If, for example, we assumed that the corporations become better able to assess risks as more merchants insure with them, the results would be qualitatively unaffected.

Proof. The payoff to using a corporate underwriter is

$$u_c(\theta) = u(W + I - p_c I) \quad (1)$$

The expected payoff to insuring with a private underwriter is

$$u_p(\theta) = (1-\phi)[\sigma u(W+(1-\theta)I) + (1-\sigma)u(W+(1-p_p)I)] + \phi[\theta u(W) + (1-\theta)u(W + I)] \quad (2)$$

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 fails (leaving the merchant uninsured). Both terms are strictly decreasing in θ . \square

Lemma 1 ensures that in searching for equilibria of this game, we have only three possible cases to consider: pooling equilibria in which all merchants choose private underwriters and $u_p(\theta) \geq u_c(\theta) \forall \theta$; pooling equilibria in which all merchants choose corporate underwriters and $u_p(\theta) \leq u_c(\theta) \forall \theta$; and semi-separating equilibria in which there is some critical value of θ , $\tilde{\theta}$, such that merchants with types $\theta < \tilde{\theta}$ choose private underwriters and those with $\theta > \tilde{\theta}$ choose corporate underwriters (and those with $\theta = \tilde{\theta}$ are indifferent).

Figure 1 depicts the choices faced by merchants for some given values of p_c , p_p and σ in the third case.

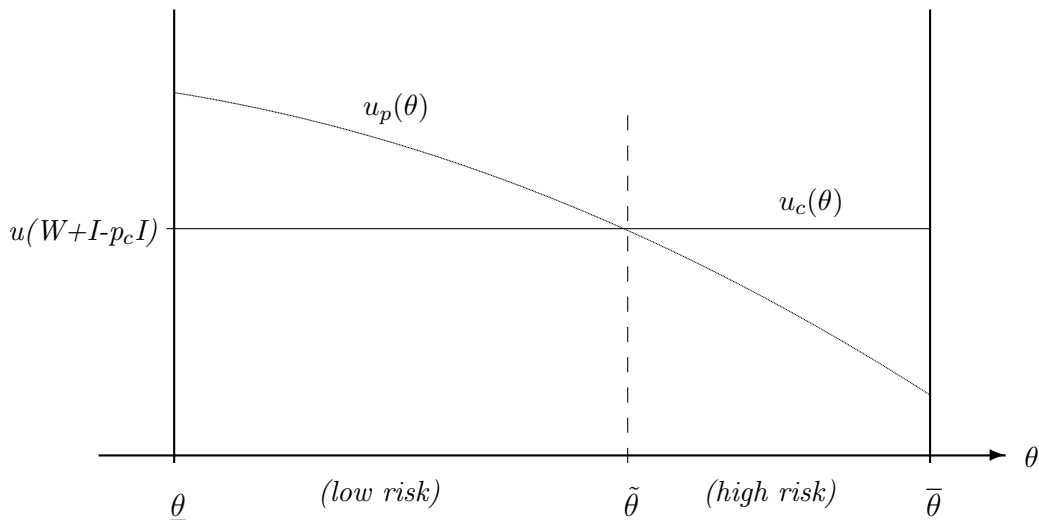


Figure 1: Payoffs to merchant's choices in semi-separating PBE

However, in equilibrium, p_c , p_p and σ are determined endogenously by the aggregated strategies of the merchants. 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) There exists a pooling PBE in which all types of merchants insure with corporations.

(iii) For sufficiently small values of ϕ , there exists a PBE in which merchants with types $\theta < \tilde{\theta}$ (good risks) insure with private underwriters and merchants with types $\theta \geq \tilde{\theta}$ (bad risks) insure with corporations, for some $\tilde{\theta} \in (\underline{\theta}, \bar{\theta})$.

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. Figure 2 depicts the choices faced by merchants in this case.⁶

However, if it is expected that at least some merchants will insure with private underwriters, then the best risks (low-risk) merchants might prefer private underwriters, since if the private underwriters observe their type, they will pay lower premia. But then, the corporations will be left with a disproportionately poor selection of risks, forcing them to raise their premia. This in turn will induce more of the better risks to apply to private underwriters; and so on, until the corporations are left with only the very worst risks. Thus, in a variant of the familiar “lemons problem” logic, we arrive at an equilibrium 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, as illustrated in Figure 1.⁷

⁶The payoff to insuring with private underwriters is downward-sloping, even if they charge all merchants the same premium, because the failure of the private underwriters is more likely to affect merchants who are more likely to experience losses.

