Property Rights and Institutional Change
During Australia's Gold Rush

By

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ABSTRACT

Major mineral discoveries were made in California (1848), Australia (1851), and Nevada (1859). Different reactions by the U.S. federal government and Victoria's colonial government to the unexpected discoveries present an opportunity to complement previous studies of de novo contracting in the American West with the Victoria government's use of administrative regulations to govern mining. The analysis focuses on the rapid institutional change in Victoria, where the government delegated its rule-making authority to elected mining courts in 1855. Comparison with studies of institutional change in the American West indicates that the evolution of institutions in Victoria generally follows American patterns, yet also accommodates significant differences.

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Property rights institutions provide the basic framework within which individuals make decisions concerning investment, production, and exchange. Changes in property rights often produce major changes in the use of resources and, conversely, changes in economic conditions can place pressure on existing property rights institutions and cause them to erode or undergo substantial change. The discovery of gold and silver on federal lands in the American West during the mid-nineteenth century offered an opportunity to examine how property rights for minerals are initially established. Numerous studies (Libecap, 1978a,b, 1979; McCurdy, 1976; Umbeck, 1977a,b, 1981) have documented how, in the absence of governmental institutions, a private system of property rights quickly arose "to reduce potential conflict and uncertainty over claims" (Libecap, 1986, p. 236). As legal institutions developed with the establishment of territorial and state governments in Nevada and California, the process of dispute resolution built on the existing system by delineating the privately established property rights in a more detailed and precise manner.

In this study I examine the formation and evolution of property rights to gold in Australia during the gold rushes of the 1850s. In both the American and Australian cases, rights to minerals on public lands were held by the government, and no legal mechanisms for the private appropriation of mining rights existed. At the start of the California gold rush, the federal government did not enforce its rights due to insufficient military strength. Even after the number of soldiers in California increased, the federal government did nothing to evict trespassing miners. This left the miners free to contract for property rights. At the start of the Australian gold rush, colonial governments also allowed trespassing miners to stay on the land and mine the gold. In contrast to the American case, the Australian colonial governments exercised their property rights by establishing and enforcing rules for private mining and by charging a monthly licence-fee to each gold miner. In 1854 mounting discontent with Victoria’s mining rules culminated in a violent miners’ rebellion. The colonial government responded to the crisis by delegating most of its rule-making authority on the gold fields to courts elected by miners. The different reactions by the U.S. government and Victoria’s colonial government to the unexpected discoveries present an opportunity to complement
previous studies of de novo contracting for property rights in the American West with a study of institutional evolution in which mining rules specified by the government quickly yielded to private contracting for property rights.

Although gold was discovered in both New South Wales and Victoria, this study confines its attention to Victoria's gold fields which accounted for over 85% of production during the 1850s (Searle, 1977, Appendix 5). Section I documents and analyzes the discovery of gold and the establishment of mining rules by the colonial government. Section II covers the miners' rebellion at Ballarat and discusses the establishment of miners' courts and their enactment of a new set of mining rules. Section III compares the institutions developed in California and Australia and enumerates topics for future research.

I. The Early Australian Gold Rushes: 1851–1854

A. A Brief History

Gold was first discovered in New South Wales in April, 1851. This finding prompted exploratory activities in Victoria, and the first discovery (at Clunes, approximately 100 miles from Melbourne) quickly followed, with news of the discovery announced in Melbourne during early July. By September 21, one of the richest fields of gold ever discovered, Ballarat, had approximately 800-1000 men digging. Major discoveries at Bendigo, Castlemaine, and Mount Alexander sent the populace of Melbourne hurrying to the gold fields. By December, 1851, about 20,000 people (out of a total population of 97,000) were working in the gold fields. These shallow alluvial deposits were mined by opening the claims as a pit, "exposing the gold-bearing stratum, picking up any nuggets with a knife and handing the rich earth up in buckets" (Serle, p. 73). Deeper deposits required that a shaft be sunk and the sides of the shaft shored up by timbering. The rich earth would then be placed in a California cradle or a puddling-tub, combined with water, and worked until the earth washed away, and the gold was isolated.

The rush to the gold fields forced the Victoria government to develop policies to govern
mining. Almost all lands in the colony were Crown lands, and by common law all mineral discoveries, whether on private or public lands, belonged to the Crown. On August 15 the government asserted its rights by announcing that permission was required to prospect for gold; on August 18 the government adopted the licencing system developed in May by the New South Wales government. A licence-fee of 30s. per month was required to search for gold. Licences were nontransferable and were to be issued only to those who could show that they were not "improperly absent from hired service." Governor La Trobe appointed gold field commissioners to settle disputes, keep order, sell licences, and establish a set of rules for each gold mining area. One mining rule, again borrowed from New South Wales, rivaled the licence-fee in importance; claim size for an individual miner was limited to 8 feet square (8 ft. x 8 ft.). Parties of 4 miners or more were allowed a maximum area of 24 feet square at the Ballarat gold field. This regulation stands in stark contrast to California, where claim sizes were decided by a majority vote of miners in each camp (or district) rather than imposed by state authority. Average claims in California were about 100 feet square per miner, or about 156 times larger than in Victoria.

It is, however, noteworthy that between the proclamation of the new rules (August 18) and the arrival of police and commissioners at the Ballarat gold fields (September 21), meetings of diggers established rules and resolved disputes between miners. The Melbourne Argus reported on September 8 that "upwards of a hundred diggers are already spread along [the creek's] margin, which is divided in proportion to the numbers composing each party, by mutual consent. The greatest unanimity prevails, and all are resolved to preserve themselves in their present integrity..."[emphasis added]. On September 17 the Geelong Advertiser gave a colorful report of a miners' meeting in Ballarat:

And so all come trooping, and after a brief delay appoint a Chairman, who mounts a high stump. He is the 'Stump Orator'. Before discussing the question, which is a dispute with some new comers, he calls in virtue of his office for a division. 'All who are satisfied with the present regulations stand on this side,' says Tom Toddleton, 'and those who are dissatisfied remain where they are.' Tom thus executes a 'coup d'état', securing a large majority, without the bother of discussion, which is a decided improvement, and wastes no time, which is a valuable commodity, just now. The Stump Orator then recites the 'Regulations', and intimates
to the malcontents that the majority is resolved as one man to maintain them, peaceably if possible, but if not, at the expense of a few broken heads.

