



# Property in Land and Other Resources

EDITED BY DANIEL H. COLE  
AND ELINOR OSTROM



Foreword by Douglass C. North

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*Edited by*

Daniel H. Cole *and* Elinor Ostrom

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# Opportunities and Limits for the Evolution of Property Rights Institutions

THRÁINN EGGERTSSON

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The economics of property rights is concerned with explaining or predicting three types of social phenomena: (1) the allocation of resources within a particular framework of organization and property rights; (2) the logic of organization within a specific system of property rights; and (3) the emergence of a particular bundle of property rights.<sup>1</sup> In the 1960s, the assigned readings in economics courses dealt almost entirely with a subset of the first category: resource allocation in a well-defined market system, which sometimes suffered from impurities such as monopoly, spillovers, and business cycles. But already in the 1960s, two relatively minor changes within the rational-choice paradigm had sowed the seeds of a revolution that gradually pulled issues (2) and (3) into mainstream economic research: the extension of rational and strategic behavior into the political domain; and the formal recognition of information as a scarce resource (Alchian 1965; Buchanan and Tullock 1962). When information is scarce, search, measurement, and enforcement are costly activities, and it is important to know how various forms of organization and various bundles of property rights influence the costs of transacting.<sup>2</sup> The appearance of selfish maximizers in the political sphere spoils the traditional story of welfare economics about politicians whose goal is to maximize a social welfare function.<sup>3</sup>

The new institutionalism that emerged in the 1970s and 1980s relies not only on microeconomics extended in the direction of transaction costs and politics, but also on game theory.<sup>4</sup> The assumption of strict selfish rationality requires that all institutional arrangements be self-enforcing, and modern game theory provides

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<sup>1</sup> Eggertsson's (1990a) survey of new institutional economics is organized around these three types of questions or dependent variables.

<sup>2</sup> Williamson (1985) and Barzel (1989) pioneered the transaction-costs approach to the economics of organization.

<sup>3</sup> See Mueller (2003) for a survey of the public choice literature. Olson's (1965) classic *The Logic of Collective Action* created a path for later work on group behavior. The transaction-costs approach to politics, however, indicates that agency problems limit the power even of absolute rulers (North 1979).

<sup>4</sup> The new literature on institutions, or "the literature," refers to "new institutional economics" (NIE). For more information about NIE, see the Web page of the International Society for New Institutional Economics, <http://www.isnie.org>.



tools for modeling self-enforcement.<sup>5</sup> As late as 1990, the research questions, tools, and findings of the new institutionalists appeared exotic. Twenty years later, this approach has entered the mainstream of economics and political science, and the typical young researcher seeks progress (and promotion) by refining existing research tools and data rather than struggling with methodology.

This overview pays special attention to the origins and evolution of institutions. The literature offers three explanations of the emergence of institutions: they appear spontaneously; they arise through self-governance; or a high authority hands them down. Social norms, which grow in a decentralized, spontaneous manner, not unlike coral reefs in marine waters, are to a large extent independent of deliberate policy making. Self-governance is often found in small groups, such as clubs, parliaments, and local resource users who set their own rules. Finally, high authority, such as a legislature or a government bureau, may create institutions and impose them on the ruled. Although the three types of institutions vary in origin, they are closely related. New formal laws are often based on prior social norms; formal laws may lose their effectiveness if they conflict with strongly held norms; and public law usually circumscribes the scope of self-governance by small groups.

Institutional policy involves the design of rules and methods of enforcement (social mechanisms) that channel individual and aggregate behavior in some desired direction. Social mechanisms are complex systems, and, except for minor reforms, institutional policy is a knowledge-intensive activity. The new literature usually simplifies by assuming that the makers of institutional policy know how to reach their goals. However, effectively accounting for incomplete knowledge is the most important and difficult problem facing the economics of institutions.

To illustrate the problem of knowledge, let us compare the builders of institutions to the builders of bridges. Imagine that the designers of bridges of a specific kind already know (or know where to access) the relevant and effective engineering technology.<sup>6</sup> There is no disagreement among experts about the construction technology, and carefully built bridges function as planned. Here we have no reason to look for a knowledge problem. There is no need to explore how competition among alternative models of bridge technology sometimes results in collapsing bridges. Instead, scholars study other more relevant issues. An economist might examine, for instance, how the cost of supervising builders is related to the quality of bridges, or how changes in relative price lead designers to adjust their use of various building materials marginally. The same reasoning applies to the study of institutional policy. When all players know the appropriate effective social technology, social scientists can forget about the problem of knowledge and can focus entirely on other issues, especially the role of power and preferences in shaping institutional change.

In reality, institutional policy is often plagued by serious knowledge problems, and the policy process is driven by competition among (mental) models of design

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<sup>5</sup> See Greif (2006). The self-enforcement requirement arises because of the classic question: who monitors the monitors? In the literature on institutions, many scholars implicitly ignore the problem of self-enforcement by not modeling it.

<sup>6</sup> Note, however, that knowledge of bridge building is not a constant but changes over time, which is also true of knowledge of social mechanisms.

and social fit. Models of design involve such questions as the following: How do I design structures of incentives, planning methods, and enforcement mechanisms that produce my desired social outcome (regularity in social behavior)? And how do the planned institutions harmonize with existing structures of incentives, planning, and enforcement in the social system? Social fit models, on the other hand, focus on the compatibility of new social mechanisms with general social theories and worldviews, which are embodied in religion, ethics, political philosophy, legal systems, and cultural symbols. Design issues usually involve hypotheses that, in principle, are testable, but social fit theories are generally not testable.<sup>7</sup> Official policy makers are usually first movers in the game of public institutional policy, making the design decisions. Courts, public intellectuals, the media, various political and religious leaders, and the general public make the social fit decisions. The success of institutional policy initiatives depends on the distribution and nature of design and social fit models, as well as on the usual concerns of the new institutionalism, the distribution of power and material preferences.

The first part of this chapter examines how the assumptions that information is costly and that politics is rational yield useful tools for exploring the logic of institutions and the sources of institutional change. Six case studies of historical and modern institutions in Iceland present the various tools and techniques in action. Iceland's relatively simple and transparent institutions are ideal for identifying fundamental social regularities that have general application. The chapter's second part discusses new directions for the economics of institutions, in particular, competing mental models in the arenas of design (social technologies) and social fit. The confusing evolution of Iceland's fisheries regulations illustrates these issues.

## Opportunities and Limits for Reform: The Traditional Approach

The modified neoclassical approach to institutions has provided economics and politics with useful new tools and concepts for studying organization and institutions (Furubotn and Richter 2005; North 1990). It is helpful to look at several theoretical constructs, beginning at the top of the social pyramid and descending to the local level. Table 1.1 lists these theoretical constructs and links each of them to a particular topic in Iceland's economic history. The linkage between a construct and particular case, however, is an artifact or a rhetorical device because several tools and concepts are necessary to analyze each historical case.

### *Social Equilibriums and Limits to Reform: Why Iceland Starved*

Jagdish Bhagwati (1978) observed many years ago that the introduction of rational, selfish, and optimizing political actors creates a dilemma in the study of public policy. The design of top-down institutions is no longer a haphazard process where the authorities look to idealistic reformers, social scientists, or international aid agencies for advice on how to fix social dilemmas and reform inefficient

<sup>7</sup> Theories of the social fit of institutions are derived from beliefs in moral and other social principles that usually cannot be verified scientifically. Consider, for instance, moral beliefs forbidding the use of interest in financial transactions.



