

Trade Without Law: Private-Order Institutions in Mexican California

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Trade prospered in absence of law in California during the 1830s and 1840s. Merchants, through intermerchant trade and the partnerships they organized to buy goods abroad, played a central role in trade. This article examines the private-order institution that facilitated intermerchant trade. The hypothesis is that a particular type of private-order institution, a coalition, governed agency relations among merchants in California. Within the coalition, a reputation mechanism mitigated the commitment problem inherent in having individuals handle goods that they did not own by linking a merchant's past behavior and his future payoff. Evidence from the merchants' business correspondence supports the hypothesis. A game-theoretic model of a coalition is presented. The model provides insight into the punishment merchants imposed on cheaters, the expansion of the coalition in the 1830s, and its collapse around the time of the gold rush in 1848–1849

1. Introduction

Between 1830 and 1846, trade in California flourished in the absence of state enforcement of contracts. At the nexus of trade, in what was then a remote Mexican frontier, stood the resident merchants. They acted as intermediaries between the ships' captains and supercargoes, who brought goods to the coast from Boston, Mexico, the Hawaiian Islands, and South America, and their

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retail customers; engaged in intermerchant trade in domestically produced and foreign goods; and organized partnerships to buy goods directly in Mazatlan or the Hawaiian Islands. The success of both intermerchant trade and the partnerships among the merchants is striking, because these activities took place among self-interested individuals interacting with varying frequency in an environment characterized by uncertainty and limited ability to observe one another's actions. This success is attributable to the existence of a private-order institution, a coalition, which provided merchants with incentives for honesty when acting as agents for one another.

Resolution of the problem of opportunism was a primary issue in trade. A merchant who employed an agent often economized on travel costs, benefited from the agent's comparative advantage in performing a given task, and shifted the mix of risks that he faced away from his local market. However, while engaging an agent could lead to cost savings, the agent could also act opportunistically, because he handled goods that he did not own. The problem was not confined to California. Similar concerns arose in a number of other settings in premodern and modern trade.¹ In many cases, merchants addressed the problem by using family members as agents (Greif, 1994; de Roover, 1963). In the western Mediterranean, during the eleventh century, merchants addressed the problem through a coalition (Greif, 1989, 1993). The central feature of a coalition was the reputation mechanism that linked agents' past conduct and their future payoff. Merchants benefited from membership in the coalition, because they could realize the gains to hiring other members as agents and being hired as an agent. Continued membership was contingent on acting in accordance with both the accepted standards of behavior and the explicit contractual arrangement with the principal. The operation of the reputation mechanism, therefore, enabled members acting as agents to commit *ex ante* not to cheat *ex post*.

Evidence from individual commercial transactions in California between 1830 and 1846 supports the hypothesis that there existed a coalition that provided merchants with incentives for honesty. The California merchants left a rich written record of their business activities in the form of letters, contracts, bills of lading, receipts, account books, and statements of current account.² The record suggests that this coalition may have operated somewhat differently than other coalitions. In particular, it appears to have been costly for a principal to punish an agent in some instances, because other agents were not always perfect substitutes. As a result, merchants did not collectively punish an agent accused of cheating by refusing all future interaction with him. Instead, merchants refused interaction with such an agent only when it was inexpensive to

1. See Carlos (1992), Greif, Milgrom, and Weingast (1994); Landa (1981); and Milgrom, North, and Weingast (1990).

2. This project draws on the Henry Fitch, Thomas Larkin, William Leidesdorff, Nathan Spear, Abel Stearns, and Alpheus Thompson Collections, which include about 1,000 letters written by merchants to other merchants in California, as well as merchants' memoirs and accounts of trade by visitors to the coast. The multivolume works by Bancroft and Larkin are cited by author and volume. The volume number for Bancroft refers to the volume in *History of California*.

do so. In the second half of this article, I present a game-theoretic model of a coalition in which punishment is costly for some transactions but not for others. The model indicates how such a coalition could have provided members with an incentive not to cheat, and illustrates the relationship between a coalition and the environment in which it operated.

2. Trade in California

During the first half of the nineteenth century, California was governed by three nations. Spain, the first, directed the initial exploration and settlement. Spain, however, lost control to Mexico in 1821 as a result of Mexican independence. Subsequent to independence, Mexico maintained weak hold on the region. By the early 1840s, many speculated that Mexico would lose California to Britain, France, Russia, or the United States. The speculation ended in 1846 when the United States annexed California. The annexation was formalized in the Treaty of Guadalupe-Hidalgo in 1848, and California became a state in 1850. Prior to American annexation, California had been a thinly settled frontier. Its status as a marginal frontier region ended forever, however, when James Marshall discovered gold at Sutter's mill on January 24, 1848. Over the next four years, 250,000 people, lured by the promise of gold, descended upon a region that had in 1848 been populated by 15,000 people.

Trade in California during the Mexican period can be divided into two phases. The first ended in the early 1830s and was characterized by the commercial dominance of the Roman Catholic missions. Twenty-one missions were located within 30 miles of the coast in a line that stretched from just north of San Francisco Bay to San Diego. By virtue of their control of most of the land between these two points, the missions became the primary producers of agricultural goods in the region. In an 1846 letter, Thomas Larkin, a prominent Monterey merchant, described the situation: "In the year 1825 the missions may be considered at the height of their prosperity. At that time they consisted from two to three thousand Indians each, and from six to one hundred thousand head of black cattle, an equal number of sheep, and such an immense number of Horses, that large numbers were killed in order to avoid the destruction of pasturage."³

The mission priests traded directly with the ships' captains and supercargoes who brought goods to the coast. Under Spain, such trade had been forbidden, but this restriction was relaxed following Mexico's independence. Mexico's opening of the coast to trade in the early 1820s coincided with a shortage of hides and tallow in world markets caused by political unrest in South America. Word of the missions' herds of cattle drew ships to California, where trade centered on the exchange of cattle products for luxury food items such as chocolate, sugar, and tea, as well as cloth for the Mission Indians and religious items. Trade was almost universally based on credit. Ships' captains extended goods on credit, and the missions paid in hides and tallow a year or more later.

3. Larkin, IV:304. Thomas Larkin, *Description of California*, Monterey, April 20, 1846.

By 1830 the relative importance of the Catholic missions in trade had already begun to diminish. Spain had made fewer than 25 grants of land up to 1821. Despite the opposition of the mission priests, Mexico was considerably more liberal. The cumulative effect of these grants was to create a new class of producers. In the mid-1830s, the missions' dominance in trade came to an abrupt end with the passage of secularization laws that reduced the missions to the status of parish churches and returned their land to the government.

The second phase lasted from the early 1830s to 1846. It was associated with the dominance of individual producers and the rise of merchants as intermediaries. As mentioned, the government granted land to some individuals prior to secularization and to hundreds more following secularization. These grants were, with few exceptions, located near the coast and encompassed between 4,000 and 40,000 acres. Grantees used them as ranches, running hundreds of head of cattle. Ranchers and their cowboys slaughtered cattle annually, beginning in the early summer, and spent the next few months drying the hides and rendering the fat. They then took the hides and tallow in oxcarts over dirt paths to the nearest coastal town, where ranchers used them to pay debts and buy goods. The products passed from the ranchers to merchants and eventually to the ships' captains, whose crew would salt the hides and prepare the tallow and other goods for shipment.

Ranchers, along with government officials, soldiers, artisans, and their families, were the primary participants in the market. The size of the market was determined by the approximately 10,000 foreign and native-born individuals of European or mixed European-Native American ancestry who lived in towns along the coast.⁴ Native Americans' role in the market is more difficult to determine. Although former Mission Indians provided much of the labor for households and ranches, only a handful received land grants and raised cattle. Further, most Native Americans lived in the interior and, because of ongoing hostilities with the residents, appear to have had little or no economic interaction with the market. Coastal residents and those Native Americans who did participate in the market bought diverse goods ranging from damask, mustard, sugar, rum, brocade, and plates to purple velvet, blankets, chalk, lemon syrup, tumblers, and coffee.⁵ As in the first phase, most of this exchange involved credit. By extending credit, parties reduced the transaction costs of trading in a society with seasonal agricultural production and limited alternative sources of liquidity.

Contemporary estimates of the volume of trade indicate that trade was expanding. In 1839 California exported goods valued at about \$300,000 on the

4. Bancroft, III:610–11, 632–33, 649, 667, 698, and 699. He estimates that in 1840 there were 150 residents in San Diego, 900 in Santa Barbara, 1600 in Monterey, 1330 in San Francisco/San Jose, and 1800 in Los Angeles. Langum (1987:22) argues that these estimates are quite low. The Indian population declined from 300,000 at the beginning of the Spanish period to 150,000 in 1845 (Bean and Rawls, 1988:132).

5. Stearns Collection, Box 71, Envelope, 1833. John Ebbets to Abel Stearns, San Pedro, April 1833. Larkin, I:35. Alpheus Thompson to Thomas Larkin, March 12, 1840.

world market.⁶ Joseph de Rosamel, a French ships' captain, noted that this estimate had to be viewed with caution: "In a country such as this, where contraband, fraud, and deals with customs officers are a daily occurrence, it is impossible to obtain accurate figures."⁷ Although this is the only year for which such an estimate exists, there are estimates of customs revenue. In 1846 Thomas Larkin reported that customs revenue had averaged \$86,000 per year over the previous seven years and had been \$138,000 in 1845.⁸ If customs revenues are assumed to be a constant fraction of the value of exports, then this suggests that they were stable or increasing. Another measure of the growth can be obtained by comparing raw exports for 1839 and 1846. In 1839 exports included 60,000 hides; 3,400,000 pounds of tallow; 500,000 pounds of wheat; and \$10,000 worth of beaver and otter skins. In 1846 they included 85,000 hides; 1,500,000 pounds of tallow; 1,000,000 pounds of wheat; \$20,000 worth of beaver and otter skins; 1,000,000 feet of lumber; \$10,000 worth of soap; and 1,000 barrels of wine and brandy.