When government officials and troops first arrived at mining camps in September and October to enforce the government's new rules, they were greeted by vigorous protest meetings. Unsuccessful miners resisted paying the tax, while successful miners paid the fee for fear of being dispossessed of their rich claims. In October, 1851 only 2,261 of over 6,000 miners at Ballarat paid the licence-fee, and in November, December, and January, "fewer than half the diggers paid the fee. Moreover, the regulation that those found without a licence had to pay one-tenth of the gold in their possession was almost entirely inoperative" (Serle, 1977, p. 24). The desertion of police and government officials also meant that few officials were available to issue licences on the gold fields. Diggers often had to journey substantial distances to the commissioners' offices in each field and then wait in long queues to obtain the licence. Despite the unpopularity of the licence-fee and the problems with its administration and collection, the government announced on December 1, 1851 that the fee would double, effective January 1, 1852. The outcry against the increase was so loud that the government was forced to rescind its order, announcing on Christmas Eve that a gold export levy was being considered in lieu of a licence-fee increase. As the year ended, the government was barely functioning. "[O]n New Year's Day 1852 only two of Melbourne's forty municipal constables remained on duty in a city of reveling diggers" (Blainey, 1981, p. 36).

The government's fortunes stabilized in early 1852 as increased pay for the civil service and an emergency force of 130 military pensioners from Van Diemen's Land (Tasmania) augmented the small police force previously available to gold field administrators. By April two-thirds of the 30,000 diggers in the fields were taking out licences. During the first half of 1852, migrants from the other Australian colonies poured into Victoria, while beginning in August migrants from Britain began to arrive in Melbourne. The population figures for Victoria (see Table 1) exhibit substantial annual increases throughout the 1850s. The increasing number of diggers and their mobility (due to the small size of claims, the unmarried status of many miners, and the small amount of tools and belongings to be moved) meant that the police were constantly struggling to keep up with the diggers and to
enforce licence-fees.

In 1852 the government decided to share half of the proceeds from fines for illegal liquor sales and licence-fee evasions with the policeman who apprehended the violator. This gave incentives to policemen to ignore their other duties (i.e., to enforce law and order) and to pursue these violations more vigorously. Brutality often characterized these enforcement actions, as "[m]any of the police-officers had been convict-superintendents long practised in savagery and sadism" (Serle, p. 97). Many of the gold commissioners criticized the licence-fee system during 1852, and some resigned. In 1853 the military pensioners were returned to Van Diemen's Land, and a more professional mounted police was recruited, but the basic antagonisms between the diggers and the police over the licence system remained. Many diggers objected to the techniques used by police to check diggers for licences. Others objected to the requirement that the digger travel at the beginning of each month to a central licencing office to renew his licence. The most fundamental objection to the licence was that the lump-sum fee imposed too heavy a burden on unsuccessful diggers. The licence system was reconsidered three times (late 1851, 1852, and 1853) by the colonial government and the Legislative Council and was left intact on each occasion.

The burden of the licence-fee increased over the two years following 1852 as average miner income fell by more than half (see Table 1). At the same time wages in other occupations were increasing. The decline in miner income was due to an exhaustion of the surface alluvial gold and to increasing numbers on the gold fields. Between 1852 and 1854 approximately 132,063 people migrated from Britain and Ireland to Victoria in response to the lure of gold mining's riches (Serle, Appendix 2). In December, 1853 there were approximately 53,000 diggers in the field; by June, 1854 the number of diggers had grown to over 80,000 (Serle, Appendix 4). Opposition was also fueled by a skewed distribution of returns. About one-tenth of the diggers left the fields having made their fortunes, another one-tenth made a comfortable living, while 80 percent of the diggers either made market wages or did not make enough to meet their expenses. Under these circumstances a high lump-sum tax on prospecting and mining was sure to incite opposition from unsuccessful diggers,
particularly as competition in the fields increased.

Diggers' meetings to protest the licence-fee system occurred throughout 1853, with a temporary licence boycott in Bendigo prompting the government to reduce the licence-fee for three months starting in September, 1853. In November the Legislative Council passed a new Goldfields Management Act that reduced the annual licence-fee from £18 per year to £8 per year. A £50 annual licence-fee for goldfield shopkeepers was also enacted. While the fields were remarkably free of agitation during early 1854, by March there was a marked drop (from three-quarters or two-thirds to about one-half) in the number of diggers paying their licence-fees.

B. Economic Analysis of Licence-Fee and Claim Size

Geoffrey Blainey (1981, p. 20) has argued that the licence-fee was imposed in New South Wales (and copied by Victoria) because

Governor Fitzroy feared desperadoes and petty thieves and released convicts would quickly gather at the goldfields. Shepherds and drovers would leave their sheep, farmers would abandon their plough, seamen the sea and schoolmasters the schools, policemen would desert their beats and jailers would desert their prisoners. Law and industry might be submerged in the rush for gold.

The licence-fee would reduce the returns to mining and thereby discourage large numbers of workers from quitting their jobs and making the trek to the gold fields. If large numbers of workers were to leave their jobs, wages for many occupations would rise, and government, constrained by its limited tax revenues and its labor-intensive production technology, would have trouble finding and paying workers as well as maintaining law and order. In addition, farmers ("squatters") raising sheep, stock, and a variety of agricultural goods were the main constituency of the colonial government; they would be hurt in the short run by increasing wages and surely favored measures by the government that would allow them to retain their workers at current wages. A high lump-sum licence-fee is consistent with Blainey's reasoning, but the effects of the small claim size on the miner population is more problematic. As claim size falls, the return to a miner from discovering a deposit falls, thereby reducing the miner population. At the same time, smaller claim sizes allow more miners to prospect near an initial discovery, thereby increasing the miner population. Given the substantial
rents expected by the diggers, the net effect of small claims was probably to increase the mining field population. If the government's goal was to reduce the mining field population, it did not choose the appropriate instruments to accomplish the task; or more bluntly, it acted foolishly.

