Economics of Rural Land-Use Change

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Chapter 3

Effects of Policy and Technological Change on Land Use

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Introduction

Land use in the United States is dynamic, as discussed in Chapter 2, with millions of acres of land shifting uses each year. Many of these land-use changes are the result of market forces in an economy affected by modern technology and policy choices. Changes in land use are the result of choices made by individuals, corporations, nongovernmental organizations, and governments. This chapter considers forces that act at broad scales to affect land-use changes, operating via land markets, where they exist, and evidenced by the behavior of economic agents over a broad geography. The specific foci are the effects of policy and technology on land-use choices.

Land Markets

Land markets reflect the aggregation of individual decisions by sellers and buyers within the constraints imposed by land-use policies and regulations. The aggregation of these individual decisions determines the type and extent of land-use change. However, market failures exist (see Chapter 6), such that actions of individual buyers and sellers do not result in socially desirable outcomes. Policies designed to address such failures or to accomplish other public policy goals alter land supply and demand conditions. The political system has reacted to failures of land markets and interest in other public policy goals by the passage of legislation affecting land use, e.g., the 2002 Farm Security and Rural Investment Act ('2002 Farm Act').

Before introducing specific examples of land-use policies, we broadly characterize major drivers in land use among rural uses and then between urban and rural uses. In both cases, a number of factors influence land supply and demand conditions. Examples include changing consumer demand for goods and services produced on the land and for direct consumption of land, e.g., through housing developments. Other factors are increases in population size and personal income levels that lead to an increase in demand for agricultural and forest products (U.S. Department of Agriculture, Forest Service 1988, 1990). Changes in land supply or demand conditions can alter land rents, and landowners may react to

higher income levels will add up to greater consumption and demands for developed space. For example, consumers may demand more shopping space, as demonstrated by the 27 per cent increase in U.S. shopping area, and the 24 per cent increase in the number of shopping centers, between 1990 and 2000 (U.S. Department of Commerce, Bureau of the Census 2001).

The amount of urban land added per additional person is higher for non-metropolitan than for metropolitan counties (Reynolds 2001; Zeimetz et al. 1976). Many Americans have a strong preference for the spreading out of development. They prefer to live in less-congested areas and will commute additional minutes or hours to realize their goals, a choice made possible by our excellent road system. Moreover, an increasing population of retirees has augmented out-migration from central cities and suburbs to rural areas that offer aesthetic amenities. Natural amenities may be a more important determinant of population growth than nearness to metropolitan centers or type of local economy (McGranahan 1999).

The market price of land can be decomposed into different sources of value, such as its current use in production and its expected use in alternative enterprises. In many areas adjacent to urban centers, the expectation of urban development has a greater influence on the value of land its current use in farm or forestry production (Alig and Healy 1987). For example, the market value of more than 15 per cent of farmland is significantly influenced by urban development. For those urban-influenced acres, urban development pressures account for two-thirds of their market value (Barnard 2000). Of course, many landowners welcome this urbanizing influence, as it greatly increases their net worth. This marked appreciation allows them to borrow more and perhaps expand their operations, or it allows them to sell their land and realize capital gains.

Although individual producers may be better off when they sell their land to developers, the checkerboard pattern of developed land and farm and forest production can have a variety of negative impacts on producers who choose to stay. Impacts include complaints by new residents about the noise and pollution associated with farm and forestry production, loss of local farm infrastructure, such as input suppliers, and difficulty in expanding for those producers who would like to purchase nearby parcels of land. For those who want to stay in agriculture or forest production, low profit margins do not allow producers to compete with developers for additional land as land prices are bid up by residential and other types of development encroachment. The checkerboard pattern of development can also have substantial ecological ramifications for wildlife species dependent on large blocks of forested or grassland habitat (Alig, Butler, and Swenson 2000).

Some producers have seen the urban sprawl trend as a business opportunity for staying in farm production. They have shifted their commodity mix to satisfy the nearby market demand for perishable fruits and vegetables, as well as other fresh commodities. Other producers have adjusted by catering to the demand by local residents for farm visits. In 2000, 28 per cent of sightseers surveyed indicated that a motivation for their trip was to visit a farm or agricultural setting (U.S. Department of Agriculture, Forest Service 2000–2002). These include visits to purchase farm products or visits to learn about farming and to enjoy the view on