The move from a small number of large producers (missions) to a large number of smaller producers (ranchers) led to a change in the organization of trade. Resident merchants, who were, like many of the ships' captains and supercargoes, predominantly British or American by birth, began to act as intermediaries. This Anglo-American dominance of trade was noted by contemporary observers. Richard Dana, the author of one of the most famous accounts of life in California, *Two Years Before the Mast*, wrote in 1835, "In Monterey there are a number of English and Americans . . . Having more industry, frugality, and enterprise than the natives, they soon got nearly all the trade into their hands."⁹ Many merchants had arrived in the 1820s and early 1830s as ships' captains or supercargoes and had settled in the larger towns. Once in California, they had assimilated by learning Spanish and, with few exceptions, by converting to Catholicism, becoming Mexican citizens, and marrying into local families.

Merchants' enterprises varied significantly in size and scope. Petty and small merchants were itinerant or operated shops. In contrast, larger, more prosperous merchants owned branch stores, ranches, flour mills, and other businesses in addition to their retail establishments. These merchants would purchase thousands of dollars of goods from ships on the coast annually and control goods, buildings, and other property worth tens of thousands of dollars, at a time when earnings of \$1 or \$2 per day, made by miners at a small gold placer, were considered very good.¹⁰ By the time the United States annexed California in 1846, the larger California merchants had reached a level of success comparable to that of lesser provincial merchants in Mexico.

The largest merchants, who are the subject of this article, frequently used one another as agents. A merchant acting as an agent for another merchant

6. de Rosamel (1958:71).

7. *Ibid.*

8. Larkin, IV:305. Thomas Larkin, *Description of California*, Monterey, April 20, 1846.

9. Dana (1948:68).

10. Larkin, I:217. Abel Stearns to Thomas Larkin, Los Angeles, May 3, 1842.

would regularly handle several hundred and often thousands of dollars worth of goods. The precise nature of their agency relationship was defined by a contract. In a debt contract, the agent agreed to repay a fixed amount, whereas in consignment and partnership contracts, he agreed to provide trade-related services in return for a share of the profits. In partnership contracts, unlike in the other two cases, the agent also usually supplied capital on an equal footing with the other partners.¹¹

3. The Merchant Coalition

In spite of the benefits of hiring an agent, a merchant would not use another merchant as an agent if it was anticipated that the agent would act opportunistically and retain all or part of the funds owed him. An agent had the ability to act opportunistically because, in the course of selling goods and collecting debts for others, he handled goods that he did not own. Unless an agent could credibly commit prior to undertaking the transaction not to engage in opportunistic behavior once he had the goods in his possession, a merchant would not employ his services. Thus, to realize the gains to hiring agents, an institution must have existed that enabled agents to overcome their commitment problem.

Correspondence indicates that such an institution governed agency relations among the merchants in California. The frequency with which merchants entered into agency relations and the low incidence of misconduct reported in their letters suggest the atmosphere was one of trust.¹² The trust did not arise because the merchants were innately honest or did not have the occasion to act opportunistically. Indeed, the merchants explicitly identified themselves as self-interested. James Forbes, a San Francisco merchant, put it bluntly in 1845 when he wrote to Thomas Larkin, "Self interest is the predominant passion in the human breast and that in California, this passion is mingled with that of bitter enmity wherever those interests clash."¹³ They also expressed concern in a few instances that a merchant who had acted as their agent might have absconded. For example, in 1837 some speculated that James McKinley had done just that: "I have strong suspicions that he does not intend to return + consequently never intends to pay me."¹⁴

The Mexican legal system in California did not provide the institutional structure that supported trust and cooperation among the merchants. More specifically, it did not provide state enforcement of contracts. In civil cases, the judicial officer, the *alcalde*, rendered a decision but relied on community pressure rather than force to induce the parties to comply with his decision.

11. See Ogden (1981) and Miller (1972).

12. For instance, only four disputes are mentioned in the 98 letters in the Larkin Collection written between California merchants from 1839 to 1842.

13. Larkin, III:113. James Forbes to Thomas Larkin, San Francisco, April 1, 1845. On the same subject, see Stearns Collection, Box 52. Hugo Reid to Abel Stearns, 1840 [?]. Larkin, III:78-79. John C. Jones to Talbot Green, Santa Barbara, March 21, 1845.

14. Stearns Collection, Box 47. Thomas Shaw to Abel Stearns, San Pedro, December 10, 1837. See also, Spear Papers, Box 1. Miguel Pedorena to Nathan Spear, Monterey, September 28, 1840. Stearns Collection, Box 62. Abel Stearns to David Alexander, Los Angeles, August 22, 1848.

Furthermore, the *alcaldes'* limited powers of enforcement and complex jurisdictional problems made resolution of disputes between individuals who did not live in the same town all but impossible. These problems and the courts' use of civil rather than common law prompted the merchants to settle their disputes outside the legal system.¹⁵

Even if the legal system had provided contract enforcement, asymmetric information may have prevented the merchants from using the courts to enforce contracts. The asymmetry arose because agents operated in distant ports in an environment characterized by price variability. As a result of the asymmetry, an agent who was paid a fixed wage or a share of the proceeds could sell goods, underreport the proceeds to the principal, and retain the difference. To prove that an agent had cheated, a merchant first had to determine that the agent had in fact withheld profits owed to him, possibly a difficult task. The court then had to verify the factors, such as price and quantity, mentioned in the contract. Doing so *ex post*, often months or even years after the fact, may have been nearly impossible.

Price variability, which together with distance led to asymmetries in information, occurred because of irregular, uncertain supply. The influence of supply and, more specifically, individual cargoes on the market is seen in James McKinley's warning to Thomas Larkin in 1841 that a ship was about to sail from San Blas with "panocha & sugar Sarapes Rebosos &c" and if possible to invest his funds otherwise.¹⁶ Jacob Leese, in an 1836 letter to Nathan Spear, identified the effect of arrivals on a particular market: "Now is the time that they [the goods] can be disposed of at good advantage for you know that if in case that there should a vessel come in under the present circumstances that they will hit the nail on both sides."¹⁷ Uncertain supply also affected the prices of domestically produced goods. James McKinley, for instance, noted in an 1841 letter to Abel Stearns, a Los Angeles merchant, "You will do well by buying up all the corn and beans you can get hold of at a reasonable price as there will be a scarcity [*sic*] of grain at Monterey."¹⁸

An information network linked merchants and traders who were active on the coast. This network mitigated the problem posed by asymmetric information by providing merchants with information regarding the activities of other merchants. In an 1845 letter, John C. Jones, a Santa Barbara merchant, revealed detailed knowledge of market conditions in Monterey—knowledge that he had doubtless acquired from the information network—to Talbot Green, Thomas Larkin's clerk, stating, "I presume from the *very low* price for which you appear to have sold it [the rum], that it was of course for cash . . . I shall say nothing of 3

15. The *alcaldes'* use of community pressures rather than their power as an agent of the state to enforce their decision was a frontier-wide phenomenon. On this and other aspects of the Mexican California legal system, see Langum (1987). For more on the role of alternative institutions in the provision of contract enforcement, see Auerbach (1983), Ellickson (1991), and Macauley (1963).

16. Larkin, I:80. James McKinley to Thomas Larkin, Mazatlan, March 14, 1841.

17. Spear Papers, Box 1. Jacob Leese to Nathan Spear, Yerba Buena, November 31, 1836.

18. Stearns Collection, Box 42. James McKinley to Abel Stearns, San Pedro, October 6, 1841.

arrobas of rancid butter for \$37.4, but the 9 *Gallon keg at 4 Dollars* is rather too outrageous.”¹⁹ Few actions remained hidden for long. On the basis of a letter he had seen, Henry Fitch informed Abel Stearns in 1840 that “Paty sold his goods higher in Sn Pedro [to Stearns] than he did at Sta Barbara.”²⁰ Merchants also often asked for and received information on prices in other markets. In 1842, for instance, Abel Stearns advised Thomas Larkin as to the market prices for lumber, wine, and brandy in Los Angeles.²¹

The information network also furnished critical pieces of news on actual and expected arrivals of ships, the market for goods in other ports, and social political events. Almost every letter mentioned some news. Thomas Larkin’s 1834 letter to Abel Stearns is typical, stating, “Not a vessel in port excepting the Lagoda. Mr. J. C. Jones is expected here in all next month—presume you have heard of the marriage of Mr. James Forbes. . . . No news.”²² Henry Fitch’s 1839 letter of inquiry to Abel Stearns demonstrates the importance that the merchants attached to the information that they received through the network. Fitch wrote, “I have not received the news I expected from the North, therefore I hope you will write me by the next post without fail and let me know the news, I wish in particular to know about what time I may expect the Catalina along, and in fact any news that you will have the goodness to communicate will be thankfully received, what arrivals at Monterey when expected down the coast etc., etc.”²³

Given that information was an unpriced commodity and that transmission may have been costly, it is important to examine the incentives for information transmission. Ships’ captains, supercargoes, and other traders had an incentive to advertise their arrival and the cargo through letters and often added other news as well. Once in port, however, passing on news was effectively costless and a means to cultivate business relationships with the merchants. A merchant could and did alleviate the free-rider problem by becoming a correspondent with a variety of merchants. These fairly formal relationships put the onus on both parties to pass on information to the other. Nathan Spear replied to Abel Stearns’ invitation in 1834 to become his correspondent by stating, “I shall feel myself honored by your correspondence and shall avail myself of every chance of [giving] you notice of such passing events as may be of interest to you.”²⁴

A potential weakness of the network was that merchants could use it to spread incorrect information about market conditions or falsely accuse other merchants. The silence of the historical record on strategic misinformation and

19. Larkin, III:78. John C. Jones to Talbot Green, Santa Barbara, March 21, 1845. An *arroba* is 25 pounds. Emphasis is in the original.