⁷There are two reasons why bad risks prefer to insure with corporations. First, the corporations are

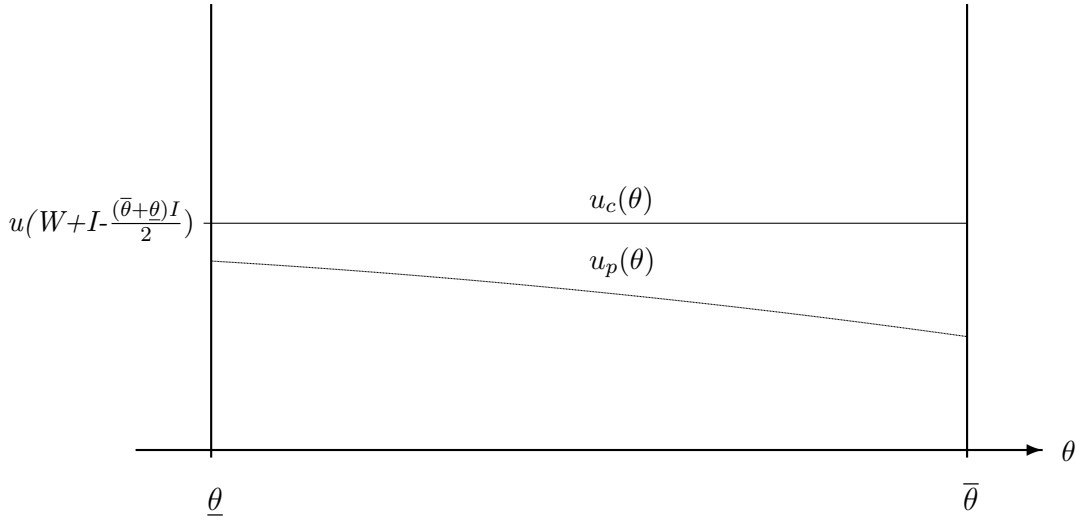


Figure 2: Payoffs to merchant's choices in pooling PBE

The model departs from the bulk of the theoretical literature on insurance in that only allows underwriters to compete on price, thus ruling out the possibility of screening contracts.⁸ However, screening contracts only work if customers can buy only one insurance contract. This assumption is not tenable for eighteenth century marine insurance, when it was quite common for merchants to insure with multiple underwriters in different ports and even in different countries, and insurers could not limit the total amount of insurance purchased.⁹ We also assumed that all merchants inelastically purchase full insurance. Basic insurance theory reveals that, at a given premium, good risks would wish to purchase a lower

unable to observe their types (though they will correctly infer that their type is at least $\tilde{\theta}$); but the more merchants insure with private underwriters, the more likely it becomes that the private underwriters would have learned their type anyway; and second, since bad risks are more likely to face a loss, they are more severely affected by the possibility of private underwriters' insolvency.

⁸For example, Rothschild and Stiglitz (1976) show that firms may be able to 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).

⁹To control moral hazard, a merchant could not legally recover more than the value lost. In the event of inadvertent over-insurance (for example, if the value of the cargo had been overestimated), only whichever insurance had been made first was effective, and the premia on the remaining policies were returned net of a small deduction (Weskett 1781). Deliberate, fraudulent over-insurance was a serious concern for underwriters. For example, in 1755 the London Assurance discovered a suspected fraud in which the same goods had been insured multiple times in London, Amsterdam and Hamburg (Guildhall Library MS 8755, 28 February 1755).

quantity of insurance than bad risks (eg., Rothschild and Stiglitz 1976), and the historical record confirms that merchants frequently underinsured, particularly if they had a relatively small amount of merchandise travelling on a “good” ship.¹⁰ Relaxing this assumption would add another twist to the adverse selection problem without affecting the qualitative conclusions: not only will the corporations get the worst risks, but the worse the risks are, the more insurance they will buy.¹¹

We have studied the insurance transaction as a one-shot game. However, the theory of repeated games has shown that repeated interaction can be an important means of overcoming agency problems, and the historical evidence clearly shows that a reputation mechanism helped to constrain fraud and opportunism among private underwriters at Lloyd’s and elsewhere. Both private and corporate underwriters strove to build up “a connection” with merchants, so that by engaging in repeated business they could in order to reduce the degree of uncertainty and the danger of opportunism involved in their transactions; merchants, similarly, were constrained from fraud by the threat that suspicious claims would make it harder for them to obtain insurance on reasonable terms with good underwriters in the future. Brokers played an important role as intermediaries to channel information and facilitate trust through their repeated interactions on both sides of the market (Kingston 2006). The prominent Lloyd’s broker and underwriter, J.J. Angerstein, for example, stressed that reputable underwriters and brokers would only deal with other men of “character”.¹²

However, repeated interaction would not substantively change our conclusions; on the

¹⁰For example, American merchant Henry Laurens instructed his agents in London that when his goods were shipped “by a good vessel and master” they should leave values below £100 uninsured, and only $\frac{3}{4}$ of the value of larger shipments (Laurens to Bridgen and Waller, 7 January 1786 [Hamer 2003]).