TABLE 1.1

## Testing the Economics of Institutions in Iceland

New Institutional Tool or Concept	Icelandic Topic
Social equilibriums and limits to reform	Starvation in Iceland
Shocks and institutional change	Modernization in the nineteenth century
Political logic of bad economics	Financial markets until the 1990s
Transaction costs and efficient organization	Historic mountain pastures
Spontaneous opposition to reform	Upholding the hay-sharing norm
Coase's theorem to the rescue	Property rights and Iceland's health records

arrangements.<sup>8</sup> Rather, current institutions embody the rulers' interests and power. Idealistic reforms come up against rock-solid social equilibriums, and only random exogenous events will upset the status quo.<sup>9</sup> In recent decades, the idea of a stable overall balance of interests has made economists rethink institutional reform, foreign aid, and historical and modern economic development (Easterly 2006).

In a study of economic decline in Iceland in the premodern period, Bhagwati's dilemma and the idea of social equilibrium can explain why Iceland starved (Eggertsson 1996; 2005). A particular question is why Icelanders did not develop a full-scale fishing industry until the nineteenth century. The fishing grounds around Iceland are among the richest in the world, whereas the country's farmland is of marginal quality. But in premodern times, fishing was strictly limited to small open rowboats that were staffed by farmworkers who usually returned to shore the same day and went fishing mostly in the winter season. From around 1400, the Icelandic fishing grounds attracted fleets from various European countries, and, theoretically, the Icelanders could have cooperated with some of these nations (for instance, the French, the English, the Spanish, and the Germans) to develop a strong export industry and transform their living conditions.

The solution to the puzzle proposed here rests on the notion of a two-tier social equilibrium that was held together by a domestic component and an external one. First, consider the local element. In historical times, a few wealthy owners possessed most of the country's farmland and rented it to poor tenant farmers, who typically employed even poorer farmworkers. The workers received only token compensation, in addition to food, clothing, and housing. A regulation from 1490 required all citizens to live on a farm, with the exception of a very small, restricted category of cottagers. In effect, social relationships in Iceland resembled serfdom, and tenants and farmworkers were trapped on the island.

The domestic equilibrium was fragile because a powerful landlord with a relative advantage in fishing and exporting had an incentive to defect from the coalition of landlords. A new fishing industry could easily attract necessary labor by offering a small margin on top of the rural subsistence pay. The landlords feared defections

<sup>8</sup> A useful role for economic advisers can be reestablished by making political leaders uncertain about how best to reach their goals.

<sup>9</sup> Unexpected and unwanted internal dynamics that undermine social systems also upset social equilibriums. A financial system that unexpectedly sets off wild speculative activities that end in general bankruptcies creates a policy vacuum, competition among mental models, and, possibly, opportunities for radical reform.

from the rural areas, believing that a full-time fishing industry would dramatically raise their labor costs.<sup>10</sup> The empirical evidence shows that landed interests tried to block expansion and modernization of the fisheries and even sought court orders to prevent introduction of new productive fishing gear. But the domestic element required a complementary foreign component to maintain the status quo.<sup>11</sup>

In the fifteenth and sixteenth centuries, when Iceland was a colony of Denmark, the island was overrun, first by English fishing and commercial interests and later by German fishers and merchants of the Hanseatic League. When the foreign incursions started, Denmark had not built a strong navy, and it never maintained a permanent military presence in Iceland. Instead, the Crown protected its interests in Iceland through cooperation with the powerful landowners.<sup>12</sup> Once the newly built Danish navy had driven English and German interests out of the country, the Danish Crown developed a strategy to solve its Iceland problem that would yield satisfactory benefits at low cost. Its solution included the following elements:

1. Isolate the island and establish an off-limits cordon of the ocean around it. Forbid all contacts between Icelanders and foreigners from outside the Kingdom, including all visits to the country and all forms of trade.
2. Establish a Danish trade monopoly that buys farm products and fish from the Icelanders and sells them essential imports, such as grain. Trade takes place in the summer; the monopoly traders are not allowed to winter in Iceland; the relative price of fish is kept artificially low.
3. Further strengthen the Danish navy.

The Danish trade monopoly lasted from 1602 to 1787. The Icelandic population nearly perished in a series of famines, the country's capital stock deteriorated, productivity declined, and in the eighteenth century, the mean stature of the population fell by an estimated five centimeters. Cooling temperatures, volcanic eruptions, and epidemics overwhelmed the primitive farming economy, but the social equilibrium was reform proof.

### *Shocks and Institutional Change: Impetus for Modernization in the Nineteenth Century*

The *How the West Grew Rich* literature is probably the best-known strand of the new institutional economics, which should not come as a surprise.<sup>13</sup> Few, if any, topics in social science are of greater general interest than the origins of modern economic growth. In their accounts, the various scholars generally use exogenous events and conditions to explain critical turning points in the economic history of Europe—various impulses that upset the social equilibriums. The literature has few direct policy

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<sup>10</sup> A robust fishing industry would have stimulated demand for farm outputs and would have increased prices. The analysis here assumes that the landlords were not able to formulate and test their hypothesis with the help of a global model (general equilibrium analysis) of supply and demand.

<sup>11</sup> See Eggertsson (1996; 2005) for references relevant to this subsection.

<sup>12</sup> The Icelandic fisheries did not attract the fishing fleets of the Danish kingdom, which had access to abundant fishing grounds nearer home.

<sup>13</sup> The title is that of a book by Rosenberg and Birdzell (1986). The topic has generated a thriving cottage industry. See North and Thomas (1973) for an early contribution.

implications for the poor countries of the world, except that they will remain stuck in a poverty trap until the right kinds of exogenous shocks release them.

The account of the origins of modern growth in Iceland falls squarely in the category of exogenous shocks (Eggertsson 1996; 2005). External events crushed the Danish element of the pernicious social equilibrium, and the local component was too weak to restrain public disobedience and control free riding. The external events that upset the equilibrium included the destruction of the Danish navy in 1807 during the Napoleonic Wars and the rise of British domination in the North Atlantic. Also, in the late eighteenth century and in the nineteenth century, some of Europe's leading powers adopted the free-trade model (an exogenous ideological impulse). When Denmark was at war, Iceland was virtually on its own, and later, in 1855, a much-weakened Denmark gave Iceland the right of free trade with all countries, which was the last step in a series of trade-liberalization measures.

In Iceland the landlords did not respond to the exogenous move of free trade by lifting domestic constraints on the labor force; on the contrary (and not surprisingly), they tried to tighten those constraints. Throughout the long process of liberalization, landed interests fought to control labor mobility and prevent the emergence of an independent fishing industry. The Crown abolished the Danish trade monopoly in 1787 and opened trade with Iceland to all subjects in the kingdom. Already in 1781 Iceland's landed interests had responded to Danish attempts to modernize the Icelandic fisheries and liberalize the local economy by introducing internal passports for people crossing county boundaries, and two years later they withdrew the occupational licenses of the very small, confined, but potentially dangerous group of independent workers. The ban against cottagers remained in effect. But the historical evidence clearly shows that with the external element gone, the devastating historical equilibrium broke down. Iceland modernized with the traditional formal domestic institutional framework still in place. Workers ignored formal restrictions on labor mobility and drifted into urban areas. Historians frequently date the advent in Iceland of a modern fishing industry around 1870, but the Althingi (Iceland's parliament) formally removed labor bondage in 1894 and restrictions on cottagers only in 1907.

### *Political Logic of Bad Economics: Financial Markets Until the 1990s*

In an empirical study of endogenous ideology, Chai (1998) finds that leaders in former colonies, in the first decades of their independence, attempt homegrown economic policies to differentiate themselves from their former masters. These rulers embrace what Chai calls "opposition ideology" (1998, 263).<sup>14</sup> The leaders of third world countries with no colonial history usually lack these tendencies. In the modern era, Iceland has had close relations with the other Nordic countries; the country's institutions are, to large degree, copies of the Scandinavian system. But there are important differences because Iceland's governments have embraced opposition ideology. For example, consider the country's financial system.