20. Stearns Collection, Box 26. Henry Fitch to Abel Stearns, Santa Barbara, February 15, 1840.

21. Larkin, I:217. Abel Stearns to Thomas Larkin, Los Angeles, May 3, 1842.

22. Stearns Collection. Box 39. Thomas Larkin to Abel Stearns, Monterey, August 28, 1834.

23. Stearns Collection, Box 26. Henry Fitch to Abel Stearns, San Diego, September 7, 1839.

24. Stearns Collection, Box 60. Nathan Spear to Abel Stearns, Monterey, January 24, 1834. For other examples, see Stearns Collection, Box 34. William Hinckley to Abel Stearns, San Francisco, January 9, 1843. Stearns Collection, Box 39. Thomas Larkin to Abel Stearns, Monterey, April 18, 1843.

abundant commentary about allegedly untruthful accusations of misconduct suggest that the latter was more of a problem. Letters either to the accuser or to other prominent merchants often included complaints of unjust accusations.²⁵ Most appear to have arisen in the process of airing and resolving disputes rather than as a result of willful false accusation. As a rule, a merchant had little to gain from falsely accusing a merchant in another town, because he was unlikely to see an increase in his own business as a result.²⁶ The reciprocal nature of the information network probably mitigated to some extent merchants' incentives to knowingly transmit incorrect information. Further, merchants undoubtedly gathered market information from a variety of sources, so the potential benefits from transmitting such information were comparatively small.

The theory of repeated games suggests that when individuals cannot enforce contracts but can observe one another's behavior, a reputation mechanism may allow them to credibly commit not to cheat. The central idea is that a principal conditions hiring on an agent having been honest in the past and pays an agent a wage such that his expected present value of being honest is at least as large as his expected present value of cheating and being punished. This reputation mechanism, which links past behavior and future payoff, creates incentives that are known *ex ante* for the agent to be honest *ex post* and enable the principal to trust the agent.

California merchants, in their correspondence, implicitly referred to the nature of the reputation mechanism that governed interaction. When he wrote to Nathan Spear in 1836, William Hinckley linked past behavior and future interaction: "I have begged hard of Thompson to let me have 5 or 10 casks [of brandy] for you but he is not inclined to accommodate and I hope you will remember it when he is on the coast."²⁷ An 1839 letter from Thomas Larkin, a Monterey merchant, to John Temple, a Los Angeles merchant, shows that Larkin also conditioned future interaction on past behavior: "I thought you would be willing to take good flour at a fair price, in order to continue trade between us . . . It seems not!"²⁸ Another example of this link is found in an 1840 letter by Henry Fitch to Abel Stearns: "He [Williams] acted very sharpley with me about the dried beef . . . I shall know how to deal with him another time."²⁹

A dispute that arose between Nathan Spear and William Hinckley provides additional evidence on the operation of the reputation mechanism among the California merchants. While Spear was away, Hinckley made out their ac-

25. See, for instance, Larkin, III:113. James Forbes to Thomas Larkin, San Francisco, April 1, 1845. Larkin, IV:165-166. Alfred Robinson to Thomas Larkin, New York, January 16, 1846. Stearns Collection, Box 41, Jacob Leese to Abel Stearns, Monterey, June 18, 1837.

26. An exception appears to have been Robert Ridley's accusations that William Leidesdorff, another San Francisco merchant, had smuggled in large quantities of liquor and buried it, which could have resulted in Leidesdorff's arrest and increased business for Ridley. Larkin, IV:159. William Leidesdorff to Talbot Green, January 6, 1846.

27. Spear Papers, Box 1. William Hinckley to Nathan Spear, Honolulu, February 13, 1836.

28. Larkin, I:18. Thomas Larkin to John Temple, Monterey, July 22, 1839.

29. Stearns Collection, Box 26. Henry Fitch to Abel Stearns, San Diego, November 28, 1840.

count current, which showed that Spear owed him \$10,657.50. News traveled quickly, for Stephen Reynolds reported to Spear from the Hawaiian Islands in a letter dated May 1, 1838: "Letters have been received here stating your a/c current with W. S. Hinckley makes him quite in funds, say 11,000 dollars, some were almost frantic with joy."³⁰ In a scathing letter to Hinckley regarding the inaccuracy of the account current, Spear referred to the relationship between reputation and credit and the fact that the California merchants refused to extend additional credit to Hinckley: "It was also told me that you had got in your hands a document (the a/c [account] current) which you meant to show as you went down the coast to show what had become of your property and by that means reestablish your credit."³¹

The operation of the reputation mechanism depends on the existence of implicit or explicit contracts, which enable individuals to determine whether an agent has cheated. Merchants referred to the implicit contract, which specified standards of behavior, frequently in their letters. These letters indicate that parties to a contract were expected to provide goods of customary or agreed-upon quality and make appropriate allowances in the event that they did not. In addition, contracts could not be canceled without the consent of both parties, and agents were expected to keep accurate records of expenses and report the proceeds of sales honestly.³² By relying on the implicit contract, the California merchants could economize on the writing of contracts. For instance, Thomas Larkin wrote to John Paty in 1842 to ask him to purchase certain articles in Oahu and specified that he would pay cost plus 50 percent.³³ Abel Stearns simply advised John Temple via letter the same year to buy the *Nymph* at auction in Mazatlan, if the price was low enough, and that he could get goods suitable for the California market.³⁴ Even more complex contracts, such as partnership agreements, rarely exceeded one or two pages.³⁵

If a reputation mechanism exists, but information is imperfect or the implicit contract is not complete, disputes will arise. To preserve their reputation, individuals will try to prevent disputes and privately resolve those that do arise. In California, merchants did just that. When goods arrived damaged, for example, merchants often arranged for an impartial survey by third parties. In 1840 Isaac Williams had several merchants known to Thomas Larkin examine Larkin's flour and told Larkin that he could appoint additional individuals if he so desired.³⁶ When disagreements arose, most letters expressed a desire for an amicable resolution to the problem.³⁷ Thomas Larkin apologized profusely to

30. Spear Papers, Box 1. Stephen Reynolds to Nathan Spear, Oahu, May 1, 1838.

31. Spear Papers, Box 1. Nathan Spear to William Hinckley, Monterey, May 5, 1838.

32. See Langum (1987:183).

33. Larkin, I:207. Thomas Larkin to John Paty, Monterey, April 22, 1842.

34. Stearns Collection, Box 61. Abel Stearns to John Temple, Los Angeles, January 27, 1842.

35. See, for example, the contract between William Hinckley, Nathan Spear, and Jacob Leese, reprinted in Langum (1987:284-85).

36. Larkin, I:61. Isaac Williams to Thomas Larkin, October 17, 1840. For another example, see Larkin, I:138. Drafts of Affidavits, David Spence, and James Watson, November 30, 1841.

37. Larkin, I:190. James Scott to Thomas Larkin, Santa Barbara, April 12, 1842. Larkin, I:66.

Stearns in 1834 after having made a mistake on a bill that he had then passed to a third party. He also requested that Stearns resolve the problem by charging him the amount overpaid rather than by rejecting the bill.³⁸

Discussion of the reputation mechanism leaves open the question of the institution that provided the merchants with incentives for honesty when acting as agents. Institutions based on either repeated bilateral or multilateral interaction could have provided such incentives. In repeated bilateral interaction, the principal provides the agent with incentives for honesty by (i) committing to future interaction, provided the agent has not cheated him in the past; and (ii) paying the agent a wage such that the expected value of the agent's future earnings from their interaction is at least as high if the agent is honest as if he cheats. Where repeated bilateral interaction supports cooperation, one expects to observe three things. First, pairs of individuals interact frequently and on an ongoing basis. Second, an agent only settles a dispute if he expects to continue the relationship. Third, a principal conditions continuation of the relationship only on the agent's behavior in the context of the relationship. The relationship would not, for instance, be affected by the agent cheating a third party.

Repeated multilateral interaction can support two different types of institutions, decentralized ones such as coalitions and centralized ones such as clubs or guilds. In both cases, interaction is within a group of individuals. Incentives are maintained through (i) the commitment to future interaction with other members of the group, provided the agent has not cheated any principal in the group in the past; and (ii) the payment of a wage such that the expected value of the agent's future earnings are at least as high if the agent is honest as if he cheats. Under either type of institution, one expects to observe three things. First, members of the group interact frequently and on an ongoing basis, although particular pairs of individuals may interact for periods of finite duration or infrequently. Second, there is evidence of a collective identity. Third, an agent settles disputes with a principal, even if he does not expect to interact with that particular member in the future, as long as he does expect to interact in the future with other members of the group. The differences between the two institutions lie in the organization of and incentives for punishment. In both cases, members condition continued interaction on the agent's behavior towards themselves and other principals and collectively punish cheaters. In a coalition, members independently identify cheaters and find it individually rational to punish them (Greif, 1989, 1993). In a club or guild, a central authority identifies cheaters and may punish individuals who do not punish cheaters (Greif, Milgrom, and Weingast, 1994).

Evidence from the historical record indicates that a multilateral institution governed agency relations in California, and that this institution was a coalition. Merchants routinely entered into agency relationships known to be of finite duration. Most requests for goods and the collection of debts fell into this

John Paty to Thomas Larkin, Honolulu, December 21, 1840.