Of course, the government may have had other objectives in mind. Another possible rationale for a high lump-sum tax was to transfer scarcity rents from the miners to the government. Given the lack of concrete information about the extent and value of the gold deposits and given the miners' high expectations of discoveries, the government could realize substantial revenue from a lump-sum tax while prospecting proceeded. As information about the value of the deposits gradually appeared, the government could, if the discoveries proved to be larger than expected, switch to a proportional tax to extract additional revenues. This explanation is bolstered by the government's use of revenues from the licence-fee. In March, 1852 Governor La Trobe gave his consent to the Victoria Legislative Council's request that the gold field revenue be made available for "expenditures other than direct management of the fields" (Searle, p. 28). If the government's objective was to maximize its extraction of rents, then the initial use of a small claim size makes more sense, as it increased the number of miners paying the high lump-sum fees, thereby increasing government revenues.

It is unclear, however, whether Victoria's officials had this objective clearly in mind when they initially adopted rules on claim size. Due to the unexpected, sudden rush to the goldfields in the winter of 1851, mining rules were required immediately, and institutions that had been developed to govern a comparable situation could be easily borrowed from New South Wales where gold rushes had occurred two months earlier. In New South Wales the decision to adopt small claim sizes was made by the first gold fields commissioner, J.R. Hardy. Blainey (1962, p. 138) suggested several possible reasons why Hardy designated small claims. First, the valley in which gold had been discovered was relatively narrow and small. Second, thousands of men had already raced to the site, and most were unlicenced. Larger claims would have excluded large numbers of these men, and without additional police support it is doubtful whether claim sizes excluding a large proportion of the diggers would have been sustainable.
Another possible rationale for the government's use of small claims is suggested in the work of Barzel (1989, pp. 91-93) and Allen (1991). Both authors have emphasized the role of protection costs in explaining the small size (160 acres) of homesteading claims in the American West. By opening a small restricted area of land to homesteading at a zero price, the U.S. government ensured that settlers on frontier lands would be clustered together. The advantage of this arrangement was that it reduced the cost to government of providing protection for the settlers. This line of reasoning may also have motivated the Victoria government as establishing law and order on the gold fields was surely important in a society which had continuously received convict shipments from Great Britain's prisons during the first half of the nineteenth century. The potential for violence on the rich gold fields could be reduced if the claim sizes were adjusted to induce clustering and to reduce miners' use of violence. Larger claims provide incentives for new entrants and small claimholders to compete for additional land by using violent methods. If the number of gold miners is expected to expand, then initial specification of small claims should reduce the use of violence in allocating land. Less recourse by miners to violence allows the government to devote fewer resources to maintaining law and order. In addition, law and order should be less costly to establish the smaller the geographic area over which it is to be maintained. Our arguments point to the conclusion that small claim sizes in Victoria reduced the cost to the government of establishing law and order.

Barzel and Allen's arguments concerning clustering can be extended in another direction, as the clustering induced by small claims also facilitates the collection of scarcity rents. Geographic clustering reduced the administrative expenses of collecting the licence-fee, but more importantly it also reduced the cost of detecting miners evading the fee. Devising efficient methods for reducing enforcement costs was particularly important at the start of the gold rushes, as the provincial police force had been decimated by desertions, and wage rates were under competitive pressure from gold mining. One prediction from this analysis is that as the shortage of policemen eased (more were brought in from Tasmania, and additional soldiers were sent from Britain), government had less incentive to use small claim sizes to facilitate rent collection and should have increased the size of the
claim.

Other gold field mining rules were also directed to reducing the cost to the government of enforcing its property rights. For example, a shovel in the middle of a claim would hold it for several days while the claimholder was purchasing supplies or renewing his licence. As in California (Umbeck, 1977, p. 123) the miner had to work his claim several days per week. By requiring that claimants be present and working the claims, the government and other miners were able to enforce the small claims rule by simply recording activity at a claim for a few days. A rule allowing longer absences would have allowed miners to work several claims simultaneously and to circumvent the government's restrictions on claim size.

The government's initial specification of small claim sizes and a high lump-sum licence-fee allowed it to realize its initial goals of establishing law and order and collecting scarcity rents. The twin goals were, however, achieved at a high cost, as the lump-sum licence-fee created massive popular opposition to government gold field policies. Between 1851 and 1854 opposition to government polices was coupled with changing conditions on the gold fields. The gold field population had exploded; the surface alluvial gold was becoming exhausted; and additional capital was required if the deeper deposits were to be extracted. In sum, the stage was set for the collision between a government bent on preserving stability and miners buffeted by rapid change and declining individual prospects.

II. The Transition to Privately Defined Property Rights: 1854–1860

A. Rebellion and the New Miners Courts

In 1854, on the eve of the rebellion by its gold miners, the Ballarat field was a particularly risky field for a digger staking a claim. The rivers which originally carried the field's gold were buried beneath layers of basalt, clay, and sand. The course of existing rivers and the lay of the land gave no clues concerning where the old rivers flowed, and the discovery of deep leads of gold could be attributed much more to luck than to skill. Miners in the first rushes to Ballarat in 1851 and 1852 found large deposits of surface alluvial gold, but miners in the later rushes (which began in the
spring of 1852) found gold at depths of 50 to 180 feet. Shafts often passed through "zones of drifting sand from which water poured" (Blainey, 1981, p. 47). The water had to be continually bailed and the sides of the shaft reinforced. When the old river bed was finally hit, the miners would excavate a chamber under the full area of their claim. It usually took 5-9 months to dig the shafts and only a couple weeks to bring the gold-laden paydirt to the surface. Most shafts failed, however, to hit their target, meaning that this form of mining was substantially more risky than that occurring on other fields. The probability of discovering gold on a particular claim was not much different than on other fields, but the amount of time put into a single claim was 5 to 10 times higher. Parties at Ballarat were larger than on other fields as more labor and capital were necessary to dig the gold from such deep leads.

Disputes at Ballarat were also harder to settle, as they occurred deep underground where it was difficult to ascertain claim boundaries; they involved coordinated water pumping across several claims; and they often involved a form of free-riding known as "shepherding", where adjacent claimholders postponed exploration until the value of the claim was ascertained. Miners felt gold commissioners were arbitrary in their decisions and in September, 1854 formed a Gold Diggers' Association to press their grievances. Blainey (1981, p. 51) states that "[t]he Ballarat mines had advanced beyond the capacity of the law and its representatives to control them."