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<sup>14</sup> In terms used later in this chapter, Chai (1998) attempts to make endogenous a particular class of models of design and fit. Chai supports his theoretical claim concerning "opposition ideologies" with reference to well-known psychological processes.

In the decades after World War II, when the Scandinavian countries (and the countries of western Europe) gradually liberalized their financial systems, Iceland set up mechanisms of financial governance that more closely resembled the rules in use in Colombia than in western Europe. According to the well-known terminology of McKinnon (1981), and McKinnon and Mathieson (1981), financial repression can involve any of five ascending stages. A study of Iceland's post-World War II financial system found that it belonged to the fifth and highest stage in the 1970s (Eggertsson 1990b).<sup>15</sup> The perverse features of the system included a large inflation tax on currency and bank deposits, a requirement that commercial banks keep very large reserves (unprotected against inflation) in the central bank, the suppression of nonbank financial institutions, low ceilings on interest rates, and rationing of bank credit by the state.

In Iceland from the 1960s to the late 1980s, the only available financial instruments were bank deposits that yielded negative real interest rates, often in the double digits. There was no market in the country for bonds and stocks. The entire financial system was politicized, not obliquely but formally. All financial organizations had three directors who represented (and were selected by) the country's three largest political parties. Commercial banks were owned by the state, as were investment credit funds, which were financed through forced loans from the country's commercial banks and pension funds.<sup>16</sup> A political selection mechanism guided the granting of loans, both for commercial credit and long-term investment. The system favored borrowers with strong political connections, who usually dealt directly with financial managers who represented their political parties. The flow of credit also reflected the electoral overrepresentation of rural districts.

In the early 1970s, it was an odd experience to find a Colombian financial system in a Nordic country, one that violated nearly all the principles of good governance that textbooks had extolled. But the system met the needs of the political parties, which snoozed in a comfortable equilibrium and had no plans for a major overhaul of the system. The structure of the financial organizations was bad economics, but good politics. The financial institutions served the political parties well because regardless of whether they were in or out of power, they had secure property rights to one of the three managing positions in all financial organizations and control over the flow of credit. In the business community, major clients of the political parties were well supplied with loans that carried negative real interest rates.

McKinnon (1981) argues that the highest stage of financial repression is not sustainable in the long run, but lower stages of financial repression are more durable, and the experience in Iceland confirms this.<sup>17</sup> But the shock that compelled Iceland

<sup>15</sup> McKinnon (1981) uses the financial system of Colombia in 1972 to illustrate the institutional structure that characterizes the fifth and highest stage of financial repression.

<sup>16</sup> Special-interest groups, however, controlled a few investment credit funds. Eventually, the government decided to reduce pressure by tolerating small private banks that were associated with commercial and manufacturing interests that were dissatisfied with the services provided by the state banks. From 1975 to 1985, the private banks were allowed a share of about 20 percent of total commercial banking, and until 1984, they were not permitted to deal in foreign currency.

<sup>17</sup> According to McKinnon (1981), the highest state of financial repression is unsustainable because spontaneous internal dynamics undermine the system. Eventually, highly negative real interest rates will shrink real bank deposits and make the credit system unworkable. In Iceland, during the 1960s and 1970s, the public's avoidance of bank deposits effectively cut the banking system's holdings in half, as measured by the ratio of bank deposits to gross domestic product. The authorities responded to the ensuing credit crises with partial reforms, such as indexation of financial obligations, which lowered the stage of financial repression.

to introduce market-based financial organizations came from abroad. Iceland is not a member of the European Union (EU), which is the country's largest export market. Toward the end of the twentieth century, in order to maintain access to the EU's internal market, Iceland made an agreement with the EU to adopt virtually all regulations related to the EU's single market, including the European financial rules in use.<sup>18</sup> The old financial system thus came to an end, but it had two important long-term consequences. It preserved the country's post-World War II industrial structure, blocking modernization by providing credit primarily to traditional political supporters and industries. Second, at the time of the changeover to a market-based and open financial system, there were virtually no bankers and regulators in Iceland with substantial experience in international finance. The lack of experience and knowledge was an important factor contributing to the collapse of the country's financial system in 2008 (Eggertsson and Herbertsson 2009).

*The Logic of Organization and Transaction Costs:  
The Historic Mountain Pastures*

The structure of top-down institutions often seems illogical when the criterion of joint wealth maximization is used, but it makes better sense when it is evaluated in terms of the interests of the rule makers (the high authority). Private interests and social efficiency often overlap when small groups set their own rules. Self-governing groups often have detailed knowledge of relevant issues and receive feedback from their trials relatively rapidly, which encourages experimentation and trial by error. Elinor Ostrom's book *Governing the Commons* (1990) is the classic reference. Williamson's book *The Economic Institutions of Capitalism* (1985) also brims with examples of efficient solutions for economic governance.

Inspired by Ostrom (1990), Eggertsson (1992) studied the effectiveness of self-governance in Iceland's historical mountain pastures, which local farm communities have managed for more than a thousand years. The pastures are used for individually owned flocks of sheep (and sometimes horses), which graze the pastures unattended during the summer months.<sup>19</sup> The article examines whether the institutional arrangements (property rights) governing the pastures involve obvious unnecessary costs. Specifically, it uses an informal model borrowed from Field (1989) to analyze whether the pasture arrangements minimize the sum of three types of costs: regular production costs (transformation costs) and two types of transaction costs, the cost of exclusion and the cost of (internal) governance in the pastures. Exclusion costs arise when insiders invest in keeping outsiders from using a resource; governance costs arise from attempts to enforce cooperation and to make the insiders

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<sup>18</sup> Iceland protected its European export market by joining the European Economic Area (EEA), which was established in 1994. EEA membership allows Iceland, as well as Liechtenstein and Norway, to participate in the EU's single market without conventional EU membership, provided the countries adopt all EU regulations related to the single market except those in fisheries and agriculture. Financial reform, therefore, was one of the conditions of access to European markets. Before the EU shock, those who preached fundamental financial reforms had little or no influence.

<sup>19</sup> Farms in Iceland usually are scattered through low-lying coastal areas. Huge mountain pastures belong to the farmers in each region.

maintain the resource and avoid overusing it. One implication of models that allow for exclusion and governance costs is that in some circumstances, communal ownership (rather than individual ownership) is the most efficient property rights arrangement.

Throughout most of Iceland's history, surprisingly sophisticated institutional arrangements protected the mountain pastures from overuse (Eggertsson 1992). The relative costs of enforcement and governance easily justify the communal nature of the pastures. Various ancient institutional arrangements lowered the cost of coordination among the insiders, took advantage of scale economies in monitoring, and limited spillover effects. It is surprising to learn that the communal system employed the price mechanism and relied on marginal analysis. The grazing quotas of each farmer were tradable, and the law recommended marginal analysis for estimating the total grazing capacity of the commons. Grágás, the law book of the Icelandic Commonwealth from 930–1262, establishes the following method for estimating total capacity: "Let them find the number [of grazing sheep] that does not give fatter sheep if reduced but also fills the pasture" (Eggertsson 1992, 433).

### *Spontaneous Opposition to Reform: Defending the Hay-Sharing Norm*

In the new literature on institutions, reform failure is usually explained in terms of organized opposition by political groups and special interests or by spontaneous, norm-based opposition. Scholars tend to see social norms as slow-moving institutions that usually are beyond the reach of the makers of public policy (Roland 2004). The life cycle of social norms is poorly understood, and the phenomenon does not lend itself well to rational-choice analysis. Some of these truths can be found in a study of ancient hay-sharing practices in Icelandic farming and the failure of public policy makers to override the norm of sharing by public rules (Eggertsson 1998).