38. Stearns Collection, Box 39. Thomas Larkin to Abel Stearns, Monterey, January 7, 1834.

category. In 1842 Abel Stearns offered to take some lumber on consignment from Thomas Larkin. The two interacted only infrequently at this time, and Stearns's letter did not imply that interaction would be ongoing. More broadly, the patterns of letters between merchants suggest that agency relationships did not endure. Partnerships also indicate the finite duration of most agency relations between members. Henry Fitch, a San Diego merchant, owned shares of one ship and four cargoes with seven distinct groups of individuals between 1839 and 1842, but Fitch did not enter into any further partnerships after 1842 with his partners from this period.³⁹

The California merchants were viewed by others and themselves as having a collective identity. Henry Peirce of the Hawaiian Islands complained in 1843, "With the traders of California, I have had an immense deal of trouble, annoyance and loss."⁴⁰ The traders were also viewed as an entity by California residents and the merchants themselves. Hugo Reid referred to a friend as a *comerciante*, a merchant, in a letter to Abel Stearns and identified Stearns as a member of this group.⁴¹ In a letter to the owner of the French ship *Ganges*, Thomas Larkin informed the owner that he had warned the captain against "trading with People on shore who had no character to sustain as Merchants."⁴² This collective identity was manifest in other ways, such as concern over other merchants' actions. A falling out that Abel Stearns and William Hinckley had over politics in 1836 generated sufficient concern within the community for Robert Elwell, a Santa Barbara merchant, to urge reconciliation in a letter to Stearns.⁴³

Even if they did not expect to have future interaction, merchants virtually always settled disputes that arose. The number of actual disputes was quite small. The 98 letters in the Larkin Collection written between Thomas Larkin and other California merchants in the years 1839 to 1842 contain references to just two major disputes and two minor disputes.⁴⁴ As discussed, merchants attempted to preclude disputes and privately resolve those that arose. Resolution of disputes was not, however, conditional on future interaction. William Rae, in an 1844 letter to Thomas Larkin, indicated that he expected settlement of their dispute, although he did not intend to use Larkin again as an agent: "If you will settle your a/c [account current] in an honest & honorable manner . . . I shall not in the future wish the favor of any more merchantile transactions with you."⁴⁵ More generally, because most relationships were of finite duration, the parties did not know when they settled whether they would have future interaction.

39. See Ogden (1981) and Miller (1972).

40. Fitch Documentos, nos. 304–5 as cited in Langum (1987:213).

41. Stearns Collection, Box 52. Hugo Reid to Abel Stearns, 1840 [?].

42. Larkin, II:104. Thomas Larkin to Monsieur Gauden, Monterey, April 21, 1844.

43. Stearns Collection, Box 22. Robert Elwell to Abel Stearns, Santa Barbara, August 26, 1836.

44. Letters to Larkin from Aguirre (1 letter), Burton (3), Cordua (2), Den (5), Fitch (5), Hinckley (8), Jones (8), Leidesdorff (1), McKinley (3), Mellus (2), Henry Paty (3), John Paty (7), Rae (4), Robbins (1), Robinson (2), Spear (13), Stearns (2), Temple (12), Thompson (13), and from Larkin to Jones (1), Temple (2) in Larkin I.

45. Larkin, II:214. William Rae to Thomas Larkin, Yerba Buena, September 2, 1844.

The high rates of settlement meant that collective punishment was only rarely observed.

The multilateral institution had the attributes of a coalition and not a club or a guild. For a club or guild, one would expect to find evidence, such as membership lists or printed rules, of a central organization. In particular, one would expect to see centralized determination of cheating. Surviving letters and other business materials from the California collections do not include membership lists, rules, directives to punish cheating, or other indications of centralization. Nor do the letters suggest that merchants punished merchants who failed to punish cheaters, which is an attribute of some centralized multilateral institutions. It appears that each merchant made an independent determination of cheating based on the available information and then decided whether it was in his interest to punish the cheater.

The striking thing about the merchant coalition in California is the infrequent use of collective punishment. The other context in which we observe a merchant coalition is the western Mediterranean during the eleventh century (Greif, 1989, 1993). In both cases, disputes between principals and agents inevitably arose because of imperfections in the information network and contingencies not specified in the implicit or explicit contract. In the western Mediterranean, however, the Maghribi traders used collective punishment more frequently in the course of their interactions. This rather striking difference appears to be attributable to the costs to principals of punishing agents. The costlier that punishment is, the more principals will attempt to avoid punishing agents. In particular, they will exert more effort to determine whether cheating actually occurred before punishing. Furthermore, if punishment is differentially costly, that is, principals can substitute away from a cheater more easily for some transactions than for others, principals will choose to punish cheaters in the least costly way possible. Thus, principals may punish agents who cheat by substituting away from them when it is inexpensive to do so and reserve costlier punishment, full ostracism, for repeat offenders. The cost of punishing agents seems to have been higher for the California merchants than for the Maghribi traders. While the Maghribi traders moved their business easily from one merchant in a port to one of the several other merchants in the port, at most a few California merchants or, in some cases, only one were active in each town.

The idea of differential costs of punishment for principals can be captured by defining transactions as either general or relation-specific. General transactions are those that all agents can perform approximately equally well. Punishing an agent by substituting away from him is therefore inexpensive or free for the principal. Examples of general transactions would be the disposal of most types of excess goods. The market, for instance, for wine and brandy was strong in nearly every town. Similarly, many merchants could have acted as agents in the sale of soap, sugar, or cloth. Relation-specific transactions are those that a particular agent can perform more efficiently than other agents. Punishing this agent by noninteraction is therefore costly for the principal. Three types of transactions are likely to fit this description. The first would be retail debt collection, in which it is necessary to use a merchant who lives in the same town

as the debtor and preferable to use the most prominent merchant. The second would be an already functioning partnership, in which the current agent has a much more detailed knowledge for events to-date than any potential agent. The third would be in the sale of unusual items that were not in demand in most towns.

The California merchants appear to have punished cheating by substituting away from an agent for general transactions. Substituting away from an agent effectively meant that the merchant refused to grant that agent further credit. William Hinckley's problems are an interesting case in point. In December, 1837, Stephen Reynolds, in a letter to Nathan Spear from the Hawaiian Islands, hinted at these problems: "If one tenth of the Reports concerning WSH are true I shall feel very sorry as it would seem he pays little regard to his word, and less to his obligation."⁴⁶ Reynolds may have been referring to Hinckley's agreement with Thomas Larkin and James Watson to exchange hides for cash in which he took the cash and then failed to produce the hides.⁴⁷ The results of his actions were that the California merchants refused to extend him further credit. Some Hawaiian merchants went further and refused to pay him the money they owed.⁴⁸

In 1845 and 1846 Alpheus Thompson, a Santa Barbara merchant, was having similar problems. In 1845 Thomas Larkin received concerned letters from two firms in Mazatlan that had extended credit to Thompson, inquiring about his ability to pay.⁴⁹ In reply, Larkin stated that he believed that Thompson's credit was good, although Thompson had a reputation for being slow to pay.⁵⁰ In 1846 Thompson complained to Larkin that a supercargo, who had unsuccessfully tried to collect a debt, "is determined to injure us as far as talk goes."⁵¹ By that time, his credit problems were not limited to the supercargo. His hunters discovered that Thompson's credit was not good in Monterey when they attempted to obtain supplies there.⁵²

The punishment that the merchants did impose was sufficiently severe that it eventually led individuals to resolve the problem rather than face continuing punishment. The problems associated with a business in which Charles Hall and James McKinley had allegedly been partners first arose in late 1837, when McKinley refused to pay debts owed by Hall after Hall left the business. The dispute wore on through 1838 and into 1839. In November, 1839, William Hinckley finally reported to Abel Stearns, "After some trouble I am happy to be able to say that McKinley has settled the affair by consenting to pay in full of all

46. Spear Collection, Box 1. Stephen Reynolds to Nathan Spear, Oahu, December 12, 1837.

47. Larkin, IV:15. Thomas Larkin to William Hinckley, Monterey, October 1845. The timing of this is uncertain, because Larkin mentioned it many years later. Larkin's description does, however, date it as occurring before August of 1842.

48. Spear Collection, Box 1. Stephen Reynolds to Nathan Spear, Oahu, May 1, 1838.

49. Larkin, III:166-68. Mott Talbot & Co. to Thomas Larkin, Mazatlan, May 2, 1845. Larkin, III:163-64. Parrott & Co. to Thomas Larkin, Mazatlan, May 2, 1845.

50. Larkin, III:263. Thomas Larkin to Mott Talbot & Co., Monterey, July 8, 1845.

51. Larkin, I:203. Alpheus Thompson to Thomas Larkin, Santa Barbara, February 16, 1846.

52. Nidever (1937) as cited in Langum (1987:205).

claims, and also to go to Monterey to adjust the affairs of the Don Quixote."⁵³

There is no evidence that the California merchants ever punished a merchant by completely ostracizing him either temporarily or permanently. If ostracism were occurring, one would expect discussions or at least mention of this to appear in the merchants' letters. It does not. Merchants appear to have continued to interact, at least on a limited basis, with merchants who they knew were embroiled in disputes with others. William Hinckley had credit troubles and a dispute with Nathan Spear in 1838. Despite this, however, Spear did not replace Hinckley, who continued to act as Spear's agent.⁵⁴ The Paty brothers were involved in a dispute with Abel Stearns that stretched from late 1840 into at least the middle of 1842.⁵⁵ During this period, Thomas Larkin had John Paty sell a mule in the Hawaiian Islands and try to collect a debt from a merchant in San Francisco. James McKinley also sent \$200 for Larkin from Los Angeles to Monterey with Paty.⁵⁶ In each case, changing to a new agent appears to have been costly because of an existing partnership arrangement or the need to find a merchant who was going to a particular destination at a given time. Moreover, all of the merchants who had been involved in major disputes continued to be active as merchants in California.