¹¹Indeed, the adverse selection problem may drive good risks from the market altogether. If merchants can choose to remain uninsured, then the equilibrium in which all purchase from corporations (and all pay the same premium, $\frac{\bar{\theta}+\underline{\theta}}{2}$), will only survive if

$$u(W + I - (\bar{\theta} + \underline{\theta})I/2) \geq \underline{\theta}u(W) + (1 - \underline{\theta})u(W + I)$$

so that low-risk merchants purchase insurance. Otherwise, we could construct an equilibrium in which some merchants purchase insurance from corporations, and some remain uninsured. However, this is not the case we are interested in here: rather, we have shown that under suitable conditions, good types may be driven to insure with (informed) private insurers instead of (uninformed) corporations.

¹²Select committee on marine insurance, 1810, evidence of Angerstein.

contrary, it strengthens our argument in the following way. Although we have treated the merchant's "type" as a measure of exogenous maritime risk, the model can also be loosely interpreted as a reduced form of a repeated-game model, in which a merchant's "type" would reflect their "character" (or reputation).¹³ Just as it was easier for an underwriter at Lloyd's to procure information about the nature of a risk, it may also have been easier for him to learn about the reputation and past behavior of a prospective customer. A corporation would find it harder to observe a merchant's reputation, or to use the threat of negative gossip to constrain a merchant's behavior, and might therefore attract a disproportionately "disreputable" clientele. It is not surprising therefore that a substantial part of the business done by the two British corporations was done for, or brokered by, their directors and shareholders (John, 1958), and that they frequently refused business from merchants with whom they did not have a "connection".

4 EQUILIBRIUM SELECTION AND INSTITUTIONAL CHANGE

The persistence of private underwriting in Britain presents a marked contrast to the French and Dutch, and especially to the American experience, where the market became dominated by marine insurance corporations. Each of these patterns of behavior, once established, was stable over time, suggesting that the market may have been characterized by multiple equilibria. The model in the previous section explores the nature of these equilibria, in a static sense. But this raises further questions: how did these equilibria arise, and why did they persist? What processes of institutional change drove the bifurcation of institutional structure between Britain and other countries? What were the role of exogenous shocks and endogenous parameter shifts as drivers of institutional change? And what, if anything, prevented merchants in one country from copying the institutions in another?

¹³See Kandori (1992) for a model of community enforcement which stresses the role of reputational information in overcoming opportunism. Applied to this context, the basic idea is that if a corporation found it harder to observe a merchant's reputation, or to use the threat of gossip to constrain a merchant's behavior, it might therefore attract a disproportionately "disreputable" clientele.

4.1 INSTITUTIONAL CHANGE IN AMERICAN MARINE INSURANCE: THE FRENCH AND INDIAN WAR, AND THE QUASI-WAR WITH FRANCE

Marine insurance played an important role as the trade of the American colonies expanded during the eighteenth century. In the early years of the century, the amount of capital available for underwriting in the colonies, and the scale of the market, was as yet insufficient to support marine insurance on any substantial scale, so American merchants generally obtained their insurance in London, although the distance created considerable inconvenience. Orders for insurance sometimes arrived too late, and when losses occurred, sending the documentation required to receive payment was a time-consuming process, particularly if disputes arose, as they not infrequently did. It was also necessary for American merchants to pay their London agents to purchase the insurance on their behalf, and they had to trust them to effect it on the best possible terms, to obtain good underwriters, and to settle their represent their interests when settling claims.

All of this encouraged American merchants to find ways to share risk among themselves rather than insuring in Britain. In Boston a brokerage for this purpose opened in 1724. In Philadelphia, marine insurance was being practiced on a small scale in the 1740s, but it was during the French and Indian War (1754-63) that the industry really took off. French privateers drove up premia on West Indies voyages from the peacetime rate of $2\frac{1}{2} - 3\%$ (one way) to 15 – 20%, and rates to Europe were even higher. The war also disrupted channels of communication with Britain, which made it even harder to place orders and settle claims, and exacerbated the agency problems between Philadelphia merchants and their British agents and underwriters (Kingston 2007a). This gave a substantial boost to Philadelphia's marine insurers, and their business mushroomed. By the end of the war, Philadelphia had an established marine insurance market with several active brokerages, and was receiving orders for marine insurance not just from local merchants, but from those in other American ports and the West Indies.