The following two statements about the traditional Icelandic farm economy are not in dispute. First, farmers did not practice systematic livestock management. They did not trim their stocks and store fodder (hay) in anticipation of exceptionally hard and long winters, which sometimes came two or more in a row. Instead, farmers took their chances. Second, as late as the early twentieth century, when the climate was harsh, a substantial part of the country's livestock starved to death. Eggertsson's study (1998) relates the farmers' high-risk strategy to uncertain individual property rights in hay and interprets the uncertain rights as side effects of the farm community's ancient social welfare system.

In historical Iceland, the farm community pooled specialized risks in each district (*hreppur*) by making farm households collectively responsible for helping members who were stricken by misfortune, such as fires, flooding, avalanches, or deaths of heads of households. When misfortune struck and support from wider family and kin was unavailable, either the stricken household received material help from the district, or its members were dispersed and placed with other farms. Ancient laws and social norms also required that farmers, when asked, always share their animal fodder (hay)



with their neighbors.<sup>20</sup> Because a prudent farmer who tried to protect himself against random climatic downswings by storing extra supplies of hay would have his stores depleted by neighbors in a hard winter, it is not surprising that farmers typically did not prepare for such winters.

Given the difficult environment and the country's primitive technology, Iceland's traditional welfare system was relatively effective except when risks were general and affected whole regions or the whole country (Eggertsson 1998). In analyzing the system, one can speculate that psychological principles may have made it impossible to exempt the sharing of hay from the general principle of supporting needy neighbors. There are, of course, various counterarguments to this thesis. Perhaps practical factors ruled out large-scale storage of hay, or the most efficient strategy available to farmers was indeed the high-risk strategy of maximizing the size of livestock in each period and not storing emergency hay reserves. But, no matter whether the high-risk strategy was inefficient or efficient, hay sharing is a striking example of a slow-moving informal institution that was utterly resistant to reform.

The episodic mass starvation of farm animals had for centuries appalled the authorities in Iceland and Denmark, who saw the hay-sharing solution and the high-risk strategy as dangerously inefficient.<sup>21</sup> However, all their reforms failed. For more than 150 years, royal Danish decrees, legislation by the Althingi, and informal campaigns by private reformers had no effect. In 1806, for instance, the Danish Crown abolished by decree a hay-sharing law from 1281 that called for serious punishments of farmers who refused to share their fodder with neighbors.<sup>22</sup> The Danish decree had no influence on the farmers. The Icelanders were given home rule in 1874. In the next few years, the Althingi passed a series of laws aimed at dismantling the farmers' high-risk strategy, gradually raising the punishment for offenders. A law from 1889 even called for the imprisonment of farmers who starved their animals. But all these efforts were in vain. The farm community ignored the new laws, and the local authorities made no effort to enforce them. Mass starvation of farm animals continued intermittently into the early years of the twentieth century.<sup>23</sup> The phenomenon disappeared only when the national government organized a centralized system of relief, more or less at taxpayers' expense, and welfare-state social services and commercial insurance replaced the communal system of sharing as the main method of coping with specialized risks. In other words, the hay-sharing norm did not disappear until a fundamentally new social system (and new production and transportation technologies) had made the ancient hay-sharing norm irrelevant.

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<sup>20</sup> Farmers could charge only a trivial or token price for their hay. The community forgave nonpayment or even theft of hay, but attempts to steal sheep would ruin reputations.

<sup>21</sup> Indeed, the storage problem spans the entire economic history of Iceland. It even helped give the country its name. The sagas record that Raven-Flóki, one of the first Norsemen to settle in Iceland (probably in the ninth century), neglected to make hay for his animals, which perished during his first winter in the country. Flóki then renamed the new country "Iceland" and returned to Norway.

<sup>22</sup> No records of court verdicts based on the hay-sharing law of 1281 have been found, but there is abundant evidence that the farm community informally enforced the norm of hay sharing.

<sup>23</sup> A cold spell in 1800 reduced the sheep population by three-fifths, or 171,000 animals. In the cold spell of 1881 to 1883, the loss was 187,000 sheep, and for the period 1881 to 1908, the loss of grown sheep, lambs, and horses and the reduction in quality of survivors was equivalent to 884,000 sheep, or an average of about 13 sheep for each person in the farm community (Eggertsson 1998, 18–19). Note that horses are counted as sheep in calculating this figure.

*Coase to the Rescue: Property Rights  
and Iceland's Health Records*

In the complex interactions among property rights and science and technology, three basic relationships can be discerned. First, advanced technology is a necessary condition for operating advanced forms of social organization and property rights, and, conversely, primitive physical technology can support only primitive social organization (Posner 1980). The causal link between the sophistication of property rights and the level of technology runs primarily through the dependence of methods of enforcement (communication, measurement, monitoring, and sanctioning) on physical technology. The second relationship between property rights and natural science concerns the important role of social organization in stimulating both scientific discovery and the application of science to practical uses. The third relationship arises because efficient use of new technology calls for complex adjustments in property rights. In fact, in modern high-income countries, the two key developments that create pressure for major adjustments in property rights are new technology and increasing scarcity of environmental resources. In recent decades, biotechnology, digitalization of data, the Internet, and new communication and computing technologies have altered the effectiveness of existing property rights and stimulated plans for various reforms.

New technology often raises the expected value of a resource that previously was in little demand and subject to uncertain ownership rights.<sup>24</sup> Unexpected increases in the value of resources can trigger ownership races among competing groups and sometimes among previous informal or de facto owners and new interests. Demsetz's (1967) well-known theory of property rights recognizes how rising values create demand for exclusive rights, but his theory does not consider how the new rights are supplied.

A recent study (Eggertsson 2011) examines the evolution since the mid-1990s of property rights to the records of Iceland's national health system. The curious case of the country's health records has several interesting features: The rule maker, the state, passes a new law that formally removes the informal ownership rights of the de facto owner (Iceland's medical research establishment) and gives a new right holder, a U.S.-registered biogenetics corporation, formal control rights of the health records. The informal owners, now formally the designated duty bearers, rebel. The state gives in and does not enforce the new law. The final act in the drama involves bargaining, whereby the de facto owners voluntarily transfer (sell) their informal property rights to the corporation.

The population of Iceland is about 300,000. The local medical research community is more sophisticated and better connected internationally than the size of the nation suggests. Local medical specialists are mostly educated at major foreign universities, especially in the United States, Sweden, and the United Kingdom. Iceland has had a unified health system since 1915, and comprehensive national health records are dispersed across the various health and research organizations. Icelanders

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<sup>24</sup> Investment in the definition and enforcement of exclusive property rights is a costly activity that is not worthwhile for resources that have very low expected value (Demsetz 1967; Libecap 1989).

also possess unique genealogical records for almost the whole nation that span 300 to 400 years. In some instances, the records go back to the High Middle Ages. Finally, Icelanders have a relatively homogeneous genetic structure.<sup>25</sup>

The corporation Decode Genetics, which was registered in Delaware and mostly financed by international venture capital, was the brainchild of an Icelander, Kári Stefánsson, who in the mid-1990s served as a professor at Harvard Medical School. In the first years of the twenty-first century, Decode Genetics became a world leader in discovering relationships between genetic structures and major diseases.