4. The Model

The model presented here captures a number of features of business life in Mexican California.⁵⁷ Merchants regularly acted as both principals and agents. Therefore, in the model, players are permitted to act as both a principal and an agent in every period. As principals, merchants hired agents to perform tasks for which it was more or less costly to hire a different agent to perform the same task. The two types of tasks in the model reflect this differential ability to substitute agents in general and relation-specific tasks. The changing nature of business conditions generally precluded a merchant from committing to future employment. Nature's determination of the type of transaction in each period in the model illustrates the principal's inability to commit to future interaction, because the nature of the task could change from period to period.

In the foregoing stage game, the payoffs have the property that there are efficiency gains to hiring an agent, but the principal will choose not to hire an

53. Stearns Collection, Box 34. William Hinckley to Abel Stearns, San Pedro, November 1, 1839.

54. This is based on accounts between them. Spear Papers, Box 1. Accounts between Nathan Spear and William Hinckley.

55. Stearns Collection, Box 35. Francis Johnson to Abel Stearns, January 28, 1841. The letter indicates that the dispute had already been going on for some time. It was still active in 1842. Stearns Collection, Box 61. Abel Stearns to Peirce & Brewer, April 25, 1842.

56. Larkin, I:67. John Paty to Thomas Larkin, Honolulu, December 21, 1840. Larkin, I:170. John Paty to Thomas Larkin, San Francisco, March 6, 1842. Larkin, I:172. James McKinley to Thomas Larkin, Los Angeles, March 11, 1842.

57. The model draws on two types of models—models of repeated games with periodic forced separation (Shapiro and Stiglitz, 1984; Greif, 1993) and models of repeated games with random matching (Kandori, 1992; Okono-Fujiwara and Postlewaite, 1990).

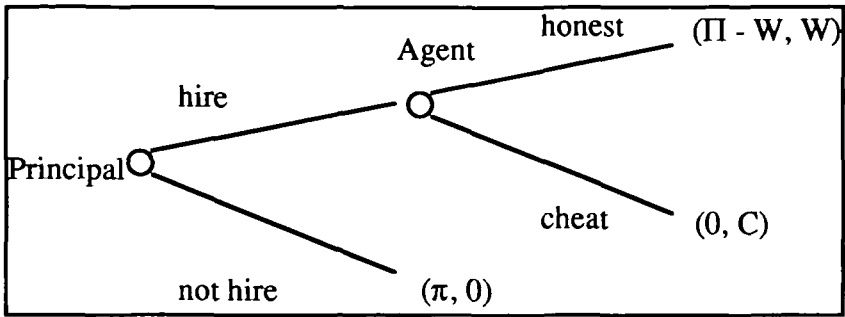


Figure 1. The stage game.

agent in a one-period game. The efficiency gains arise from the assumption that the total payoff if an agent is hired, Π if he is honest and C if he cheats, is greater than the total payoff π if an agent is not hired, where $\pi > 0$. If an agent is hired and he is honest, then he receives a wage W , which is chosen by the principal. The largest wage that a principal would be willing to offer an agent is the total gains to hiring an agent, $\Pi - \pi$. The principal can commit to pay any wage $W \leq \Pi - \pi$, because the agent handles his goods, which have a value $\Pi > W$. After completing the transaction, the agent retains W and remits $\Pi - W$. If an agent is hired and he cheats, then he retains the goods and remits nothing. The agent's payoff in this case is C , where it is assumed that $\Pi \geq C > \Pi - \pi$. C may be less than or equal to Π , depending on whether there are any costs to cheating. If a principal does not hire an agent, then he receives π . An agent who is not hired receives nothing.⁵⁸ The Nash equilibrium of the stage game is (not hire, cheat), because the largest wage that a principal would offer an agent, $W = \Pi - \pi$, is less than the value of cheating.

4.1 The Repeated Game

It is assumed that information is perfect and complete; a principal and an agent play the stage game; the game is infinitely repeated; the discount rate is β for all players; and players (a principal or an agent) can only have a single partner in any period. Each of the N identical players may act both as a principal and as an agent in each period. There are, therefore, equal numbers of principals and agents. In what follows, players are identified by their roles; for instance, a player acting as an agent is referred to as an agent. Each principal has the opportunity to engage in a single transaction in each period. The transaction that a principal undertakes is of one of two types: general or relation-specific. Any agent may be hired for a general transaction, but a particular agent must be hired for a relation-specific transaction. At the beginning of every period, nature makes a *single* move that determines for *all* principals whether their

58. This represents his normalized outside wage.

transaction is general or relation-specific. A general transaction occurs with probability $1 - \alpha$, and a relation-specific transaction occurs with probability α . In the latter case, nature uniformly and randomly matches each principal with a single agent; thus, the probability that each agent (other than the principal) is designated is $1/(N - 1)$.⁵⁹

$G^\infty(\beta)$, the infinitely repeated game, is defined by the component game G , where $G = (S_1, \dots, S_N; \bar{y}_1, \dots, \bar{y}_N)$; $S_i = (\text{hire at } W, \text{ not hire; cheat, not cheat})$; \bar{y}_i is the payoff to player i ; $i = 1, \dots, N$; and the discount factor $\beta \in (0, 1)$. A pure strategy for player i specifies an action in every period as a function of past actions of all players. Each player maximizes his expected profit earned as a principal plus the expected wages earned as an agent.

Before discussing strategies, it is useful to define some terms. An honest player is one who has never cheated any player. A dishonest player is one who has cheated on one or more transactions. He may have cheated on either a general or a relation-specific transaction(s) or on both. Dishonest players may be subdivided into two categories, which correspond to first offenders and repeat offenders. An A-dishonest player is one who has cheated on one transaction. A B-dishonest player is one who has cheated on more than one transaction.

In the model, I compare two strategies, a Strong Multilateral Punishment Strategy and a Weak Multilateral Punishment Strategy. In first strategy, the Strong Multilateral Punishment Strategy, honest players do not interact with dishonest players. The second strategy, the Weak Multilateral Punishment Strategy, is more complex. Honest players do not interact with dishonest players for general transactions. For relation-specific transactions, however, honest players may give first offenders (A-dishonest players) a "second chance." Specifically, they may continue to interact with A-dishonest players for relation-specific tasks, but will not interact with B-dishonest players. Whether honest players give first offenders a "second chance" depends on whether $R > R^*$, where R is the total number of honest and A-dishonest players. To put it another way, R is the number of players who remain in the game in the sense that they are not being fully ostracized. The problem is that as R gets low, an A-dishonest player is less likely to be randomly matched with honest or other A-dishonest players, which means that the payoff to honesty diminishes. Thus, at some value R^* , which will be defined in equilibrium, honest players quit giving A-dishonest players a second chance, because incentives can no longer be maintained.

A Strong Multilateral Punishment Strategy (SPS) is defined as follows. For a general task, an honest principal randomly hires an honest agent from the pool of all honest agents who have not been hired by an honest principal in the current period; a dishonest principal does not hire an agent.⁶⁰ For a relation-

59. An example of this process would be to generate all possible combinations of the N principals and agents, eliminate combinations in which one or more players were matched with themselves, and then have nature randomly select each period among the remaining combinations.

60. Principals might hire agents for general tasks by having nature match principals who have

specific task, an honest principal hires the required agent if the agent is honest and does not hire the agent if he is dishonest; a dishonest principal does not hire the agent. An honest agent does not cheat an honest principal as long he is offered a wage at least equal to $W_s^*(R)$. An agent cheats if (i) he is dishonest and is offered a wage less than C ; (ii) the principal is dishonest and offers him a wage less than C ; or (iii) if he is offered a wage less than $W_s^*(R)$.⁶¹ An agent who cheats for any of these reasons is not considered to have cheated.

A Weak Multilateral Punishment Strategy (WPS) is defined as follows. For a general task, an honest principal randomly hires an honest agent from the pool of all honest agents who have not been hired by an honest principal in the current period; a dishonest principal does not hire an agent. An honest agent does not cheat an honest principal on a general task as long he is offered a wage at least equal to $W_w^*(R)$. An agent cheats if (i) he is dishonest and is offered a wage less than C ; (ii) the principal is dishonest and offers him a wage less than C ; or (iii) if he is offered a wage less than $W_w^*(R)$. An agent who cheats for any of these reasons is not considered to have cheated. For a relation-specific task, when $R > R^*$, an honest or A-dishonest principal hires the required agent if the agent is honest or A-dishonest and does not hire the agent if he is B-dishonest; a B-dishonest principal does not hire the agent. An honest agent does not cheat an honest or A-dishonest principal on a relation-specific task as long he is offered a wage at least equal to $W_w^*(R)$. An A-dishonest agent does not cheat an honest or A-dishonest principal on a relation-specific task as long he is offered a wage at least equal to $W_w^*(R)$.⁶² An agent cheats on a relation-specific task if (i) he is B-dishonest and is offered a wage less than C ; (ii) the principal is B-dishonest and offers him a wage less than C ; or (iii) if he is offered a wage less than $W_w^*(R)$. An agent who cheats for any of these reasons is not considered to have cheated. For a relation-specific task, when $R \leq R^*$, an honest principal hires the required agent if the agent is honest and does not hire the agent if he is dishonest; a dishonest principal does not hire the agent. An honest agent does not cheat an honest principal as long he is offered a wage at least equal to $W_w^*(R)$. An agent cheats if (i) he is dishonest and is offered a wage less than C ; (ii) the principal is dishonest and offers him a wage less than C ; or (iii) if he is offered a wage less than $W_w^*(R)$. An agent who cheats for any of these reasons is not considered to have cheated.