A new colonial governor, Charles Hotham, arrived in August, 1854 and was displeased at the amount of licence-fee evasion. The police were ordered to check licences twice per week to increase the probability of catching and deterring evaders. A series of miners' demonstrations and incendiary incidents prompted Governor Hotham to appoint a royal commission on November 16 to review conditions on the goldfields; one week later Hotham sent all soldiers at his disposal to Ballarat. On December 3 approximately 1000 government soldiers charged into a stockade containing 120 miners, killing 30 miners and suffering 5 casualties of their own. The "Eureka Stockade" proved to be a classic instance of a government winning the battle but losing the war. Martial law was declared but lasted only a few days. Rebel leaders were brought back to Melbourne for trial but Melbourne juries
refused to convict them. Most importantly, the episode convinced the government to reform the goldfield laws. The gold fields commission presented its report on March 27, recommending major changes in goldfield management and expansion of the Legislative Council to allow miners to elect 8 representatives to the Council. In June, 1855, the Legislative Council passed legislation containing virtually all of the Commission's recommendations. Serle observed that "[s]o prompt and handsome a redress of grievances entirely pacified the diggings..." (p. 178).

The Commission recommended that the licence-fee be replaced by an export duty, as a duty "falls more equitably as regards the successful and the unsuccessful, and it is collected at much less cost, and without the occasions of social disturbance that seem inseparable from the present system." The Council replaced the monthly licence-fee of 30s. with a "miner's right", which enabled miners to vote in parliamentary elections, to dig gold, and to vote in elections for new miners courts. A miner's right cost £1 per year. The lost revenue from the licence-fee was replaced by an export duty of 2s.6d. (approximately 3% of the price of gold) on each ounce of gold exported from Victoria. Without the licence-fee, many of the police and bureaucrats assigned to gold field administration were no longer needed and were removed from the fields. Most significantly, the new Gold Fields Act turned management of the gold fields over to the miners. Local courts to make rules and settle disputes consisted of 9 members elected by the miners every 6 months, one of whom was nominated by the Governor to serve as chairman. These courts had control over all aspects of working conditions. Administrative officers associated with the courts were known as "wardens." Serle remarks that "[t]he nature of these courts was highly unusual and a remarkable democratic experience" (p. 178). In 1857 the government removed judicial powers from the courts, and vested them with a new court of mines; cases were heard by a judge and miners served as assessors when damages were awarded. The original mining courts retained their legislative powers and became known as "mining boards."

Until these changes in the law were enacted, fewer than 1000 miners paid the licence-fee in the early months of 1855. Miner's rights were first issued in June, 1855, and by December over
50,000 miners had purchased the rights. In July, 1855, local courts were elected by a show of hands from those holding the miner's rights and attending the election meeting. Miners' courts in Bendigo and Ballarat acted quickly to relax claim sizes whenever water control or the great depth made larger claims more efficient (Blainey, 1981, p. 57). "Ballarat's court encouraged the mining of its deep leads by allowing miners to unite their claims and by permitting one man to hold shares in many claims. Its court and mining board were so liberal in difficult areas that by 1863 a man could hold 120 times the maximum area of a decade previously" (Blainey, 1981, pp. 57-8).

Miners' courts did not generally follow Ballarat's lead in liberalizing their mining regulations. Instead, a wide array of regulations appeared which were generally tied to the mining techniques used in the district. Districts in which surface alluvial gold was mined with a California cradle retained their rules virtually intact. Districts where surface alluvial gold was mined by puddlers adopted larger claims, while districts with deep lead mining defined their rules more precisely and changed them substantially.

Another major change after the Eureka Stockade was the advent of company mining. In June, 1855 the Legislative Council passed legislation allowing limited liability mining companies to participate in gold mining. The power to grant leases to the companies was, however, retained by the individual mining districts, and opposition among the miners to the companies remained strong throughout the 1850s. At an 1858 conference of mining boards representatives, the Governor lobbied for districts to allow large leases to be granted by the colonial government, but the board representatives were resolute in maintaining local mining board jurisdiction. The Ballarat, Bendigo, Maryborough, and Castlemaine districts all changed their policies in the summer of 1859, however, allowing large leases to be granted on old and new ground. "By July, 1859, these four mining boards had approved 103 leases totalling 966 acres on alluvium and 105 leases for some 25,000 yards on quartz. By the end of 1861, 622 leases were issued, and in that year the government issued uniform leasing regulations for all fields" (Serle, p. 224).

B. Economic Analysis of the Export Duty and Mining Board Rules
The change from the lump-sum licence-fee to an export duty went a long way towards restoring social stability and increasing government revenues. The Commission observed that "[t]he Gold Fields could not be patrolled for the more effectual suppression of crime so long as the police were thus employed in collecting the licence-fee. While from such causes, therefore, the police were rendered quite inefficient for the ordinary public service, the force itself was withal twice as numerous and twice as expensive as would have been necessary under a different system." In testimony before the Royal Commission investigating Ballarat, Mr. John Harrison, a digger, noted that the police were present on the fields to protect the Commissioners, not the diggers: "... it has become a bye-word on the diggings that you will never see a policeman without being asked for a licence." This comment constitutes a succinct criticism of the lump-sum tax so often propounded by economists as an efficient tax. If the tax falls disproportionately on individuals unable or unwilling to pay, the increased expenditures required to collect the tax may outweigh the usual efficiency gains from a lump-sum tax. Moreover, the Commission was convinced that revenue and expenses would both decrease under an excise tax but that "in regard to the Gold Fields the general revenue will be left a gainer." Gross revenues from the gold fields declined from £460,000 in 1854 to £410,000 in 1857. Since the government had spent £224,000 on gold fields management in just the first half of 1853, it is quite possible that the reduction in the number of police on the gold fields after 1855 increased net revenue.

The change from a set of property rights defined by the government to a set of rights determined and enforced by a residual claimant had major consequences. First, given the heterogeneous circumstances prevailing across the different gold fields, it was predictable that districts adopted a wide variety of rules to govern mining. Brough Smyth observed that "the extent of the area of land which a miner was to be allowed to occupy under his miner's right ... [varied] ... according to the nature of the mining, whether alluvial or quartz, the wetness or dryness of the ground, its lying or not in the bed of a river, and generally according to the greater or less difficulty of mining in the ground occupied" (1979, pp. 385-6). These factors are discussed below in the
context of particular mining districts.