The business model that inspired Decode Genetics rested on the belief that the Icelandic data were of unique value in hunting for the genetic roots of major diseases and finding their cures. The project drew international attention, and the media and scientific journals regularly reported the firm's latest discoveries.<sup>26</sup> In 1998 Decode Genetics persuaded the Icelandic government to pass a law that authorized a licensee to build a central electronic database containing the country's health records (health sector database, or HSD). As planned, Decode Genetics became the licensee. Scientists who did not work for the corporation would be allowed to use the HSD provided their projects did not conflict directly with those of the firm. The de facto owner of the health records, the local medical establishment, responded furiously: an international corporation was planning to make startling profits by using "its" health records.

According to the 1998 HSD Act, the country's health sector workers, in cooperation with Decode Genetics, were expected to transfer their data into the central database, but they rebelled and refused to cooperate. The refusals were usually oblique. Questions were raised about both procedures and techniques for encrypting the data (the law had required encryption). The Ministry of Health hesitated and decided not to quell the rebellion: An outright confrontation with the country's health workers was not attractive, and the use of compulsion to classify, encrypt, and transfer data from the health records to the HSD was unfeasible because the opportunities for sabotage were innumerable.

The designated duty bearers were successful; a central databank has not been set up. Decode Genetics responded to the failure of the HSD by switching to a decentralized strategy that involved the following steps. For each of its disease projects, the firm identified the de facto owners (medical specialists) of the relevant health records and, in step with Coase theorem, offered the owners a deal.<sup>27</sup> Decode Genetics would acquire the right to use the medical records in return for payments in cash and even in kind. Qualified de facto owners sometimes participated directly

<sup>25</sup> Historians claim that Iceland was settled by Nordic and Celtic groups in only a few decades around 900. Until the twentieth century, there was apparently only trivial migration into and out of the country. Almost all Icelanders are related if one goes back some six to eight generations.

<sup>26</sup> For instance, a search of the archives of the *New York Times* shows that the newspaper saw Decode Genetics as a world leader in its field and sometimes made the firm's discoveries front-page news.

<sup>27</sup> Coase's theorem states that the ultimate allocation of property rights is independent of their initial allocation, provided that the rights are clearly specified and the cost of transacting is zero (or negligible). According to the theorem, property rights will find their highest valued uses. In an unending debate, many theorists have argued that the validity of Coase's theorem depends on several strict assumptions that prevent its applicability to any real-world situation (Hahnel and Sheeran 2009). The use of the concept in the context here is more casual: when transaction costs are positive but relatively low, property rights are often transferred from low- to high-value uses. Coase (1959) uses a similar casual approach in discussing the allocation of radio frequencies among broadcasters in his article on the Federal Communications Commission.

in the projects and coauthored the resulting scientific papers. Decode Genetics declared bankruptcy in 2009. The bankruptcy was not caused by the failure of the database project, but by unexpected lags and high costs in the firm's drug development projects. New uncertainty about the genetic causes of disease has also emerged.

## The Saga of Individual Transferable Quotas

### *Uncertainty and Model Competition: Design and Fit*

Although the case studies discussed here have a narrow geographic focus, they employ the standard methodology of new institutional economics: microeconomics and game theory applied to both economics and politics, costly information, transaction costs, and social equilibriums. Has the paradigm reached an end point, and, if not, where is the new institutionalism heading? Many scholars are pleased to work within the current theoretical framework, but some exploration still continues, primarily on three margins that involve experimental game theory, behavioral economics, and the mental-models approach.<sup>28</sup> The following discussion is limited to the mental-models approach and its relation to uncertainty (Denzau and North 1994; North 2005). The basic idea is simple: In an uncertain world (one of incomplete knowledge), people rely on models and theories to make choices. The models are often incomplete or outright misleading, and not everyone uses the same model. After a general discussion of uncertainty and mental models, this argument will be illustrated with an Icelandic case study.

Uncertainty is a problem child in the family of modern economics. Economists usually try to avoid uncertainty by dressing it up in the clothes of its stepsister, risk (Hirshleifer and Riley 1992). They do this by assuming that decision makers accurately know all the elements in their choice sets, either with certainty or as empirical or subjective probabilities. The actors then choose among the various alternatives on the basis of their expected utility. The quality of their decisions depends on how accurately the relevant probabilities are known. The expected-utility approach does not recognize that in situations of deep uncertainty, the elements in the choice set are unknown. Consider an example from natural science: the discovery in the second half of the nineteenth century of the germ theory of disease, that is, the discovery of the relationship between bacteria and disease (Waller 2003). It is possible, of course, to say that in prior historical periods, people assigned zero probability to the bacteria-disease relationship, but that is a trivial statement about the behavior of people who cannot observe bacteria, do not know that bacteria exist, and, therefore, cannot imagine a relationship between bacteria and disease.

In the late nineteenth century, the germ theory of disease created a new paradigm, as well as corresponding programs of medical research and practice. For a short period, the germ theory competed with other paradigms, but efficient methods of measurement and testing, as well as relatively unambiguous feedback, created rapid support for the new theory. The convergence of mental models on a new paradigm,

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<sup>28</sup> Only approaches that belong to some form of methodological individualism are considered here.

however, does not necessarily imply convergence on corresponding programs. For instance, there is room for disagreement on how to deal with bacterial infection, but now risk has (at least partly) replaced uncertainty. Empirical or subjective probabilities can be associated with specific methods to prevent bacterial infection.

Uncertainty and incomplete mental models affect institutional policy at two levels: (1) decisions concerning design and; (2) decisions concerning (social) fit. First, consider the design decision. An authority that seeks to change social behavior in a specific direction must design appropriate rules and methods of enforcement. The authority first formulates the problem in terms of its chosen paradigm and then selects an appropriate program (social technology) for creating the new social mechanism. Disagreements over how to proceed with institutional design involve both paradigms and programs. Note that an instrument-outcome relationship indicated by one paradigm may not exist in another paradigm.

Now consider decisions about the fit of new institutions. New social mechanisms (institutions) become part of a larger social system, which raises the question of how they fit the overall system according to general social theories that are prevalent in the community.<sup>29</sup> General social theories are made up of formal and informal beliefs concerning the social and natural order and the meaning of life—worldviews that are based on ideas about science, historical myths, legal theories, ethics, political philosophy, and religion. Actors apply general social theories when they evaluate the legitimacy of new institutions, that is, how the institutions fit in their worlds. In making its design decisions, a rational authority must also consider how the planned institutions will fit with prevailing general social theories and beliefs. Experts, such as lawyers, measure the fit of new social institutions in terms of theories rooted in sophisticated paradigms. Nonexperts usually frame the issues in terms of cultural symbols and informal beliefs.

Successful institutional policy requires that the policy authority correctly anticipate and overcome opposition based on (1) general disbelief about the operational quality of the design program; (2) material interests of prospective right holders and duty bearers; and (3) unfavorable interpretations by various parties of the social fit of the new institutions. As table 1.2 shows, the knowledge problem of successfully carrying through major structural changes in the social system is huge: the authority must design new mechanisms that in principle produce the desired results, and it must correctly anticipate the nature and strength of the opposition. The policy process usually involves campaigns where various groups promote their own models and criticize the models or beliefs of others. The outcome of such campaigns can make or mar planned institutional reform.

In economics and politics, the theory of interest groups has developed the useful concept of “rational ignorance” (Downs 1957, 139). Politicians and organized lobby groups often feed false data to the general voter, but the stakes for the average voter are too low to make it worthwhile for the voter to invest in finding the appropriate information (and to take action). The voters decide to be rationally ignorant. The

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<sup>29</sup> A new social mechanism (a new institution) must also fit operationally with the system into which it is introduced. For instance, in designing housing regulations, changes on one margin can have repercussions throughout the system. Operational considerations are classified as design issues.