Proposition 1 establishes that the profiles where all players follow SPS and

not cheated with agents who have not cheated. Alternatively, principals might randomly select an agent from the pool of honest agents, hire the agent if the agent had not already been hired by an honest principal, and select another agent if the agent had already been hired. If the only remaining agent was himself, the principal would trade agents with another honest principal. In either case, cheaters may hire any agent.

61. No agent would cheat if offered a wage $W \geq C$. A principal would, however, never make such an offer, since $C > \Pi - \pi$ and $\pi > 0$.

62. In the model, the wage is the same for both honest and A-dishonest agents. This has the effect of (i) conforming with what we observe, namely that wages for the two types appear to have been the same; and (ii) simplifying the exposition and the proofs without qualitatively changing the results.

all follow WPS are, under certain assumptions, subgame perfect equilibria. Under both punishment strategies, principals choose a wage, which is given in Proposition 1, such that the agent cannot gain by cheating. The wages are either directly (in the case of SPS) or indirectly (in the case of WPS) a function of R , the number of players who are not being fully ostracized. Under SPS, the direct relationship arises, because punishment is costly in relation-specific transactions. Under WPS, however, the relationship is only indirect, because an agent who cheats only loses the value of general transactions, which does not depend on R .

Proposition 1. For β sufficiently large and $\alpha \geq \frac{1}{2}$, the following are true:

(i) If all players follow SPS, the strategy profile is a *subgame perfect equilibrium*. In equilibrium, each principal hires an agent at wage

$$W_s^*(R) = \left(C - \frac{\beta}{1-\beta} \{ (1-\alpha)(\Pi - \pi) + \alpha \left[\Pi \left(\frac{R-1}{N-1} \right) + \pi \left(\frac{N-R}{N-1} \right) - \pi \right] \} \right),$$

and the agent does not cheat. When $R = N$, this reduces to

$$\left[C - \frac{\beta}{1-\beta} (\Pi - \pi) \right].$$

(ii) If all players follow WPS, the strategy profile is a *subgame perfect equilibrium*. In equilibrium, each principal hires an agent at wage

$$W_w^*(R) = \begin{cases} C - \frac{\beta}{1-\beta} (1-\alpha)(\Pi - \pi) & \text{if } R > R^* \\ C - \frac{\beta}{1-\beta} \{ (1-\alpha)(\Pi - \pi) + \alpha \left[\left(\frac{R-1}{N-1} \right) \Pi + \pi \left(\frac{N-R}{N-1} \right) - \pi \right] \} & \text{otherwise,} \end{cases}$$

where

$$R^* = \left[1 + (N-1) \left(\frac{1-\alpha}{\alpha} \right) \right],$$

and the agent does not cheat.

Proposition 1 illuminates three issues. First, although it was assumed in the model that a player would interact with other players hired in the future if he has been honest in the past, this promise of future interaction may or may not be credible when players can hire outsiders (nonmembers) for general tasks. Proposition 1 shows that because it is cheaper to hire members than nonmembers, this promise is credible. The wage differential arises as a result of the fact that it is possible to punish members more severely for cheating than nonmembers. For $R > R^*$,

$$W_w^*(R) - W_s^*(R) = \alpha \left[\left(\frac{R-1}{N-1} \right) \Pi + \left(\frac{N-R}{N-1} \right) \pi - \pi \right],$$

which indicates that wages are higher when punishment is less severe. This relationship between wages and punishment holds more broadly. The wage differential between members and nonmembers creates an endogenous barrier to hiring outsiders and enables members to credibly commit to hire honest members in the future.

Second, Proposition 1 also provides insight into why a player would want to punish an agent who had not cheated him personally. Consider the case of relation-specific tasks, where punishment is costly for other players. SPS calls for players not to hire a dishonest player and for a dishonest player to cheat if hired as an agent. So, in order to induce a dishonest agent not to cheat again, the principal would, as in the one-period Nash equilibrium, have to pay him a wage that was in excess of the total gains to hiring an agent, $\Pi - \pi$. In light of the magnitude to the wage necessary to guarantee honesty, the principal would prefer to forego hiring the agent. Thus, the linkage between expectations about future employment and the wage leads to the uncoordinated, multilateral punishment of cheaters. A player will face similar incentives to punish an agent who had not cheated him personally for general tasks, where punishment is costless. The question is why, if all players are following WPS and $R > R^*$, a player would be willing to hire an A-dishonest agent for a relation-specific task. Under WPS, the presumption is that other players will hire him in the future for a relation-specific task. If the value of this future interaction on relation-specific tasks is sufficiently high, $W_w^*(R)$ will be less than or equal to total gains to hiring an agent, $\Pi - \pi$. Thus, when matched with an A-dishonest agent, a player will have an incentive to hire him.

Third, Proposition 1 demonstrates the interrelation between the institution and the exogenous variables. This interrelation is evident from the wages $W_s^*(R)$ and $W_w^*(R)$. As expected, if an agent values future income more highly, that is, β is higher, or if the total value of cooperation, Π , is higher, then the wage that a principal must offer an agent falls.⁶³ On the other hand, if the gain to cheating, C , increases, or the noncooperative earnings, π , rise, then the principal will pay a higher wage. If all players play according to WPS, then $W_w^*(R)$ is increasing in α . This simply states that as the penalty for cheating diminishes, because general transactions become fewer, the wage also rises.

Proposition 2 examines the trade-off between the use of less-severe (less-costly) punishment and the ability to sustain cooperation.

Proposition 2. The lowest discount factor that can support cooperation using SPS is

$$\beta = \frac{C - (\Pi - \pi)}{C - \alpha(\Pi - \pi) + \alpha \left(\frac{R-1}{N-1} \right) (\Pi - \pi)},$$

63. In particular, as β approaches 1, W^* becomes negative, because future cooperation is so valuable that an agent is willing to pay a principal in order to ensure its continuation.

while that for WPS is higher,

$$\beta = \frac{C - (\Pi - \pi)}{C - \alpha(\Pi - \pi)}.$$

Although Proposition 2 shows that WPS has a cost, a tighter range of β than SPS, what it does not show is that WPS may also have a benefit.⁶⁴ The benefit is not evident, because the model assumes that information is perfect. It is useful, however, to think about the case where information is imperfect. If principals can only imperfectly monitor their agents, then on the equilibrium path, agents will be accused of cheating, and the cost of punishment to the punishers will become an important factor in the choice of a strategy. In particular, the profile where all players follow SPS, because it specifies noninteraction with a cheater on relation-specific tasks, imposes greater costs on the punishers than if all players follow WPS. If punishment is in fact costly, then one would expect players to adopt a low-cost strategy such as WPS that allows for continuation of interaction with players who are accused of cheating.

Assume that a principal who hires an agent only observes the agent's action with noise. In particular, if the agent does not cheat, the principal will observe this with probability $1 - \varepsilon$ and cheat with probability $\varepsilon > 0$. If the agent cheats, the principal will observe this with probability 1. This construction implicitly assumes the existence of variance in Π , otherwise principals could infer agents' actions from their payoffs; therefore, the payoffs from above should be interpreted as expected payoffs. The principal may be thought of as receiving a report from the information network, which is occasionally incorrect, regarding the total payoff of the transaction and punishing the agent if this is greater than the agent's report of the payoff.⁶⁵

This problem is difficult to work with, because, in general, it is optimal to punish a cheater for a finite period of time and then "forgive" him (Abreu, Pearce, and Stacchetti, 1986, 1990; Fudenberg, Levine, and Maskin, 1989). This, in turn, means that R and the payoffs will vary over time. In addition, because of the imperfect information, the game may reach a state where all players are simultaneously being punished for cheating.

The intuition is, however, clear if one thinks about using the strategies specified above, which call for permanent punishment for a first or second offense. With these strategies, the game will slowly unravel over time as players are accused of cheating. Consider a vector N , which specifies the period in which

64. With perfect monitoring, therefore, WPS is equivalent to SPS but has the disadvantage of not being able to support cooperation in some instances. This is the reason why Abreu (1988) considers only the worst perfect equilibria for each player.

65. This is similar to Demski, Sappington, and Spiller (1988). In their model, the principal compares the reports of two agents rather than comparing the agent's report to what he learns from the information network. Demski, Sappington, and Spiller show that, for a principal-agent model with risk neutral agents and bankruptcy constraints, and provided that agents are informed of their productivity subsequent to the contract, direct revelation is possible. This result is relevant in this context, because it indicates that agents will truthfully report the proceeds of a sale, even though the maximum punishment that the coalition can impose is finite.

players $i = 1, \dots, N$ will be accused of cheating for the first time. Initially, everyone earns $\Pi - W + W = \Pi$ per period. After the first person has cheated, under SPS the expected value of an honest player's earnings falls to $\Pi(1 - \frac{\alpha}{N-1})$, while under WPS it remains Π . If the matching process is identical for SPS and WPS, then the honest player(s) who would have been matched with the first A-dishonest player (in his roles as agent and principal) will be strictly better-off under WPS, since they now earn Π , and all other players will be at least as well-off, since they still earn Π . More generally, the expected value of an honest player's earnings under SPS is

$$\Pi \left[1 - \frac{\alpha(\# \text{ cheated once})}{N-1} \right]$$

and under WPS is

$$\Pi \left[1 - \frac{\alpha(\# \text{ cheated twice})}{N-1} \right].$$

The expected value of an A-dishonest player's earnings under SPS is 0 and under WPS is

$$\alpha \Pi \left[1 - \frac{\alpha(\# \text{ cheated twice})}{N-1} \right].$$

Thus, the payoffs will be higher under WPS for some honest and A-dishonest players and at least as high for others in the period immediately following the period in which a player is accused of cheating for the first time. This is true even if the player is accused of cheating again in this period.

