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conflicts after 1936. I then assess the operation of the export product cartels, using merchant bars as an example. Special emphasis is placed on the developments of the domestic steel industries and how these affected the international arrangements.

The story that emerges from these findings is that the form of the international cooperation in each period was directly linked to both the nature of the product controlled and, more importantly, the environment and goals of the various national groups. In a classic article Don Patinkin concluded that "the successful cartel must follow a policy of continuous compromise."² I agree and would add "and innovation in structure."

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² Don Patinkin, "Multiple-Plant Firms, Cartels, and Imperfect Competition," *The Quarterly Journal of Economics*, 61 (Feb. 1947), p. 203.

The Fruits of Revolution: Property Rights, Litigation, and French Agriculture, 1700–1860

The French Revolution should be assessed not simply through a debate about its economic, social, or political causes, but through its economic consequences.¹ This dissertation attempts to evaluate the Revolution by examining the political economy of drainage and irrigation. The research suggests that institutional constraints inherent to the Old Regime were responsible for the lack of investment in agriculture prior to the French Revolution. Reforms, undertaken during the Revolution of 1789, were responsible for increased investment in drainage and irrigation after 1820.

Drainage and irrigation were two types of investment in agriculture that increased the productivity of land and extended the area under cultivation. Both were identified by Old Regime reformers as important means of achieving growth in agriculture. This research shows that transaction costs involved with improving land were very high during the Old Regime, but were substantially reduced after 1789. The dissertation is organized in three parts, each of which attempts to tackle the question of institutional obstacles to investment in agriculture from a different perspective.

The first part is an empirical study of drainage in Normandy from 1700 to 1860. Using archival data, I constructed hypothetical cost-benefit series for drainage projects that run from 1700 to 1860. These hypothetical cost-benefit series suggest that drainage would have been very profitable in the absence of transaction costs during the period from 1700 to 1789, yet no drainage occurred. Based on the records of failed eighteenth-century schemes, I argue that swollen transaction costs made it impossible to drain marshes. The problems of transaction costs lay in endless litigation over property rights and the inability of property-rights owners to write binding contracts.

The ownership of marshes was highly uncertain because it involved feudal property rights that had been poorly enforced for centuries. Marshes could belong either to lords or to villages. If lords were awarded property, drainage could proceed swiftly. If villages

¹ This dissertation was completed in 1988 in the Division of Humanities and Social Sciences of the California Institute of Technology under the supervision of Philip T. Hoffman. I hold great debts to Lance E. Davis and Louis L. Wilde for advice and criticism all along the way. This research was supported by travel grants from the California Institute of Technology, a John Randolph Haynes and Dora Haynes Fellowship, and a Sloan Foundation Dissertation Fellowship.

were awarded ownership, the marshes automatically became communal property. In the case of communal marshes, drainage required that the land be divided among the villagers, a task that proved too formidable for the Old Regime. In all cases, litigation was required to sort out property rights because the judiciary systematically invalidated private contracts that resolved the question of marsh ownership. Despite frequent royal promises to reform the judiciary, the state failed to reduce the transaction costs involved with drainage. As a result, the judiciary was neither able nor willing to allocate marshes between claimants. Because customary law was unclear on the issue of marshes and because judges made money from litigation, it was always possible to appeal a verdict. In the eighteenth century, resources were thus expended to redistribute property rights rather than to make improvements. The revolutionary reforms removed all cause for litigation and gave the state the authority to enforce contracts between landowners. As a result, most of the communal marshes in Normandy were drained from 1820 to 1850.