Second, the mining regulations in force prior to the Eureka Stockade were developed when most of the diggers were mining alluvial gold. As the frequency of discoveries of large deposits of alluvial gold declined and the number of diggers in the fields increased, diggers began to sink deeper shafts and to use more complex technologies for extracting gold. The small size of individual claims made it quite predictable that both positive and negative externalities from the new operations would generate conflicts between miners. The extensive use of deep-shaft mining at Ballarat in combination with the difficulty of verifying licences for miners working in the deep shafts were obvious factors making Ballarat a site for rebellion. Prior to the 1854 rebellion the government did little to change mining regulations to fit the evolving conditions in Ballarat and other mining fields. By contrast the new mining courts not only adopted regulations reflecting regional differences between gold fields, they also moved to adopt regulations reflecting the many changes in mining techniques adopted in virtually all Australian gold fields. In sum, the mining boards quickly adopted regulations reflecting changes in general and regional conditions, thereby providing a marked contrast with the colonial government's use before June, 1855 of a single set of regulations for all fields.

With the advent of mining boards, all gold districts began to distinguish between alluvial and quartz claims. Quartz claims differed from alluvial claims in that extensive machinery and power were necessary to smash the quartz rock and extract the embedded gold. A large amount of quartz was necessary in order to extract a small amount of gold. Quartz mining therefore required larger claim sizes or cooperation among small claim owners to be profitable. Mining courts and, later, mining boards changed allowable claim sizes to adjust to the new technology. In Ballarat, "upon a quartz reef a single claim "shall be any area of ground 50 feet in length along the supposed course of the reef, and in proportion thereto for any greater number of claims by 500 feet in width." The Castlemaine mining board adopted special rules to govern tunnelling to reach quartz reefs, the removal of water from wet quartz claims, the timbering of shafts and tunnels, the use of explosives, and the width (60 feet in 1861) and length (100 on the surface, 600 feet underground) of claims. In
Maryborough, the 1860 mining board bye-laws allowed lengths of 25 feet "along the course of the [quartz] reef" and "a width of 300 feet; 150 feet on each side from the centre of the reef."\(^{33}\) Claim consolidations of up to 100 feet in length were allowed. Maryborough rules on quartz mining also governed water bailing, tunnelling, and unworked claims; in some instances the rules required claim owners to engage in night work and to pump water from claims by steam engines. The Sandhurst mining board allowed larger claims than other districts. "Any (one) miner shall be entitled to hold thirty-five (35) yards on the supposed line of any quartz lead or vein by a width at right angles to said line of one hundred and fifty (150) yards, and any two or more miners may hold a claim on the line of any quartz vein or lode to the extent of eighty (80) yards in length by a width ... of one hundred and fifty (150) yards."\(^{34}\) Claims could be temporarily amalgamated when the claimholders were searching for the path of the reef.

Allowable claim sizes for alluvial gold were also expanded by most districts after 1855. In addition, the claim size was usually allowed to vary with the characteristics of the alluvial land. In Ballarat, the frontage system was adopted for "claims on alluvial leads of a greater depth than 200 feet".\(^{35}\) A frontage claim is one for which the lateral boundaries are not fixed until the lead has been traced through it. The claims were set up as a series of concentric circles with the first claim at the center. Regardless of the course followed by the lead, the claimholders would have their allotted length upon the lead. The system has the effect of preventing "overinvestment" by competing parties. Without knowing where a newly discovered lead would flow, competitors to the party sinking the original shaft would sink additional shafts on their standard "block" claims, hoping to strike the rich lead. If, however, the parties could cooperate and use the original shaft to follow the lead, the expense of sinking additional shafts could be saved. Without a framework for facilitating cooperative behavior, the negotiating parties would have conflicts over the shares of costs and benefits and in some circumstances may not have reached agreement. The 1857 Commission on Mining Resources found that 9 shafts were sunk over 200 feet, one to a depth of 350 feet,

"where one shaft would have been equally serviceable for mining purposes; and in fact much more so, for many of the newly sunk shafts have not struck the reef at all, having been only
sunk by guess in its supposed strike, while if the reef had been followed by driving from the first successful shaft, no such uncertainty and loss could have occurred. Evidence was taken of a remarkable case at this spot of one mining party having offered the use of their shaft to another holding the adjacent claim a few yards off, for the sum of five hundred pounds (£500), with the understanding of mutual assistance in extracting the reef; but the agreement could not be made, and a fresh shaft, which to reach the reef would cost about three thousand pounds (£3000) was commenced.\textsuperscript{86}

Ballarat's frontage claim system gave different lengths to frontage claimants depending on the depth of sinking. Table 2 presents the scale used by wardens to assign 5 to 6 additional feet to each claim's length for each additional 20 feet of depth in the entry shaft.

Castlemaine did not use frontage claims, but it did expand the amount of land granted to miners working alluvial claims. "Shallow sinking" claims meant all shafts less than 40 feet in depth, while "deep sinking" claims applied to all shafts more than 40 feet in depth. Shallow claims were allotted thirty feet square for each miner employed, while deep claims were allotted forty feet square for each miner employed.\textsuperscript{37} In July, 1861, Castlemaine changed its bye-laws again to increase claim sizes: "To encourage combined action among miners and the introduction of machinery on the gold fields, any party of miners shall be entitled to hold a claim of one acre for every four miners employed, but in no case shall a greater area than twenty acres be allowed in one claim."\textsuperscript{38}

The Maryborough Mining Board allotted to one miner working an alluvial claim 28 feet square and to two miners 40 feet square.\textsuperscript{39} If the claim involved wet sinking ("where slabbing [reinforcing the shaft's walls with stone slabs] may be necessary on account of water"), then 4 miners were allotted 80 feet square.\textsuperscript{40} This is over 11 times the allotment that a miner received prior to the Eureka Stockade. Sandhurst used an alluvial claim allotment rule which was a combination of the rules found in Maryborough and in Ballarat. The extent of the claim varied with both the number of miners in the party and with the depth of sinking. The Sandhurst rules are set forth in Table 3. Once again, note that the land allotted for shallow claims was 8.5 times larger than under the government's original 1851 rules and over 17 times larger for deep claims.