5. Stability of the Merchant Coalition

In California, barriers to entry into and exit from the coalition created stability, which supported the operation of the reputation mechanism. First, the barriers, by ensuring stable membership in the coalition, enabled the information network to provide a principal with information on an agent's past actions and to mitigate information asymmetries between a principal and an agent. Second, barriers preserved the differential between what members could earn inside and outside the coalition. It was this differential that allowed the coalition to provide members with incentives for honesty when acting as agents. The issue is that if anyone could become a member of the coalition and earn higher profits in every period, then earnings outside the coalition would have to rise to reflect this opportunity, and the differential would disappear. If it did, then the coalition would no longer be able to provide members with incentives for honesty.

There were two types of barriers to entry into and exit from the merchant coalition.⁶⁶ Exogenous barriers to entry and exit arose for reasons not directly related to the merchant coalition. An individual, as discussed earlier, had to

66. These barriers to entry serve the same function as bonds. On the role of bonds in facilitating cooperation, see Kranton (1996).

overcome barriers of location, nationality, and religion to reach and remain in California. To be a merchant, he also had to overcome educational and linguistic barriers. Merchants, for instance, had to be functionally literate, able to maintain accounts, and conversant in both Spanish and English. Once he had overcome these barriers to entry, family ties and debts owed by residents prevented a merchant from leaving.

Barriers to entry also arose endogenously. At some point in time, a coalition crystallizes and membership in it is defined. Once that happens, barriers to entry will arise as a result of the operation of the reputation mechanism. This follows from members' incentives to employ other members as agents rather than outsiders. These incentives and the resulting labor market segmentation may explain why the Anglo-American merchants did not use local residents to collect debts, even though, by virtue of their kinship ties to the debtor, they might have been at least as efficient at collection as a merchant. These incentives may also explain why the Anglo-American merchants had relatively little interaction with large resident merchants of other nationalities.

While strong enough to maintain stability, the barriers were also porous enough to allow for the gradual expansion of the coalition over time. Between the mid-1820s and the early 1840s, a number of merchants became members of the coalition. We can date the arrival of many of these merchants. In Los Angeles, John Temple established himself as a merchant in 1830, and Abel Stearns established himself as one in 1833. In Santa Barbara, Alpheus Thompson arrived in 1834, and John C. Jones arrived in 1841. It is more difficult to date individuals' active participation in intermerchant trade. Hawaiian merchants such as Alpheus Thompson and John C. Jones tended to become active quite quickly, because they had already formed ties to California merchants in the course of trade and possessed sizable amounts of capital when they emigrated. Other merchants did not become active until long after their arrival. Thomas Larkin, for instance, opened a small store in Monterey in 1833, but experienced, at best, modest success between then and 1838, when his fortunes improved.

The coalition's expansion allowed merchants to capture the gains that arose from the better matching of agents to tasks. The transactions costs of having a Los Angeles merchant collect debts or sell goods in San Diego, because there was no coalition member there, would have been high. The existence of economies of scale to matching and diseconomies of scale in information suggest that an optimal size for a coalition would have existed. It may, however, have never reached that size. This intuition stems from members' preferences for hiring members rather than nonmembers as agents. Underlying their preferences was the belief that other merchants would not hire the outsider in the future, and the outsider, knowing this, would cheat. Members' beliefs would have been self-fulfilling in equilibrium, unless the gains to matching were large. Thus, in the absence of centralization, the merchants may not have been able to coordinate their expectations in order to realize all of the gains from scale.

Instability caused by overland migration from the United States in the mid-1840s, the American annexation of California in July of 1846, and the gold rush in 1848 led to the eventual collapse of the coalition. During this period, we

observe changes in both the information network and the apparent profitability of membership in the coalition. The information network came under stress during the gold rush because ships went directly to San Francisco. The collapse of the transportation network between the ports resulting from the desertion of crews in San Francisco meant that the captains, previously a vital link in the network, no longer brought news and letters. As early as 1846, the continued profitability of membership may have been in doubt. Three well-known merchants considered leaving California outright in April of that year. William Howard wrote to Abel Stearns, "I am afraid we shall see a great deal of trouble in California this year there are 7 or 8000 emigrates from the W. . . . Larkin talks some of going home with me in Jany accrost land you had better make up your mind and go with us."⁶⁷ Howard, Larkin, and Stearns stayed, but only Howard, who was based in San Francisco, continued to be active as a merchant once the gold rush began. For merchants outside San Francisco, the need for and ability to conduct intermerchant trade fell in 1848–1849 as most of the population in their markets left for the gold fields. At the same time, the rise in land values created other opportunities for their skills and capital. Individuals such as Thomas Larkin, Abel Stearns, and David Spence, drawing on their ties to the local residents who owned town lots and ranches, began to act as both land brokers and land speculators.

As merchants anticipated the end of the coalition, one would expect to see agents cheating. Cheating was not a problem prior to the Bear Flag revolt, which began on June 10, 1846, and precipitated American annexation on July 7, 1846, because the change in government was unexpected. Thomas Larkin, Monterey merchant and the American consul, wrote to Mott, Talbot & Co. of Mazatlan on June 18 about the revolt, "Why this affair has happened how or by who I can not imagine . . . Whether this transaction is a personal affair for plunder or satisfaction for past insults or to change the whole California Government I can not say."⁶⁸

Interestingly, cheating was not much of a problem after American annexation, because merchants looked to the legal system for contract enforcement. This point arises in two letters addressed to David Alexander, one in 1847 and one in 1848. In the first, Thomas Larkin requested Alexander to collect a debt and added, "Should he not make arrangements to settle it at once, you will put it in suit, and then endeavour to recover."⁶⁹ In the second, Abel Stearns asked Alexander to detain Charles Flügge, a small merchant: "There being no civil magistrate at this post to who I can apply for redress I have to request of you and demand that he shall not be allowed to embark untill he has settled and paid me the amount justly due."⁷⁰

67. Stearns Collection, Box 35. William Howard to Abel Stearns, San Francisco, April 21, 1845.

68. Larkin, V:52. Thomas Larkin to Mott, Talbot & Co., Monterey, June 18, 1846.

69. Larkin, VI:262. Thomas Larkin to David Alexander, Monterey, August 10, 1847.

70. Stearns Collection, Box 62. Abel Stearns to David Alexander, Los Angeles, August 22, 1848.

6. Conclusion

A complex structure of trade emerged between 1830 and 1846 among resident merchants in California, which was then a part of Mexico. These merchants, who lived in towns along the coast, frequently employed one another as agents to sell goods, collect debts, buy goods in Mexico and the Hawaiian Islands, and provide other trade-related services. An agent, because he handled goods that he did not own and operated in a distant location, could easily have acted opportunistically and withheld part or all of the proceeds of the transaction. Despite the potential for opportunism, the atmosphere was one of honesty and trust. The agents' honesty is not attributable to the operation of the Mexican California legal system, because judicial officers did not enforce contracts.

Surviving collections of merchants' papers and other historical materials suggest that the honesty of agents in intermerchant trade is attributable to the operation of a private-order institution, a coalition. This coalition was based on a reputation mechanism that provided individuals with incentives for honesty by linking past behavior and future payoff. An information network allowed merchants to determine an agent's past behavior and monitor the agent once employed. The implicit contract, which defined standards of behavior for coalition members, and the agent's explicit contract with the principal enabled merchants to determine whether a particular agent had cheated. When merchants cheated, which happened only infrequently, other merchants substituted away from them for some types of transactions but not others. This punishment was sufficient to maintain the incentives for honesty.

Trade often runs ahead of the structures of modern economics such as contract enforcement by a formal legal system. Private-order institutions such as a coalition could, and in some cases, as in Mexican California, did arise to fill the gap and thereby foster expansion of trade. This study of the merchant coalition sheds light on the history of Mexican California and the role that institutions played in facilitating trade.

Appendix

Proof of Proposition 1

G is bounded; therefore, to show that a strategy profile is a subgame perfect equilibrium, it is necessary and sufficient to check that no player can gain by deviating in a single period and conforming thereafter.

(i) SPS

Table 1. Summary Table of SPS for Both General and Relation-Specific Tasks

Attribute of the other player:	Honest Principal	Dishonest Principal	Honest Agent	Dishonest Agent
Honest	Hire, W^*	Not Hire	Honest if $W \geq W^*$	Cheat
Dishonest	Not Hire	Not Hire	Cheat	Cheat

For each subgame, it is necessary to check that (a) an honest principal will not deviate by not hiring an honest agent or by hiring a dishonest agent as long

as $W_s^*(R) \leq \Pi - \pi$; (b) a dishonest principal will not deviate by hiring an agent; (c) an honest agent will not deviate by cheating, as long as the principal is honest and he is offered a wage at least equal to $W_s^*(R)$; (d) an agent will not deviate by being honest if he or the principal is dishonest and he is offered a wage less than C , or if he is offered a wage less than $W_s^*(R)$, given that he will not be punished for cheating in these circumstances. If these hold, a player will not gain by deviating either as a principal, as an agent, or both in a single period and then conforming thereafter.