The second part of the dissertation examines irrigation supply in Provence from 1700 to 1860. As in the first part, quantitative evidence suggests that, in the absence of transaction costs, irrigation would have been very profitable in the eighteenth century. Despite the high profits irrigation could have earned, few of the projects that were promoted in the eighteenth century succeeded. The Old Regime's failure to develop irrigation is ascribed to the division of authority over eminent domain and water rights, as well as to the inability of developers to commit to announced prices for irrigation water. Eighteenth-century Provence was in fact a collection of highly autonomous areas. Many villages had enough authority to control the right of eminent domain in their territory. Thus they were able to hold irrigation projects up for ransom. Moreover, promoters of irrigation faced problems that were similar to those of drainage promoters in Normandy. The property rights to unused water were highly uncertain because the royal government had given exclusive rights to draw water from the same river to many different parties. Again the judiciary was incapable of resolving the ambiguities of overlapping titles to water. Therefore litigation frequently dragged on for several decades, to no avail. The revolutionary reforms centralized all authority over water rights and eminent domain in the hands of the national government. From 1820 to 1860 new canals irrigated more than five times as much land as the canals built during the last century of the Old Regime. As a result, the irrigated area in Provence nearly doubled. The research on Provence also points to the dramatic consequences of the decline in transaction costs as a result of the Revolution's reforms.

The third section makes use of game theory to explain how property rights to marsh land came to rest so frequently with villages. I analyze a theoretical model of litigation and settlement that includes burden of proof as a key variable. The model describes the interaction between a landowner and a developer who has rights to the property of the landowner. In order to use the property the developer must make a settlement offer to the landowner. The landowner can either accept the developer's offer or sue in court for higher compensation. If the landowner sues, both parties may search for evidence. The court decides the level of compensation based on the evidence that the developer and the landowner bring to court. This section shows that a sequential equilibrium generically exists. Modeling expenditure decisions endogenously allows an examination of the issues of burden of proof in litigation. I show that burden of proof has substantial impact on the probability of litigation and the magnitude of the settlement offer.

More importantly, the analysis illuminates two issues relevant to the drainage of marshes. First, burden-of-proof rules seem to have played a crucial role in the high frequency of successful litigation by villages. Second, marshes that were allocated to villages could not have been drained because it was impossible to arrive at a division of village marshland that the judiciary would enforce. Moreover, the judiciary made direct bargaining between villagers and developers impossible. Thus it was rational for

developers to attempt to have the rights of villages invalidated and for villages to sue. I then extend this model to examine the causes of the historical divergence of peasant property in Britain and France.

It thus seems that the French Revolution was a very important event in the economic history of France. Although the Bourbon monarchs had claimed absolute power, they never achieved the power of nineteenth-century governments. While the physiocrats and other Old Regime reformers had demanded institutional reform, they never achieved an efficient judiciary or better-defined property rights. The French Revolution did have high costs and featured significant amounts of redistribution, but it also involved institutional change. In the long run the Revolution's legacy may well be centralization of power and greatly simplified property rights.

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Labor Market Institutions and the Geographic Integration of Labor Markets in the Late Nineteenth-Century United States

The late nineteenth century is widely regarded as the era in which a national economy first emerged in the United States.¹ The elaboration of national rail and telegraph networks in the decades after the Civil War lowered the cost and increased the speed of transportation and communication. While manufacturers in many industries consolidated national markets for their products, a variety of new financial intermediaries promoted increasing arbitrage in the market for capital. My dissertation examines the extent of labor market integration at this time.

There are two complementary ways of approaching the question of labor market integration. First, integration may be explored qualitatively by examining the institutions through which labor market adjustment operated. Second, the correlation of wage movements across markets and the magnitude of geographic wage differentials can be used to provide quantitative indexes of the impact of the operation of these market institutions.

In contrast to the increasing specialization and centralization of intermediation in financial and product markets, labor market adjustment continued to rely primarily on informal, word-of-mouth communication channels provided by family and friends. Although the number of employment agencies and publicly sponsored labor exchanges operating in local markets increased considerably, they played only a minor role in directing long-distance movements of labor. These formal labor market intermediaries attracted a good deal of attention around the turn of the century, and published results of a number of contemporary studies make it possible to construct a clear picture of the extent and characteristics of their activities. It appears that most job-seekers were deterred from using employment agencies by the risks of opportunistic behavior to which they were exposed. As a result, employment agencies were important only in directing the first wave of long-distance migrants. Once an established industrial work force was in place, informal communication channels replaced formal intermediaries.

¹ This dissertation was completed in 1988 at the Economics Department of Stanford University under the supervision of Paul David and Gavin Wright.