Special provisions were also made for "puddlers" in some districts. Puddling involved a mechanized version of the California cradle, thereby enabling larger quantities of paydirt to be
processed more quickly. Profitable use required the purchase of horses and a puddling machine (£25-50 in total) as well as the use of larger tracts of land, as the technique allowed gold to be extracted from otherwise marginal alluvial soil. Much ground in Bendigo which could not be profitably mined using the cradle method became profitable with the advent of the puddling technique. Sandhurst allowed puddlers "to claim and occupy one acre [208.71 feet square] of ground, exclusive of the site for his mill dam, road, and other appurtenances to his machine."\(^4\) Maryborough bye-laws do not refer to puddling, while Castlemaine granted one quarter of an acre to puddlers.\(^4\) Puddling constituted only a small percentage of mining activity in Ballarat (with its deep leads) and the Ballarat Bye-Laws contained no special claim size provisions for puddlers.\(^4\)

Earlier it was observed that frontage claims were adopted to prevent overinvestment in shaft sinking. In contrast, the original property rights imposed by the government contained incentives for underinvestment in other activities. Miners who discovered major new leads received the same claim sizes as the miners who followed them. Prospecting is a risky activity, however, and new discoveries were often preceded by many shafts that failed to strike a lead. While a new discovery could be kept a secret for a short time, once the information leaked out the discoverers were confined to standard size claims. For miners to have proper incentives to prospect for large deposits, the reward for prospecting had to be increased. Ballarat did not grant larger claims to prospectors, but other districts had specific bye-laws which increased the gains to successful prospectors. Castlemaine's Bye-Laws stipulated that "[a]ny party prospecting for alluvial gold deposits shall be entitled to four hundred feet square, provided the claim be at a distance of not less than five miles from any gold workings."\(^4\) Parties making new "shallow" discoveries that were more than 100 yards from a payable claim were granted 10,000 square feet, while "deep" discoveries were allotted 20,000 square feet. Maryborough had the most elaborate bye-laws governing prospecting, with higher awards specified for dry alluvial sinking, wet alluvial sinking, quartz reefs, and rules elaborated for the cooperation of competing prospectors. The combination of rules that increased the incentives for prospecting and also decreased the incentives for rent dissipation in a race to be first are analogous to the combination of patent and
patent pooling laws; patent laws create an incentive to be the first to discover and specify a process/product, while "patent pooling" laws create incentives for potential competitors to cooperate and minimize the rent dissipation resulting from the "racing" competition from patents.45

While mining boards and courts adopted rules reflecting the changed circumstances in the gold fields, miners still resisted the adoption of capital-intensive technologies by mining companies. Miner resistance to capital-intensive mining rested on whether the new technologies displaced the alluvial miners or whether alluvial gold had already been exhausted. The alluvial gold was cheap to mine and allowed lucky diggers to earn significant rents. Once this gold was exhausted, additional mining required a change in mining technique, the application of additional capital, and a larger claim size. Prior to the exhaustion of surface alluvial gold, small-scale miners correctly perceived that larger claims would not only enable companies to begin more capital-intensive mining, but it would also allow companies to appropriate the rents adhering to the remaining surface alluvial gold deposits. In a competitive labor market, rents from mining sites would be appropriated by the new companies rather than by the individual miners.46 This reasoning leads to the conclusion that opposition by diggers to company mining should fall as alluvial gold discoveries become less frequent and less rich. Ballarat, where surface alluvial gold was exhausted in the fall of 1852, provides some support for this proposition, as it was the first district in which company mining was encouraged under the miners' courts and mining boards.

III. A Comparison with Mining Rules in the American West and Suggestions for Future Research

A comparison of mining institutions in the American West and in Victoria indicates that institutional change in Victoria's gold fields follows American patterns in many respects, yet also accommodates significant differences. The most significant differences stem from the presence of an established provincial government in Victoria and the lack of established governmental authorities at the start of the California (1848) and Nevada (1859) rushes. In both Nevada and California, miners held local meetings to devise their own rules to establish and enforce property rights in the mineral deposits.47 In Victoria, miners also initially devised their own rules, but the colonial government
quickly asserted its property rights by promulgating a common set of mining regulations across the various gold fields. The combination of a high lump-sum licence-fee and a small claim size enabled the government to appropriate scarcity rents even during the prospecting phase of mining. One reason for the Victoria government’s emphasis on rent extraction was the political power of another major interest group, the squatters. Given the lack of miner representation in the Legislative Council prior to 1855, it is unremarkable that the government enacted measures to gain a portion of gold’s scarcity rents. By contrast, the absence in California and Nevada of functioning governments beholden to other established constituencies allowed different sets of mining rules to develop in each mining camp and miners to keep the rents stemming from their mineral discoveries.

Despite the major differences cited above, the similarities between institutions in the American West and Victoria are notable. Many mining rules were virtually identical in California and Victoria. First, participants in both rushes received exclusive rights to a designated piece of land; this meant that the claimant received exclusive rights to income from the claim. It is striking that in the early years of both rushes, when the variance of income across miners was extremely high, share contracts were not voluntarily chosen by groups of miners in California and were not considered by the government regulators in Victoria. Second, miners were required to work their claim for a specified number of days per week in both rushes. Third, each miner was allowed to hold only a limited number of claims; in Victoria each miner was allowed only one claim, while in California miners were often allowed to hold several claims. Fourth, the maximum size of a claim was specified by the mining rules. Claim sizes were, on average, much larger in California and Nevada than in Victoria. The presence of a functioning government in Victoria may explain the differences. It was argued above that the Victoria government had incentives to specify smaller claims if its goals were (1) to provide law and order on the gold fields at the least cost and (2) to extract scarcity rents. In addition, Blainey’s argument that the small size of the valley where gold was first discovered in New South Wales mandated small claims can not be simply dismissed. Fifth, despite the initial difference in claim sizes, as the surface alluvial gold became exhausted in California and Victoria, mining rules
changed to allow miners to claim more land (Umbeck, 1981, p. 109; Shinn, 1948, p. 159). In general, as the cost of extracting gold from claims rose, claim size increased in California and, after 1855, in Victoria. Sixth, as development of the mineral claims progressed, the rules governing the claims became increasingly more detailed (Libecap, 1989, pp. 42-49) in Nevada and in Australia. The tendency to develop more detailed rules surely reflected both the increasing conflicts between the ever increasing miner population and the desire to continue extracting the scarcity rents before the game ended. Seventh, the same "overinvestment" phenomenon that appeared in Victoria as excessive deep shaft sinking also appeared on the American River in the California gold fields as excess construction of temporary dams (Umbeck, 1981, p. 89):

Several ... river mining groups began operations in 1849 on the north fork of the American River. Each company dug a ditch about 300 yards long. Then a dam was built at an estimated cost of $8,000 which diverted the water from its natural course into the ditch. After 300 yards, the water was returned to its original bed, whereupon another company would build a dam and a ditch and again divert the water. This process was repeated at least 9 times, with 9 separate companies each claiming that part of the river bed they drained. The group size varied from 8 to 16 members. There was apparently no technological reason why these groups could not have constructed just one dam upriver from the area to be mined, dug 1 long ditch equal in length to the sum of the separate ditches, and saved all of the costs of constructing 9 separate dams. However, this was not observed.