TABLE 1.2

## Four Ways for Institutional Policy to Fail

Policy Authority Basic Design Failure	Right Holders and Duty Bearers		
	Source of Opposition		
Unworkable institutional design, even when there is no opposition	Material interests hurt by the new institution	Beliefs that the institutional design is operationally unworkable	Beliefs that the new institution is illegitimate because it does not fit general social theories

facts in question usually are easily measurable and known to the politicians and the lobbyists. Empirical work on interest groups has conclusively demonstrated that politicians and lobby groups frequently lie to voters, and voters remain rationally ignorant or fail to mobilize (Mueller 2003). But in situations of deep uncertainty, the story is more complicated. General social theories (of religion, law, ethics, or political philosophy) often involve beliefs or hypotheses that cannot be tested. Design programs aimed at substantially changing the structure of social systems typically generate noisy feedback, in part because in social experiments, other things usually are not equal. In social science, experts strongly disagree and, as is well known, have not converged on common paradigms and programs. An Icelandic case, the saga of the individual transferable quotas, illustrates some of these ideas.

### *Regulating Iceland's Fisheries*

Social equilibriums, exogenous impulses, transaction costs, and Coasean bargaining are all essential tools for analyzing institutional change in Iceland's fisheries during the past 50 years. But there is more to the story. Ignoring the fierce competition among models of fit and design results in a saga with the plot missing.

Iceland depends on ocean fisheries to a greater extent than any other high-income country. In recent years, the fishing industry has accounted for about 30 to 40 percent of the country's exports.<sup>30</sup> In the twentieth century, property rights arrangements in the fisheries around Iceland went from essentially open access to a two-hundred-mile economic zone in 1975. Excessive harvesting by domestic and international fleets, which was already a serious issue before World War II, became a major problem in the first decades after the war.<sup>31</sup> The task of regulating Iceland's fisheries became heavier as the problem of overfishing grew larger and the country's fisheries jurisdiction expanded.

Initially, the Icelandic government relied on various methods of direct control to regulate the fisheries: aggregate quotas, which ignited races to be first; access licenses; fishing effort restrictions; investment controls; and vessel buyback programs.

<sup>30</sup> The direct share of the industry in gross domestic product (GDP) is 6 to 10 percent, but economists have estimated that the direct and indirect contribution of the fisheries to GDP is around 25 percent. The country's fishing fleet consists of about 1,300 vessels, of which 700 small vessels are of less than 15 register tons (Agnarsson and Arnason 2007). One register ton is equivalent to 100 cubic feet of cargo space.

<sup>31</sup> Paradoxically, World War II brought some peace to the fishing grounds.



In the mid-1970s the authorities began experimenting with individual nontransferable vessel quotas for specific species (initially, herring). In each instance, the quotas were eventually made transferable. These experiments culminated in a law of 1990 that set up a comprehensive system of individual transferable quotas (ITQs) for virtually all species in Iceland's fisheries (Arnason 1993; Fisheries and Agriculture Ministry, Iceland 2006). The reforms are consistent with the theory that major reforms usually are associated with severe unanticipated shocks, including unexpected institutional design failures. The startling collapse of the herring fisheries in the late 1960s, which threw the Icelandic economy into a depression, initiated the reform process. The subsequent expansion of ITQs to other species was propelled by unexpected reductions in their catches and dire warnings from marine biologists about the precarious state of valuable fish stocks, such as cod.

### *Model Competition: The Question of Design*

An authority preparing to create a structure of rights to govern a valuable resource searches its social (and natural) science paradigms for a suitable program. At the most general level, social science paradigms can be divided into two categories that dominate economic history (Eggertsson 2005). These can be called the microparadigm and the macroparadigm. Put simply, the macroparadigm emphasizes spillover effects, the importance of seeing the whole picture, and central control. It deemphasizes the cost of information, agency problems, and the role of perverse incentives. The microparadigm focuses on the alignment of individual incentives with social goals, self-enforcing mechanisms, and monitoring costs. It deemphasizes spillover effects, the capacity to see the whole picture and manage it from the center, and systemic instability.<sup>32</sup>

After World War I, the policy orientation in the Western world drifted away from decentralization toward the macroparadigm. In the twentieth century's last quarter, policy makers returned to the microparadigm. The world financial crisis of 2008 may possibly have created another turning point toward the macroperspective. Although the paradigms toss and turn, the macromodel has, for some reason, kept a relatively strong and lasting hold over fisheries regulations. The EU, for example, has relied primarily on the macroparadigm to select its fisheries programs. Hannesson (2005), examining the perch fisheries of Soviet Estonia, concludes that the typical Western system of fisheries regulations is similar to the methods used by the Soviet Union in Estonia until the 1991 breakdown. The relatively new management system of ITQs, first introduced on a national scale in Iceland and New Zealand, is an attempt to apply programs based on the microparadigm to the regulation of fisheries (Yandle 2003).<sup>33</sup>

In the world's ocean fisheries, increasing demand and advances in fisheries technologies and in communications and transportation have in recent decades magnified

<sup>32</sup> The microparadigm deemphasizes externality problems (spillover effects) by assuming that low-level units are able to negotiate solutions to externality or scale problems with parallel and higher social units.

<sup>33</sup> In the former Soviet Union, the state dealt with the problem of enforcing fisheries regulations by directly taking over the industry and running it as a large firm. The Soviet planners faced countless agency problems and high production costs, but the system apparently removed at least some of the fishers' incentives to enrich themselves through overfishing (Hannesson 2005).

the problem of overfishing (FAO 2009). The prevailing view is that if government fisheries regulations throughout the world are evaluated by the criterion of efficiency, most of them have failed. One possible explanation of this general failure is that in most countries, especially high-income ones, fisheries are a relatively minor industry, and an efficient fisheries policy is not a major economic concern. In Iceland, on the other hand, self-preservation should (in theory) compel a rational government to give highest priority to sustainability and efficiency in the fisheries and, in case of conflicts, second place to narrow special interests.

In Iceland in the 1980s, a great many observers believed that the previous macro-oriented regulatory programs in the fisheries had failed and initially welcomed the new ITQ design. But early in the 1990s, a rowdy debate (which still continues) flared up over design issues and, especially, the social fit (legitimacy) of the new regulatory mechanism. This subsection looks at the conflict over design questions. The following subsection examines the social fit issues.

Critics of the ITQ design argue that it is counterproductive. Three points of criticism are probably most common: (1) the ITQ system is an ineffective tool for restoring and sustaining fish stocks; (2) the system is an ineffective method for increasing economic efficiency in the fisheries; and (3) windfall gains from the original free ITQs have contaminated the country's financial system. The following discussion does not attempt to evaluate the veracity of these charges. Instead, it outlines why the available empirical evidence has not produced clear-cut answers and silenced the debate.<sup>34</sup>

Consider the first point, the restoration of fish stocks. The development of fish stocks in Icelandic waters since the late 1980s has varied by species: some stocks have prospered, while other stocks have declined. Critics emphasize that the valuable cod stock has shrunk steadily, eventually to less than half its former size, but in 2010 a strong recovery was apparently under way.<sup>35</sup> In essence, the aggregate data on fish stocks are not conclusive enough to silence supporters or critics. Two theoretical considerations further confuse the debate. First, fish stocks in the oceans depend on many factors other than the catch. Understanding of marine biological conditions is limited, and scientists cannot always accurately predict the evolution of fish stocks. Second, in virtually all known regulatory systems for fisheries, the regulator (the government) selects the total allowed catch for each species. To evaluate the impact of management systems on fish stocks, it is necessary to correctly establish the relationship between the government's choice of the total allowed catch, the resulting total catch, and the nature of the regulatory system.<sup>36</sup> But little is known about the subtle impact of management systems on the behavior of politicians, administrators, and fishers (Eagle and Thompson 2003). The answer is likely to depend on

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<sup>34</sup> There has been relatively little discussion of the operational merits of alternative methods for regulating the fisheries. The critics are more unified in their rejection of the current system than in a choice of an alternative.