Throughout the remainder of the eighteenth century, private underwriting was carried out in Philadelphia, New York, Boston, and to a lesser extent in smaller ports. Although

there was a natural tendency to insure locally, merchants also purchased insurance in other ports if they found the rates cheaper. Merchants in Rhode Island and Virginia, for example, frequently purchased insurance in New York or Philadelphia, through their correspondents in those ports. However, the London underwriters were perceived as more secure, and their rates were generally lower, so American merchants continued to purchase a substantial amount of their insurance in London, particularly on transatlantic voyages.

Until the 1790s, the marine insurance business in America remained in the hands of private underwriters. Then things changed quite suddenly. In 1792, a marine insurance corporation was formed in Philadelphia. It was successful, and during the next decade many more corporations were formed in large and small American ports. Faced with this flood of competition, private underwriting rapidly withered, and by 1810, it had practically disappeared.

What drove this rapid institutional change? Kingston (2007c) argues that the transition to corporate underwriting was accelerated by a substantial exogenous shock, the increased risks to American shipping from French privateers during the “Quasi-War” between America and France (1796-1800), when French privateers captured hundreds of American merchantmen. As in previous wars, insurance rates on the important West Indies routes rose to 15 – 20%, and fluctuated rapidly as new information of captures arrived. The security of the policy therefore became particularly important (because the probability of having to make a claim rose) just as the financial security of the private underwriters, who were mainly merchants, became more uncertain.

The nature of the information required to assess risks also changed. In peacetime, what mattered most for assessing the risk on particular voyages was idiosyncratic voyage-specific information, such as the experience of the captain and crew and the condition of the vessel. In gathering and interpreting this kind of information, private underwriters, being, for the most part, merchants intimately familiar with the various branches of trade and with each other, may have had an advantage. In wartime, however, what mattered most was the systematic information about political developments, the activities of French privateers,

the disposition of the prize courts, and other political and military developments which affected the risks on all ships at once. In gathering this kind of information, which entailed high fixed costs (such as subscribing to foreign newspapers, lobbying the government, and carrying on regular correspondence with a variety of foreign ports), corporations may have had an advantage over private underwriters.

The Quasi-War arrived at a key moment when newly-formed corporations were competing side-by-side with established private underwriters, and highlighted the advantages of corporate form, particularly the security of the policy. In terms of the model, these changes correspond to an increase in the probability of private underwriters' failing (ϕ), which reduces $u_p(\theta)$, and a upward shift of the distribution of risks, $[\underline{\theta}, \bar{\theta}]$. These effects are depicted in figure 3.¹⁴

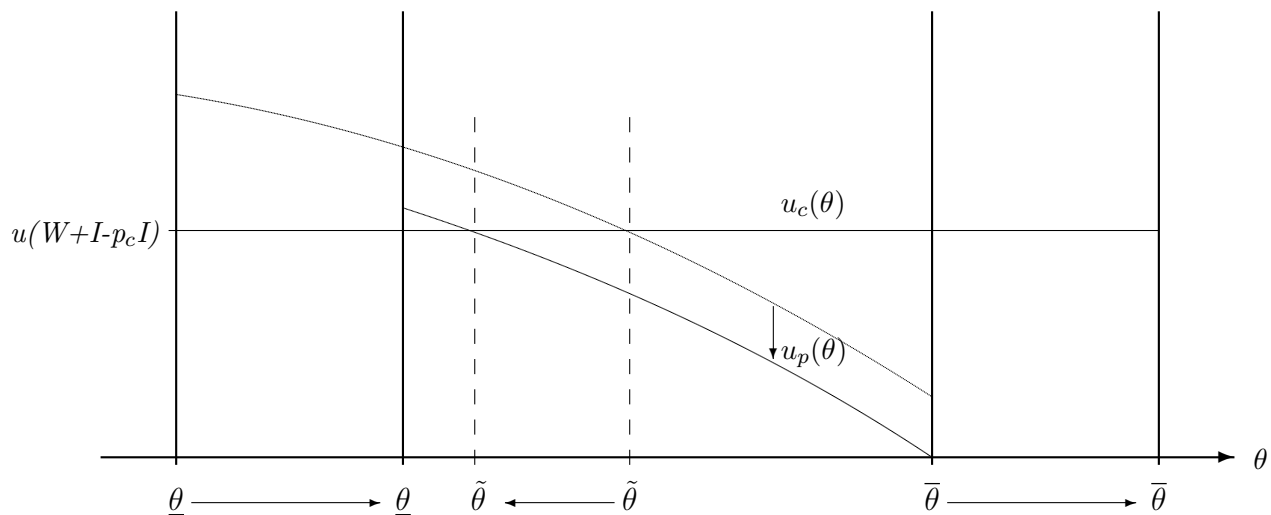


Figure 3: Effect of the Quasi-War

As can be seen, the fraction of risks covered by private underwriters ($\frac{\bar{\theta}-\theta}{\bar{\theta}-\underline{\theta}}$) falls.