Eighth, claims to deep veins in Ballarat were assigned by the frontage system to prevent overinvestment in deep shaft sinking. Libecap (1989, p. 39) observed that a similar system was established in Nevada at the Comstock Lode where "claims to deep veins were defined in terms of the vein and not surface land. Individuals were granted 200-foot slices along the vein's exposed surface or apex. Below the surface, a miner could follow his section of the vein to wherever it traveled, even below the property of others." While this system ultimately lead to conflicts (as did Ballarat's frontage system), it nonetheless represents a use of mining rules to minimize rent dissipation from overinvestment. Thus in both Victoria (after 1855) and in the American West, mining rules were structured to prevent both over- and underinvestment in prospecting and extracting activities.

Why were there so many similarities in the mining rules and in their evolution as conditions in the fields changed? Some California miners were present in the Australia gold fields; while no California miner played a major role in the development of Victoria gold field rules, the American
miners surely related their experiences as well as the California mining district rules to their digger "mates." Another possible rationale is suggested by Libecap (1989, p. 50) who observes that the process of institutional change in California was relatively rapid because of the "large expected aggregate gain from the development of the mining industry through secure property rights." The same explanation is certainly applicable to Victoria where it quickly became apparent that the gold fields were extremely valuable. In addition, Libecap cites (p. 50) the homogeneity of the miners in Nevada and "the lack of competing, nonmining interest in local governments and in Congress" as factors which allowed American miners to agree quickly on rule changes without incurring high bargaining costs. As noted above, one reason why the rules in Victoria differed from those in California may have been due to the presence of the powerful group of squatters that dominated the Victoria Legislative Council in 1851. Three years later, when the massive influx of miners established them as the primary constituency in the colony, the rules in Victoria converged with those in California.49

Finally, several topics for future research are evident. First, the transition from individual/small cooperative mining to company mining deserves more attention. Companies were treated very differently by the various mining districts and their success may be directly related to the mining district bye-laws governing their formation and operation. Second, the lump-sum taxation of workers on the gold fields deserves more attention. The situation is analogous to taxing entrants to a lottery rather than taxing the winners of the proceeds of the lottery. A formal model which derives differences in individual behavior across the two regimes would contribute to an understanding of digger behavior. Third, mining law in Australia was recognized at the turn of the century to be very detailed and superior to mining law in other countries. The judicial decisions of the Victorian mining judge, Robert Molesworth, and the decisions of the district mining boards have left a corpus of law which has not yet been carefully analyzed by economists. Given the democratic character of the mining boards and the court of mines, this body of law deserves more attention from economic historians interested in evolution of institutions.
REFERENCES


Table 1

DEMOGRAPHIC AND ECONOMIC STATISTICS OF VICTORIA

<table>
<thead>
<tr>
<th>Year</th>
<th>Victoria Population (thousands)</th>
<th>Goldfield Population (thousands)</th>
<th>Miner Wage Index</th>
<th>Composite Wage Index</th>
<th>Gold Output (oz. in thousands)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1850</td>
<td>76</td>
<td>--</td>
<td>--</td>
<td>100</td>
<td>--</td>
</tr>
<tr>
<td>1851</td>
<td>97</td>
<td>19.3</td>
<td>100</td>
<td>125</td>
<td>--</td>
</tr>
<tr>
<td>1852</td>
<td>168</td>
<td>33.8</td>
<td>510</td>
<td>341</td>
<td>4,194</td>
</tr>
<tr>
<td>1853</td>
<td>222</td>
<td>52.8</td>
<td>361</td>
<td>358</td>
<td>3,052</td>
</tr>
<tr>
<td>1854</td>
<td>284</td>
<td>65.7</td>
<td>217</td>
<td>282</td>
<td>2,165</td>
</tr>
<tr>
<td>1855</td>
<td>347</td>
<td>109.7</td>
<td>196</td>
<td>228</td>
<td>2,927</td>
</tr>
<tr>
<td>1856</td>
<td>390</td>
<td>115.3</td>
<td>179</td>
<td>212</td>
<td>3,489</td>
</tr>
<tr>
<td>1857</td>
<td>457</td>
<td>132.5</td>
<td>156</td>
<td>194</td>
<td>2,747</td>
</tr>
<tr>
<td>1858</td>
<td>496</td>
<td>147.4</td>
<td>119</td>
<td>176</td>
<td>2,527</td>
</tr>
<tr>
<td>1859</td>
<td>521</td>
<td>139.2</td>
<td>119</td>
<td>177</td>
<td>2,281</td>
</tr>
<tr>
<td>1860</td>
<td>538</td>
<td>144.4</td>
<td>137</td>
<td>177</td>
<td>2,157</td>
</tr>
</tbody>
</table>

Sources: Goldfield population is from Brough Smyth (1977), Appendix B, Table 1; Victoria population is from Australian Demography Bulletin (1949), p. 154; wage indices are from Maddock and McLean (1984), Table 2, p. 1055; gold production is the Coghlan estimate taken from Serle (1977), Appendix 5. The composite wage index takes average wages in each sector of the economy and weights them by the industry share in the economy. Gold miner wages are included in the composite wage.
Table 2

FRONTAGE CLAIMS SIZE FOR ALLUVIAL LEADS

<table>
<thead>
<tr>
<th>Depth of Sinking</th>
<th>Length of a Single Claim</th>
</tr>
</thead>
<tbody>
<tr>
<td>200–220 feet</td>
<td>36 feet</td>
</tr>
<tr>
<td>220–240</td>
<td>40</td>
</tr>
<tr>
<td>240–260</td>
<td>45</td>
</tr>
<tr>
<td>260–280</td>
<td>50</td>
</tr>
<tr>
<td>280–300</td>
<td>55</td>
</tr>
<tr>
<td>300–320</td>
<td>61</td>
</tr>
<tr>
<td>320–340</td>
<td>67</td>
</tr>
<tr>
<td>340–360</td>
<td>73</td>
</tr>
<tr>
<td>360–380</td>
<td>79</td>
</tr>
<tr>
<td>380–400</td>
<td>85</td>
</tr>
<tr>
<td>400–420</td>
<td>91</td>
</tr>
<tr>
<td>420–440</td>
<td>97</td>
</tr>
<tr>
<td>440–460</td>
<td>103</td>
</tr>
<tr>
<td>460–480</td>
<td>109</td>
</tr>
<tr>
<td>480–500</td>
<td>115</td>
</tr>
<tr>
<td>500 feet and upwards</td>
<td>120</td>
</tr>
</tbody>
</table>