<sup>35</sup> Scientific reports in English on the state of marine stocks in Icelandic waters are available on the Web site of Iceland's Marine Research Institute, <http://www.hafro.is>. See, for instance, a report on the state of marine stocks in Icelandic waters, 2009, dated 2010.

<sup>36</sup> In Iceland, following the introduction of the ITQ system, the government's choice of the allowed catch was closer than before to the level recommended by government scientists. But other things were not equal. The introduction of ITQs in Iceland was correlated with scientific reports predicting that fish stocks were near collapse.

local conditions and idiosyncratic details of regulatory programs, rather than on general categories of regulatory systems.<sup>37</sup>

Next, consider the second point, the impact of an ITQ system on efficiency. Unlike the considerable theoretical uncertainty concerning the net impact of various public management systems on fish stocks, microeconomics and Coase's theorem tell a relatively unambiguous story about the impact of transferable quotas on operational efficiency. The following is a brief summary: The trade in quotas transfers fishing rights to the most efficient users. Relatively efficient and innovative operators put upward pressures on the price of quotas, which compels inefficient operators either to leave the industry or to reorganize. Reorganization involves lower costs (because of new technology, relocation, and horizontal and vertical integration) on the production side and various marketing innovations aimed at raising prices on the distribution side.

Empirical evidence indicates that the fishing industry has been transformed through location adjustments, takeovers, and mergers. Marketing of the product has been revolutionized. Most vessel owners strongly defend the ITQ system, and drastic reorganization may explain why the industry has operated with rising profits, even with the sharp reduction in the valuable cod catch. Again, other things have not been equal. The introduction of the ITQ system was correlated with two other variables, liberalization of the Icelandic economy and important technological change in the fisheries. Multicollinearity, therefore, interferes with attempts to measure the net economic impact of the ITQ system. Experts can also quibble over interpretation of data, for instance, whether the ITQs have reduced excess capacity in the industry. In the 1990s structural adjustment and new technology involved new investment. Therefore, there is some ambiguity concerning how to interpret aggregate data on the industry's capital stock.

Finally, consider the third point, the charge that the ITQs contaminated Iceland's financial system. The initial allocation of the quotas was based on a grandfathering rule that provided the original recipients of the fishing quotas with windfall gains, sometimes in the millions of dollars. Some expert and nonexpert critics claim that these gains triggered gamblers' instincts in unqualified or unsophisticated individuals, some of whom used their new wealth in financial speculations that in 2008 contributed to the collapse of Iceland's financial system. There appears to be no systematic theoretical and empirical evidence in support of these claims, but they have figured large in discussions of the ITQ system since 2008.

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<sup>37</sup> The relative importance of bycatch and discards under various public fisheries management systems is not discussed here. ITQ systems (and other systems) can vary substantially in their use of built-in incentives aimed at reducing the extent and cost of bycatch and discards. In Iceland only indirect government estimates of discards are available, which apparently show that the problem is not serious. Critics, using informal evidence, such as hearsay, do not agree and see a large problem. There is no unique relationship between the use of an ITQ system and the fishers' incentives to preserve stocks. If the owners of fishing vessels overcome free riding and act collectively through their associations, their semipermanent property rights (quotas) might stimulate a long-term interest in preserving the resource. It is possible that individual fishers in ITQ systems will eventually develop proprietary instincts. Ownership norms are more likely to emerge when the fishers and their associations are made directly responsible to some degree for maintaining the resource, which has not been the case in Iceland. In 2010 the regulatory system appeared to be moving in the opposite direction through discussion of plans to switch to short-term fishing licenses.

In sum, the available theoretical and empirical evidence has not ended discussion of the design merits of the ITQ system. However, by itself, the stiff criticism involving the question of efficiency and sustainability does not pose a threat to the system, presumably because the system is correlated with rising profits, and most vessel owners are satisfied and are fighting hard to protect current arrangements. The real threat to the ITQ system comes from critical views regarding its fit in the general social fabric.

### *Model Competition: The Question of Fit*

Few social institutions in Iceland stand out as examples for other OECD (Organisation for Economic Co-operation and Development) countries to follow. The country's welfare system is well liked in many quarters, but it is essentially a Scandinavian copy. The ITQ system is an exception. Iceland and New Zealand pioneered comprehensive ITQ systems, and many other countries have shown considerable interest in their experiments. There are reports, for instance, that the EU looks to Iceland's ITQ system when it is contemplating reforms of its lamentable fisheries regulations. However, as has already been noted, the design of the ITQ system has been criticized. There is also opposition to transferable quotas from fishers and fishing communities because the transfers have directly hurt their material interests. The real challenge, however, involves questions of fit. Criticism comes both from nonexperts (the general public) and from United Nations legal experts.

Already in the early 1990s, it was clear that the average voter did not favor the ITQ system, and the institution has not become more popular over time. In recent years, opinion polls have often registered that 65 to 75 percent of those responding in national samples oppose the system in its current form. The opposition has little to do with direct material incentives. People in small fishing communities that have lost their fishing quotas are only a small fraction of the electorate. The opposition is largely based on shared beliefs about the illegitimacy of windfall gains accruing to those who received the original quotas some 20 to 30 years ago.

The symbol that serves as a focal point for public opposition to the system is the first paragraph of the law from 1990 that set up the ITQ system (Fisheries and Agriculture Ministry, Iceland 2006). This paragraph states that all valuable species in Icelandic waters are the joint property of the nation. In brief, typical critics typically believe that the vessel owners stole the nation's family jewels when the government allocated the original quotas free of charge (on the basis of the recent catch history of each vessel). The critics demand that the government recall the fishing quotas without compensation. They do not understand, or do not care, that in 2010 the majority of vessel owners had bought their quotas at a high price from other operators in the industry.<sup>38</sup> Many of the original owners are gone. Recall and then resale literally implies that most operators will have to purchase the same fishing licenses twice.

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<sup>38</sup> According to standard economic reasoning, the market price of a fishing quota equals the present value of the expected net income stream associated with the license to fish.

The eventual wealth consequences of the ITQ system caught most experts, the quota market, and the public by surprise. Initially, the price in the quota market was insignificant, but then it took off on a sharply rising trajectory. The industry claims that improved management has created the new wealth, but few members of the public seem to buy its argument. Although withdrawal of the quotas and the introduction of a license fee would have a trivial effect on the living conditions of the average household in terms of lower taxes or better public services, a large part of the public refuses to recognize the legitimacy of the current ITQ system.<sup>39</sup>

Experts, especially judges in Icelandic courts, have also evaluated the social fit of the ITQ system. But first it should be noted that the fingerprints of parliamentary compromise are clearly visible on the 1990 ITQ law, making the legislation a hodgepodge of conflicting social theories. The marine resource is said to be the property of the nation, which is not a recognized category in the law of property. There is also a hint of state property: the state, on behalf of the nation, is responsible for effective use of the fisheries. Elements of private property enter when the law grants experienced vessel owners free license to use the resource for an indefinite period or sell their quotas to qualified vessel owners. Exclusive private rights are then withdrawn in a clause that states that the allocation of use and transfer rights to vessel owners neither constitutes a transfer of property rights nor gives the holders irreversible control of the fishing licenses (Law No. 38/1990, sections 1 and 2). To top off the confusion, private property reappears in court rulings that recognize the valuable fishing quotas as collateral in financial markets and as part of the estate in divorce and inheritance cases.