¹⁴ $u_p()$ and $u_c()$ also depend on p_p and p_c , the premia charged to merchants about whom the underwriters have no information. These might rise or fall in equilibrium: in the case illustrated in figure 3, the private underwriters retain only the best risks, but the pool is worsening, so their pool of applicants for insurance is shrinking from both ends. The corporate underwriters find their pool expanding at both ends: they no longer attract business only from the worst risks; but the worst risks are getting worse. For clarity of exposition, the figure assumes that p_p and p_c remain unchanged.

Kingston (2007c) shows that this is what happened in Philadelphia during the Quasi-War. Philadelphia's private underwriters were not exactly driven out of business by the Quasi-War, but their business fell off dramatically; and in 1803 the leading brokerage firm reorganized their business as a marine insurance corporation.

4.2 INSTITUTIONAL STABILITY IN BRITAIN: THE BALTIC SEIZURES OF 1810 AND THE WAR OF 1812

Kingston (2007) presents evidence in favor of the hypothesis that the development of Lloyd's as an information hub gave rise to a lemons problem for the British marine insurance corporations. On a level playing field, the companies ought to have been able to compete with the private underwriters at Lloyd's; one merchant stated that "If the terms were the same, I say I should prefer the company on account of their security, but on no other account".¹⁵ Yet, the corporations charged higher premia than the private underwriters (as the model predicts), and were very wary in the selection of risks, confining themselves whenever possible to the "best" risks (good ships, about which there was little doubt, and therefore little asymmetric information). They frequently turned down business out of a concern that insurances were not being "tendered fairly". For example, one broker complained that "There are a great many risks, and parts of risks, which [the chartered companies] will not take upon the insurances to and from the Baltic; the companies will not take the risk of capture in port". Asked why, he answered: "I presume from their being incompetent judges of the value of those risks; individual underwriters are many of them merchants in those lines of trade, and are therefore more competent to decide upon the risk they run; but the companies, I believe, refuse them altogether".¹⁶ Consistent with this interpretation, the corporations also paid claims less readily than the private underwriters, and were more stringent in demanding proofs of the circumstances of a loss.

Thus, the information available at Lloyd's kept the network of private underwriters in business, despite competition from the corporations; but for most of the eighteenth century, Lloyd's lacked any formal structure; it was just a coffee house where people met to conduct

¹⁵Select committee on marine insurance, 1810, evidence of James Forsyth.

¹⁶Select committee on marine insurance, 1810, evidence of John Rogers.

marine insurance. The first elements of a formal organization began to emerge in 1769 with the formation of an ad-hoc committee to find new premises. 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. During the 1790s, these meetings became more frequent, and the committee gradually took on increasing responsibilities. In 1800, in response to overcrowding, it instituted a formal system of membership; those who were not subscribers to the committee were excluded from the underwriting rooms; and required that new subscribers be recommended by at least six existing subscribers. Despite these steps, in 1800 the organization of Lloyd's remained relatively rudimentary. "The history of Lloyd's is a history of continuous growth and change; but no step forward was ever made until its necessity has been proved by some crisis in the affairs of the House" (Wright and Fayle 1928, p.165-6).

The impetus for further formalization of Lloyd's arose from a dispute which revealed the inadequacy of the existing informal organization. In 1804, as the volume and importance of Lloyd's correspondence grew, a secretary had been appointed by the committee to handle it. In 1810, large numbers of British ships were seized in the Baltic, and shortly afterwards it emerged that the secretary had failed to make public some pertinent information which he had received from a correspondent. Those underwriters who had suffered heavy losses as a result of the Baltic seizures objected furiously, and a committee was appointed to investigate.¹⁷ The committee's report was unfavorable; the ad-hoc committee resigned en bloc; and an overhaul of the organization ensued. "A point had been reached . . . at which some more formal organisation was required, to deal adequately with the great volume of current business, to hold together the loose aggregation of merchants, underwriters, and brokers, who composed the Society, and to ensure the smooth running of the machinery of Lloyd's" (Wright and Fayle 1928: 274). Ultimately, a new committee was formed, with regular elections; and a Trust Deed was signed by all the subscribers, binding them to obey

¹⁷See "Report of the Committee, appointed at a General Meeting of the Subscribers to Lloyd's, held on the 5th of April, 1811, "To examine into the manner, in which information has hitherto been conveyed to the Members of this House, and particularly with reference to that material information received last year from the Secretary of the Admiral upon the Baltic Station", in Guildhall Library MS 31571.

the new rules, and turning Lloyd's for the first time into a formal institution with legal standing.