## Table 3

**CLAIM SIZE ON SANDHURST ALLUVIAL GROUNDS**

<table>
<thead>
<tr>
<th># of miners</th>
<th>Feet Square</th>
<th>Square Feet</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>35 x 35</td>
<td>1,225</td>
</tr>
<tr>
<td>2</td>
<td>50 x 50</td>
<td>2,500</td>
</tr>
<tr>
<td>3</td>
<td>60 x 60</td>
<td>3,600</td>
</tr>
<tr>
<td>4</td>
<td>70 x 70</td>
<td>4,900</td>
</tr>
<tr>
<td>5</td>
<td>80 x 80</td>
<td>6,400</td>
</tr>
<tr>
<td>6</td>
<td>85 x 85</td>
<td>7,225</td>
</tr>
<tr>
<td>7</td>
<td>95 x 95</td>
<td>9,025</td>
</tr>
<tr>
<td>8</td>
<td>100 x 100</td>
<td>10,000</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th># of miners</th>
<th>Feet Square</th>
<th>Square Feet</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>70 x 70</td>
<td>4,900</td>
</tr>
<tr>
<td>3</td>
<td>85 x 85</td>
<td>7,225</td>
</tr>
<tr>
<td>4</td>
<td>100 x 100</td>
<td>10,000</td>
</tr>
</tbody>
</table>

NOTES

1. There was a limited amount of gold mining on private land, but this paper confines its attention to mining on public lands. See Serle (1977), pp. 226-27.

2. The paper relies heavily on several sources for its general discussion. Maddock and McLean (1984) provide an excellent short overview of the effect of the gold discoveries on the Australian economy. Clark’s (1955) collection of historical documents contains important reports of select government commissions on gold mining as well as government regulations of the gold fields. Irving’s (1974) overview of Australian history from 1850-1870 helps to place developments in gold mining in context. Bonwick (1942), Howitt (1855), Kelly (1859), Scott (1945), and Sherer (1853) provide contemporary accounts of events. The Mining Surveyors’ Reports (1860) were useful in understanding developments in the gold fields during the late 1850s.

3. See Case of Mines (1567) 1 Plowd 310 at 336. At the start of the gold rush, almost none of the colony’s land had been sold or granted to private parties. The 1855 Report of the Commission investigating the Eureka Stockade (see Section II) found that “[u]p to the end of 1854, after more than three years of gold digging, only 80,000 acres of land in the vicinities of the Gold Fields had been brought forward for sale; and that of this quantity, the land being in some places very poor, there had been actually sold but 44,000 acres, for a population that during all that times may have about as many individuals” (p. xiv).

4. See Act 17 Victoria, No. 4.

5. In response to newspaper and public protests, the government instructed its commissioners to collect the September fee only from those able to pay the fee from their gold field earnings. It later announced that the fee for September would not be collected.

6. In 1853 the government increased the claim size to 12 feet square.

7. See Umbeck (1981), Table 8.1. Wet claims average 105 feet square, gulch claims 139 feet square, and flat claims 451 feet square. Umbeck’s sample represents about 35 percent of the estimated placer (alluvial) districts formed in California between 1848 and 1866 (p. 103).

8. See Withers (1887), pp. 1-29.


13. Act 17 Victoria, No. 4, 1 December 1853.

14. In the long run migration would benefit the squatters by expanding the domestic market and reducing wages.
15. While larger claim sizes would lead to a larger initial rush of miners seeking to claim the increased scarcity rents from the larger claim, the number of individuals remaining on the field after the initial rush would probably be lower.

16. Feeny (1981) observes that institutional innovation is a costly activity that utilizes the existing stock of knowledge about institutions. Since the cost of fast innovating activity is likely to be high, it is unsurprising that government officials in Victoria, faced with the task of quickly devising and implementing new institutional arrangements for the gold fields, selected an institution from the existing stock of institutions.


19. A lead, or vein, of gold is a long, roughly continuous trail of gold deposits.


21. See Act 22 Victoria, No. 64, 17 December 1858.

22. The miner's right and the new system of gold fields management was instituted by Act 18 Victoria, No. 37, 12 June 1855. The export duty on gold was established by Act 18 Victoria, No. 27, 20 April 1855.

23. The 1855 Gold Fields Act was amended by Act 21 Victoria, No. 32, 24 November 1857.

24. Serle (1977, p. 179) noted while 100,000 people were on the gold fields, many were not engaged in mining and miners working for companies did not have to take out the miner's right.

25. Puddlers used a mechanized version of the California cradle. See the discussion below.


31. Local court legislation also covered a variety of additional topics such as "the manner in which the miner was formally to occupy and define the area of his claim...; the prevention of unlawful interference with claims; the requiring that a person who insisted upon a rights to a claim in possession of another, ..., should establish that right by legal process, and not, as was a common practice, by taking forcible possession of the claim, or, in goldfield phraseology, by "jumping" it; the modes of working so as to prevent collisions; the obligation to work so as to check the system of "shepherd ing," ...; the determination of what should be a ground of forfeiture of a claim; the conditions under which water was to be used for mining purposes; the special privileges to be granted to successful "prospectors" or discoverers of new goldfields; and the protection from injury or nuisance by mining to public or private property" (Brough Smyth, p. 386).


43. There were specified water allowances for puddlers. See *Acts of Parliament* (1862), Schedule 30, p. 132.


45. See Yu (1981) for a detailed analysis of prior contracting in innovation.

46. This analysis assumes that the workers do not develop skills that are specific to a particular mining company, i.e., that specific human capital is not an important factor in this labor market.


48. This section draws heavily on the material in Libecap (1989), ch. 3 and Umbeck (1981), chs. 7 & 8.

49. See Roumasset and La Croix (1988) for a discussion of the coevolution of property rights and political order.