The opponents of the system have appealed to Icelandic courts to remove barriers to entry in the fisheries (the requirement of possessing quotas) in the name of freedom of occupation and industry. These attempts have been fruitless, except that the Supreme Court in a 1998 judgment extended the right to buy quotas from the original recipients to all owners of fishing ships. According to the decision, all properly registered fishing vessels can buy (and sell) quotas. In another judgment, in 2000, the court confirmed that the fishery system's restrictions on individual freedom to engage in commercial fishing are compatible with the country's constitution. The system was not a misfit.

Finally, the United Nations Human Rights Committee has ruled on the human rights fit of the Icelandic ITQ system.<sup>40</sup> The case involved two Icelanders who in 2001 decided to test (by fishing without quotas) whether the Icelandic government had violated basic human rights by allocating the initial fishing quotas only to experienced vessel owners. In 2004 the enterprising fishers took their case to the United Nations Human Rights Committee. On 24 October 2007, the committee ruled that

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<sup>39</sup> A previous government, trying to obtain public support for the ITQ system, introduced a small use fee on the industry, which was said to approximately cover the government's expenses of managing the fishing grounds and enforcing the ITQ system. However, the fishing industry that was originally glorified, for instance, during the so-called cod wars with Britain, is idealized no more. In heated public debates, not necessarily on fisheries management, it is not uncommon to declare that one's opponent is an agent of the Federation of Icelandic Vessel Owners.

<sup>40</sup> The case is available on the Web site of the Netherlands' Institute of Human Rights, <http://sim.law.uu.nl/SIM/CaseLaw/CCPRcase.nsf/f4c4778b9e02a1b1c12567b70044cc03/88db4de3b85a7a48c12573f40049f19f?OpenDocument>. The case material provides a good description both of the ITQ system and of the two Supreme Court of Iceland cases mentioned in the text.

the Icelandic quota system violated basic human rights, or the International Covenant on Civil and Political Rights. In particular, the committee found that using grandfathering to allocate use rights to a natural resource violates basic human rights. Not all members of the committee agreed with this social theory. Four separate dissenting reports expressed some surprise at the majority views. The committee did not propose specific remedies but concluded that the state “is under an obligation to provide the authors [the two fishers] with an effective remedy, including adequate compensation and review of its fisheries management system.”<sup>41</sup> In August 2011 the Icelandic government had not given a final response to the committee; the request, which is not binding, is still under consideration.

In 2009 the confluence of several developments made the removal of the current ITQ system a top priority for the Icelandic government. The financial collapse of the country in the fall of 2008 brought to power a coalition government of parties that oppose the fisheries management system. As previously mentioned, many voters link the 2008 financial tsunami in Iceland to the ITQ system. The 2007 verdict by the United Nations Human Rights Committee was for many Icelanders a final proof that the system was illegitimate—a misfit.

The coalition government of the Social Democratic and Left-Green parties that took office in February 2009 promised to begin recalling the fishing quotas on 1 September 2010, in 20 yearly installments of equal sizes. The quotas, the government stated, would be rented back to the industry, but they would also be used to support regional policy. The year 2010 was an extraordinary year in Iceland. The financial system was in ruins, and the government was close to defaulting, but the fishing industry was still going strong. It was a bright star on a dark night. Initially, the government moved slowly, only nibbling at the ITQ system. In July 2010 the fisheries minister, for instance, declared open access in the ocean shrimp fisheries but failed to introduce the promised structural reforms. In May 2011, the government finally presented in Althingi a major proposal for overhauling the country’s fisheries institutions (bill no. 1475, 2010–2011).<sup>42</sup> Moreover, the fisheries minister appointed a committee of five economists to evaluate the economic and social consequences of the proposed structural changes. The committee presented their findings on 14 June, 2011.<sup>43</sup>

The new institutions proposed by the government indicate a move from the micro-paradigm toward the macroparadigm. The new social technology creates a large role for the fisheries minister in managing the industry and pays little attention to the incentives of individual operators. The reformers are not deterred by agency problems, transaction costs, rent seeking, or the knowledge problems of a central government minister who attempts to micromanage a complex industry that operates in an unstable environment and markets diverse products internationally.

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<sup>41</sup> Internet access to the ruling of the committee is available on the Web site of the Netherlands’ Institute of Human Rights. See note 39. The citation is found in Paragraph 12, “Remedy proposed” of the committee’s report: United Nations International Covenant on Civil and Political Rights. CCPR/C/91/D/1306/2004 14 December 2007.

<sup>42</sup> The bill is available in Icelandic on the Web site of the parliament, <http://www.althingi.is>.

<sup>43</sup> The report is available in Icelandic on the Web site of the Ministry of Fisheries and Agriculture, <http://www.sjavarutvegsraduneyti.is>.



The reform bill divides total allowed catch, TAC, into department 1 containing the ITQs of the current system, and department 2 containing six so-called “pots” or regulatory sub-systems. The long-term goal of the reformers is to increase the relative importance of the six pots. The new bill proposes a time limit of fifteen years on the possession of current ITQs. The limit can possibly be extended eight more years but the conditions for extension are unclear. The share of TAC going to department 1 will be gradually reduced, the right to transfer quotas will be limited, and the right to use ITQs as collateral will be reduced and eventually taken away. The micro-paradigm suggests that the reforms will interfere with long-term planning, raise the cost of financing in the industry, and create barriers to entry. The gradual reduction of the share of TAC in department 1 is a tax on ITQ owners, reducing quantity rather than lowering net price. The bill also proposes doubling the current resource tax paid by ITQ owners.

The obvious long-term goal of the reform bill is to shrink the current ITQ system and gradually replace it with the pot system. The largest of the six pots is one where fishers can rent ITQs for a period of one year. The rental market for ITQs will be dominated by the fisheries minister, who will decide how many ITQs are available for each category of boats, regions, equipment, and so on. The rental market for ITQs is intended in part to ease entry into the fisheries, but the one year limit on the rental agreements, and the ban against using ITQs as collateral makes entry difficult. The other five pots are designed to meet specific goals, such as the promotion of environmentally friendly fishing, regional policy, and labor-intensive fisheries technologies. Each pot gets a share of the TAC, and operators who qualify for pot fishing will compete—race to be first—to finish the total pot quota. There is, for instance, a special pot for boats that use set longlines—fishing lines with hundreds of baited hooks at regular intervals. In the spirit of the macroparadigm, the bill states that to qualify for the longline pot, fishers must manually bait the hooks and not use (existing) machines for baiting.

The committee of specialists that the fisheries minister appointed to evaluate the new regime unanimously objects to many features of the new institutions. They predict that the new system will be inefficient, introduce a framework for rent seeking, fail to achieve various desired social goals, and create severe financial problems in the industry.

In a survey of the Icelandic economy dated June 2011, the OECD (2011) fears that the proposed changes in the fisheries regime may hinder the country’s recovery from the 2008 financial collapse. The OECD recognizes the importance of strengthening political consensus on the quota system but points out that “there is nothing that the government can do now to undo the perceived unfairness of the initial allocation as most current quota holders purchased their quotas” (OECD 2011, 3).

While waiting for the next chapter in the Icelandic ITQ saga, we have learned a few lessons. The ambiguous concept “property of the people” is a cover for the more conventional term “state property.” Popular calls for distributive justice have given politicians the opportunity to attempt a switch to the macroparadigm and central management. And we have learned that in the middle of a severe economic crisis policy makers, applying to their ideas about design and fit, are ready to turn a

successful industry upside down.<sup>44</sup> In most highly developed countries the fisheries sector is of trivial importance for the national economy. In Iceland of the modern era, the fisheries have been the prime engine of economic growth.

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<sup>44</sup> According to the OECD (2011, 28): “Iceland has managed its local fish stocks, i.e., stocks that are not shared with other countries, in a sustainable and profitable way.”

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