Thus, the extended period of heightened risk during the Revolutionary and Napoleonic wars (1793-1815) were critical in the development of Lloyd's, transforming it from an informal association into an increasingly formal marine insurance marketplace. In 1824, the relevant sections of the Bubble Act were repealed, enabling an influx of new marine insurance corporations, and again, it was widely expected that as a result, "the whole business of underwriting by individuals will be altogether annihilated."¹⁸ Confounding these predictions, however, Lloyd's survived and retained a substantial share of the marine insurance market down to the present day.

This poses a puzzle: How is it that the strains caused by war led to such a rapid decline in private underwriting in the US in the late 1790s and early 1800s, while similar stresses a decade later ultimately had the effect of strengthening private underwriting in Britain?

To investigate this question, I focus on how the latter part of the Napoleonic wars affected the British marine insurance industry. Data are scarce; Lloyd's itself kept no records of the volume of business done by the private underwriters who met there. However, it is possible to roughly gauge the corporations' share of the market by comparing the amounts of Stamp Duty paid on policies by private underwriters in London and by the two corporations active in London.¹⁹ Premium data were also not collected systematically at Lloyd's, but one source of data is available, based on the accounts of a single private underwriter (George Hobson), collected and analyzed by Danson (1894).

Comparing these data reveals that in Britain, as elsewhere, the disruption occasioned by war appears to have shifted business away from private underwriters and into the hands of the corporations. By the Milan decree of 1807, Napoleon had proclaimed a blockade on

¹⁸Hansard, *Parliamentary Debates*, XV (1810), p. 410. Speech by Joseph Marryat.

¹⁹This data is only meaningful after 1807, however; before that date, evasion of Stamp Duty was rampant. See Guildhall Library, MS 31571 (Minutes of the Committee of Lloyd's), May-June 1807. Stamp Duty was 2/6 per £100 insured on foreign voyages, where the premium was 20% or less; and 5 shillings per £100 insured when the premium was over 20%. (Rates for coasting voyages were half as much). (Wright and Fayle 1928: 289).

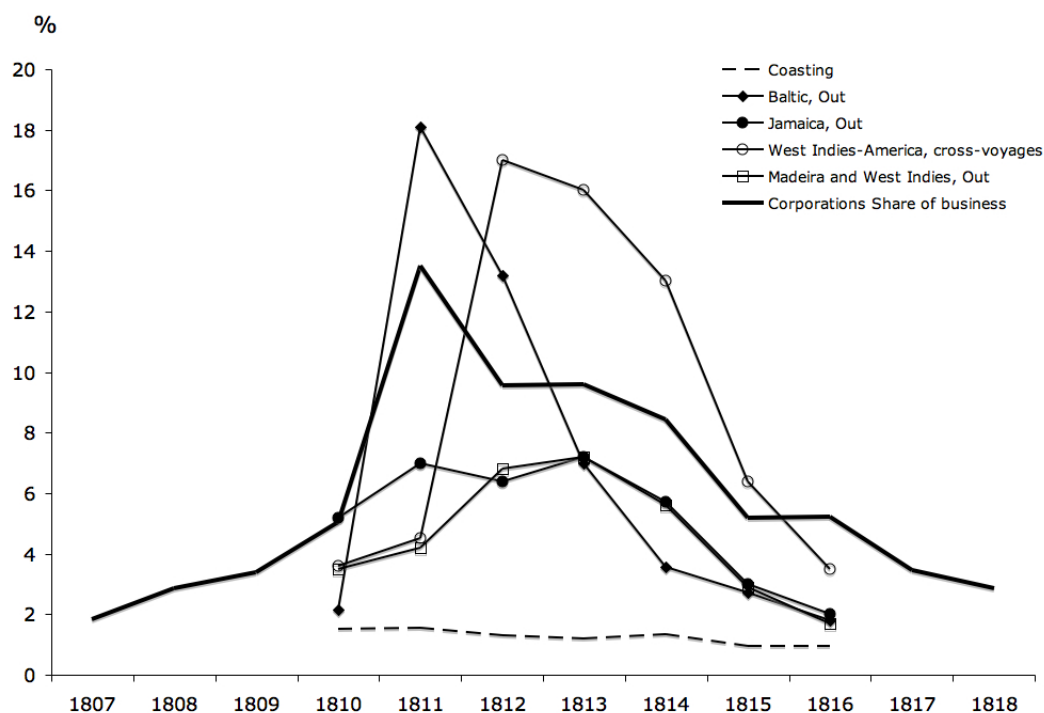


Figure 4: British corporations' share of the British marine insurance market, and premia on selected routes, 1810-16. Source: British Parliamentary Papers 1824(316) XVII.501; Danson (1894: 90-1)