(a) If he hires an honest agent in any subgame, an honest principal will make a profit of $\Pi - W_s^*(R)$. If he does not hire any agent, he will make a profit of π . If he hires a cheater, the cheater will cheat him and he will make zero profit. If $W_s^*(R) \leq \Pi - \pi$, then if he hires an honest agent, his profit will be at least as large as if he did not hire an agent and strictly larger than if he hires a cheater.

(b) If a dishonest principle hires an agent in any subgame, the agent will cheat him and he will make zero profit. If he does not hire an agent, he will make π . Therefore, a dishonest principal would not hire an agent.

(c) In any subgame, if an honest agent cheats an honest principal, the agent will be punished. Thus, it is necessary to check that a wage of $W_s^*(R)$ is large enough that he cannot gain from cheating and being punished. Let V_h denote the present value of the lifetime expected utility of an agent who never cheats, and V_c denote the present value of the lifetime expected utility of an agent who has cheated once. Let EP denote the current period earnings as a principal, which will depend on whether the task is general or relation-specific and, if it is relation-specific, whether the principal is matched with a cheater. If $W^* + EP + \beta V_h = C + EP + \beta V_c$, then an agent cannot gain by cheating. In other words, if the sum of the current and future earnings from honesty are at least as large as the sum of the current and future earnings from cheating, then the agent will not cheat.

The earnings as a honest agent will vary with the number of players, R , who are not being ostracized. Suppose $R = 2$, then

$$V_h = \Pi(1 - \alpha) + \alpha \left[\Pi \left(\frac{1}{N-1} \right) + \pi \left(\frac{N-2}{N-2} \right) \right] + \beta V_h.$$

The two remaining players hire one another as agents for every general transaction and hire one another as agents when randomly matched, which occurs with probability $1/(N-1)$. The profit Π is the sum of the earnings as an agent, $W_s^*(R)$, and the earnings as a principal, $\Pi - W_s^*(R)$. If an agent cheats, he earns $V_c = \pi + \beta V_c$. Substituting in to $W^* + EP + \beta V_h = C + EP + \beta V_c$ and solving for $W_s^*(R)$ yields

$$C - \frac{\beta}{1 - \beta} \left[(1 - \alpha)(\Pi - \pi) + \alpha \left(\frac{1}{N-1} \right) (\Pi - \pi) \right].$$

For $R = 2, 3, \dots, N$, if an agent is honest, he earns

$$V_h = \Pi(1 - \alpha) + \alpha \left[\Pi \left(\frac{R-1}{N-1} \right) + \pi \left(\frac{N-R}{N-1} \right) \right] + \beta V_h.$$

If he cheats, he earns $V_c = \pi + \beta V_c$. Solving for $W_s^*(R)$ yields

$$C - \frac{\beta}{1-\beta} \left\{ (1-\alpha)(\Pi - \pi) + \alpha \left[\left(\Pi \frac{R-1}{N-1} \right) + \pi \left(\frac{N-R}{N-1} \right) - \pi \right] \right\}.$$

At this wage, an honest agent will not deviate and cheat an honest principal.

(d) A dishonest agent will not deviate by being honest in any subgame, because the largest wage that a principal would offer, $W = \Pi - \pi$, is less than the gain to cheating, C . Similarly, an honest agent will not deviate by being honest when hired by a dishonest principal in any subgame, because he will not be punished for cheating a cheater, and the largest wage that a principal would offer, $W = \Pi - \pi$, is less than the gain to cheating, C . An honest agent will not deviate by being honest in any subgame, because $W_s^*(R) < C$ and he will not be punished for cheating.

(ii) WPS

Table 2. Summary Table of WPS for Relation-Specific Tasks

Attribute of the other player:	Honest Principal	A-Dishonest Principal	B-Dishonest Principal
Honest	Hire, W^*	Hire, W^*	Not Hire
A-Dishonest	Hire, W^*	Hire, W^*	Not Hire
B-Dishonest	Not Hire	Not Hire	Not Hire
	Honest Agent	A-Dishonest Agent	B-Dishonest Agent
Honest	Honest if $W \geq W^*$	Honest if $W \geq W^*$	Cheat
A-Dishonest	Honest if $W \geq W^*$	Honest if $W \geq W^*$	Cheat
B-Dishonest	Cheat	Cheat	Cheat

For each subgame, it is necessary to check that players will not deviate from the strategy for either a general or relation-specific task. WPS conforms to SPS in all instances except for relation-specific tasks when $R > R^*$. When the two conform, it is only necessary to determine for every subgame the wage $W_w^*(R)$ such that an honest agent will not deviate by cheating an honest principal. For relation-specific tasks when $R > R^*$, it is necessary to check for each subgame that (a) an honest or A-dishonest principal will not deviate by not hiring an honest or A-dishonest agent or by hiring a B-dishonest agent; (b) a B-dishonest principal will not deviate by hiring an agent; (c) an honest agent will not deviate by cheating as long as the principal is honest or A-dishonest and he is offered a wage at least equal to $W_w^*(R)$; (d) an A-dishonest agent will not deviate by cheating as long as the principal is honest or A-dishonest and he is offered a wage at least equal to $W_w^*(R)$; (e) an agent will not deviate by being honest if he or the principal is B-dishonest or if he is offered a wage less than $W_w^*(R)$, given that he will not be punished for cheating in these circumstances. If these hold, a player will not gain by deviating either as a principal or as an agent or both in a single period and then conforming thereafter.

General Tasks. If $R \leq R^*$, WPS is identical to SPS, and the wage is the same. If $R > R^*$, the wages paid under SPS and WPS will differ. For general tasks,

the incentives not to deviate from the strategy are the same as for SPS, where the wage is now $W_w^*(R)$. Agents receive this wage for both general and relation-specific tasks. As is discussed in part (d) below, this means that for A-dishonest players, $W_w^*(R)$ is not, in general, the lowest wage that will induce them to be honest. Using the same notation as above, if $W^* + EP + \beta V_h = C + EP + \beta V_A$, where V_A denotes the present value of the lifetime expected utility of an A-dishonest agent, then an agent cannot gain by cheating. For $R = 2, 3, \dots, N$, if an agent is honest, he earns

$$V_h = \Pi(1 - \alpha) + \alpha \left[\Pi \left(\frac{R-1}{N-1} \right) + \pi \left(\frac{N-R}{N-1} \right) \right] + \beta V_h.$$

If he cheats, he earns

$$V_A = \pi(1 - \alpha) + \alpha \left[\Pi \left(\frac{R-1}{N-1} \right) + \pi \left(\frac{N-R}{N-1} \right) \right] + \beta V_A.$$

Solving for $W_w^*(R)$ yields

$$C - \frac{\beta}{1 - \beta} (\Pi - \pi)(1 - \alpha).$$

Relation-Specific Tasks. (a) Like under SPS, an honest or A-dishonest principal will, in any subgame, make a profit from hiring an honest or A-dishonest agent that is as least as large as the profit from not hiring an agent and is larger than the profit from hiring a B-dishonest agent.

(b) If a B-dishonest principle hires an agent in any subgame, the agent will cheat him, and he will make 0 profit. If he does not hire an agent, he will make π . Therefore, a B-dishonest principal would prefer not to hire an agent.

(c) In any subgame, if the principal is honest or A-dishonest, and an honest agent cheats, he will be punished. If paid the wage $W_w^*(R)$ that is calculated above, an honest agent will not deviate and cheat an honest or A-dishonest principal.

(d) In any subgame, if the principal is honest or A-dishonest, and an A-dishonest agent cheats, he will be punished. Thus, it is necessary to check that a wage of $W_w^*(R)$ is large enough that he cannot gain from cheating again and being punished. Rearranging $W^* + EP + \beta V_A = C + EP + \beta V_B$ yields $W^* = C + \beta(V_B - V_A)$, where V_B denotes the present value of the lifetime expected utility of a B-dishonest agent. For $R = 2, 3, \dots, N$, if an agent is honest, he earns

$$V_A = \pi(1 - \alpha) + \alpha \left[\Pi \left(\frac{R-1}{N-1} \right) + \pi \left(\frac{N-R}{N-1} \right) \right] + \beta V_A.$$

If he cheats, he earns $V_B = \pi + \beta V_B$. In order for an A-dishonest agent not to cheat again, it must be that the wage $W_w^*(R)$ paid to honest agents is sufficient to induce him not to cheat,

$$C - \frac{\beta}{1 - \beta} (\Pi - \pi)(1 - \alpha) = C + \beta(V_B - V_A).$$

Substituting in for V_A and V_B in the previous equation yields

$$C - \frac{\beta}{1-\beta}(\Pi - \pi)(1 - \alpha) = C - \frac{\beta}{1-\beta}(\Pi - \pi)\alpha \left(\frac{R-1}{N-1} \right),$$

which reduces to

$$R = 1 + (N - 1) \left(\frac{1 - \alpha}{\alpha} \right).$$

If $\alpha = 1/2$, then $R^* = N$, and if $\alpha = 1$, then $R^* = 0$.

(e) A B-dishonest agent will not deviate by being honest in any subgame, because the largest wage that a principal would offer, $W = \Pi - \pi$, is less than the gain to cheating, C . Similarly, an honest or A-dishonest agent will not deviate by being honest when hired by a B-dishonest principal in any subgame, because he will not be punished for cheating a cheater, and the largest wage that a principal would offer, $W = \Pi - \pi$, is less than the gain to cheating, C . If offered a wage less than $W_w^*(R)$, an honest or A-dishonest agent will not deviate by being honest in any subgame, because he will not be punished for cheating.

Proof of Proposition 2

The largest wage that a principal is willing to pay is $W = \Pi - \pi$. Solving $W_s^*(R) = \Pi - \pi$ and $W_w^* = \Pi - \pi$ for β yields the expressions in Proposition 2.

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