the whole of the British Isles, in effect forbidding any trade with Britain. The French navy was powerless to enforce the blockade at sea, but the idea was to close continental ports and markets to British trade. For several years, the decree was laxly enforced, and British ships continued to trade with the Baltic. But in 1810, under pressure from Napoleon, the Russian, Swedish and Prussian authorities suddenly and unexpectedly seized hundreds of British ships in Baltic ports, causing millions of pounds in losses to Lloyd's underwriters (Rose 1903, Wright and Fayle 1928). As a result, premia on Baltic voyages rose sharply (Figure 4). And the corporations' share of the market appears also to have increased substantially in 1811, possibly as a result of the Baltic seizures, reaching 13.5% of the British market (18.4% of the London market). This increase, however, was apparently not enough to break the prevailing equilibrium dominated by private underwriting, even after the war of 1812 drove up premia on West Indian routes. Accordingly, as the threat of capture faded and rates declined, the

corporations' share of business also steadily declined, falling as low as 1.7% of the British market (2.2% of the London market) by 1821.

Thus, although the turmoil of the Napoleonic wars apparently disrupted the British marine insurance market and caused a temporary increase in the corporations' share of business, the effect was not sufficient to push the system to the "tipping point" and into a new equilibrium based on corporate underwriting. Instead, the ultimate impact was to strengthen the institutions of private underwriting at Lloyd's.

Because private underwriting was based on a network of private individuals operating through a broker, if the institutions of private underwriting had been extinguished, re-creating them from scratch would have become virtually impossible. Lloyd's had evolved over the course of a century; and it had developed not through the leadership of an "entrepreneur" but through a gradual evolution of informal business practices that were later formalized. The deliberate creation of such a "community" would involve a coordination problem considerably more complex than creating a firm. Precisely this fear was voiced during the parliamentary debates over the repeal of the Bubble Act in 1824, when it was argued that

"the commercial world would suffer considerably by the establishment of [a new corporation]: for when such a valuable institution as that of Lloyd's was once destroyed, it would be impossible to restore it again. The information which had been received in this country through the agents of Lloyd's, from all parts of the world, had been of the highest consequence to its commercial interest."²⁰

In the event, as we have seen, the equilibrium based on private underwriting was by then sufficiently well-established and stable that these fears proved unwarranted. This contrasts with the American case, where private underwriting had not developed to anything like the level of sophistication of Lloyd's; and in America, once the private underwriters had exited the business, they never reappeared. In 1810, there was a report of an attempt to

²⁰Hansard series 2 vol 11 (March-June 1824). (need a more exact citation here).

found an association for private underwriting in New York, but the effort evidently failed, no doubt because the established dominance of marine insurance corporations prevented such an organization getting off the ground.²¹ This is consistent with the model's claim that an equilibrium based on corporate underwriting would also be stable, once established.

5 CONCLUSION

During the eighteenth century, a series of wars disrupted the marine insurance industry, raising premia and exacerbating various kinds of agency problems. By disrupting channels of communication with London, the French and Indian war helped to bring about the development of a marine insurance industry based on private underwriting in Philadelphia. In France, Holland, and America, other wars led to changes which appear to have favored underwriters with greater degrees of organization, driving the transition from private underwriting to more stable and secure modes of organization.

The timing of these and other exogenous shocks appears to have played a key role in equilibrium selection. American independence removed the protection of the Bubble Act from America's private underwriters, enabling market entry by corporations. Then, just as the corporations were finding their feet, the Quasi-War highlighted the advantages of the corporate form, accelerating an institutional transition which might in any case have been inevitable given the rudimentary level of organization of the American private underwriters. In Britain, in contrast, the Napoleonic wars battered the informal institutions for private underwriting at Lloyd's, but sheltered by the Bubble Act, Lloyd's survived, and the ultimate effect of these shocks was to formalize and strengthen those institutions rather than to destroy them. The formal structure developed during that time provided the framework for further reforms and institutional development in later years, and conferred a resilience on Lloyd's which enabled it to survive even after the repeal of the Bubble Act exposed it to competition from new waves of corporations.

Theories of institutional change highlight two main kinds of processes at work: on the one hand, evolutionary change based on selection of those institutions which prove most

²¹Select Committee on Marine Insurance, 1810, evidence of John Bennett Jr.

successful in a particular environment; and on the other, the intentional design and creation of institutions by “entrepreneurs” who deliberately design new organizations and attempt to implement new rules through the political process (Kingston and Caballero 2008). Both kinds of processes were evident in eighteenth century marine insurance. Exogenous shocks, particularly wars, tested the resilience of existing patterns of interaction, leading in some cases to deliberate institutional innovations, which then had to withstand the evolutionary pressure of competition to survive. But while wars provided the proximate cause of institutional change, other more gradual parameter shifts - changes in the amount of information gathered at Lloyd’s, the amount of capital available for underwriting, the volume of trade, the fraction of trade which was insured, and so on - also generated new strains on the existing institutions and opened up new possibilities for institutional change. Some of these changes were at least partially endogenous to the development of the marine insurance industry: “quasi-parameters” in the terminology of Greif and Laitin (2004).

As emphasized by North (2005), the solutions adopted in response to a set of problems at a given time can shape the perceptions (or “mental models”) of the actors, and thereby affect the possibilities for institutional change in subsequent situations. In line with this framework, the creation of companies and corporations in America, France and elsewhere was clearly a deliberate act; but it rested on backward-looking experience as much as on forward-looking calculation. The Quasi-war, in particular, appears to have served as a learning experience which altered the mental models of the actors in the American marine insurance market, encouraging them to abandon the private underwriting practices they had followed for 40 years or more.

Lloyd’s, on the other hand, was an informal voluntary “community” rather than a firm, and the development of business practices at Lloyd’s during the eighteenth century was less a product of deliberate forward-looking design than an evolutionary outcome of many actors’ uncoordinated responses to the immediate needs of the moment as they arose. Yet the events of 1810-11, in particular, both revealed the importance and the fragility of these evolved practices, and stimulated deliberate collective action to modify and formalize the

institutions in order to enhance their functioning.

The comparative development of marine insurance institutions is a particularly apt case study to consider the puzzles raised in the introduction concerning the persistent diversity of institutions over time and space. From a similar starting point, despite extensive commercial contact and few informational barriers to institutional transplants, the institutions developed in different ways in different countries. This suggests that institutional change is a path-dependent process, in the sense that institutions are a function not just of current parameters but also of the historical process through which they have developed.

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APPENDIX: PROOF OF PROPOSITION 1.

(i) First suppose all merchants are expected to insure with private underwriters. We will show that this cannot occur in equilibrium. Because all insure with private underwriters, $\sigma = 1$ and because of competition among private underwriters, $p_p = (\underline{\theta} + \bar{\theta})/2$, so, from (2) the expected payoff to a merchant of type $\bar{\theta}$ from insuring with a private underwriter is

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

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

$$\begin{aligned} u_p(\theta) &= (1 - \phi)[u(W + I - p_p I)] + \phi[\theta u(W) + (1 - \theta)u(W + I)] \\ \text{whereas } u_c(\theta) &= u(W + I - (\bar{\theta} + \underline{\theta})I/2) \end{aligned}$$

By insuring with private underwriters, merchants run the risk (ϕ) 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. p_p , however, depends on the private underwriters beliefs off the path of play. We can construct a PBE by specifying that private underwriters believe that merchants who apply to them for insurance have types randomly drawn from the population. Then, $p_p = p_c = (\bar{\theta} + \underline{\theta})/2$, so, all merchants strictly prefer corporate underwriters.

(iii) Merchants take p_c , p_p and σ as given. However, suppose there is some $\tilde{\theta}$ such that merchants with $\theta < \tilde{\theta}$ choose private underwriters and those with $\theta > \tilde{\theta}$ choose corporate underwriters. Then, because both kinds of underwriters must earn zero expected profits in competitive equilibrium, the following must hold:

$$p_p = \frac{\tilde{\theta} + \underline{\theta}}{2} \qquad p_c = \frac{\tilde{\theta} + \bar{\theta}}{2} \qquad \sigma = \frac{\tilde{\theta} - \underline{\theta}}{\bar{\theta} - \underline{\theta}}$$

Define

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

(these are the payoffs to a merchant of type θ , assuming that he is the critical type, and that p_p , p_c and σ reflect this). 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

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

(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

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

or

$$(1-\phi) [u(W+I-\underline{\theta}I)] + \phi [\underline{\theta}u(W) + (1-\underline{\theta})u(W+I)] > u(W+I-(\underline{\theta}+\bar{\theta})I/2) \quad (3)$$

which holds for sufficiently small ϕ . Intuitively, (3) 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 $(\underline{\theta} + \bar{\theta})/2$ (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 there is an equilibrium in which merchants with types $\theta < \tilde{\theta}$ choose private underwriters and those with types $\theta > \tilde{\theta}$ choose corporate underwriters. \square