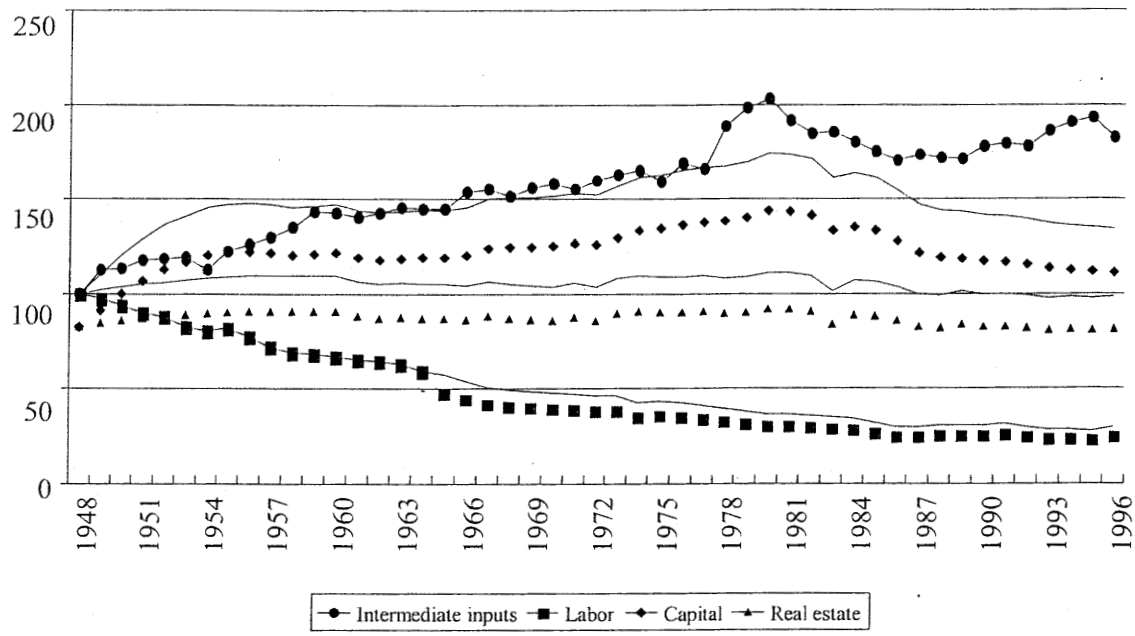

Figure 3.1 Index of farm input use in the United States (1948=100)

1994, there was a significant increase in forest ownership of plots smaller than 50 acres. With the continued pace of development into forestland documented in the 1997 National Resources Inventory, the average size of forest ownership is expected to decline (Sampson 2000). Part of the reason is that an increasing number of smaller forest properties (less than 25 acres) are used primarily for residential purposes; the number of larger-sized properties is more stable.

In spite of a relatively stable number of U.S. cropland acres, the innovations that have spurred production intensification have influenced land in two important ways. First, the scenic look of farmland has gradually changed over time. For example, confinement livestock operations have reduced the extent of livestock pasturing. Second, the production intensification permitted by some technologies has likely had a negative impact on soil quality (Batie 1993). However, other innovations, such as conservation tillage technologies or variable rate technologies, are believed to reduce the degradation of soil quality relative to conventional technologies.

One technological advance that may greatly affect both the agricultural and forest sectors is the use of genetically modified material. Yields per acre could be significantly increased under certain scenarios, and the use of environmentally degrading inputs could be reduced. While societal concerns may limit use of genetically modified organisms in some cases, adoption of these technologies in the land-intensive industries of agriculture and forestry could influence land exchanges between the two sectors if relative productivities shift.

One example of genetically modified material that affects the competition for land between agriculture and forestry involves the production of short-rotation woody crops (SRWCs), such as hybrid poplars. A national-scale analysis by Alig et al. (2000) showed that growing demand for wood fiber and tightening supply

in Europe led England to blaze pine trees 24 inches or more in diameter within three miles of water in the northeastern U.S. with the mark of a broad arrow; these trees were to be reserved for use by the Royal Navy. Later milestones include the disposal and retention of public lands. Contemporary land-use policies as a whole are multi-objective in nature. This is evident in a 1983 policy directive of the U.S. Department of Agriculture (USDA):

> It is the USDA's policy to promote land use objectives that are responsive to current and long-term economic, social, and environmental needs. This policy recognizes the rights and responsibilities of State and local governments for regulating the uses of land under their jurisdiction. It also reflects the USDA's responsibility to (a) assure that the United States retains a farm, range, and forest land base sufficient to produce adequate supplies, at reasonable production costs, of high quality food, fiber, wood, and other agricultural products that may be needed; (b) assist individual landholders and State and local governments in defining and meeting needs for growth and development in such ways that the most productive farm, range, and forest lands are protected from unwarranted conversion to other uses; and (c) assure appropriate levels of environmental quality (U.S. Department of Agriculture, 1983).

A major contemporary focus of land-use policies is to manage the direction of development; 'urban sprawl' has been cited as one of the leading concerns of Americans (Pew Center 2000). According to the Pew report, approximately 1,000 measures were introduced in state legislatures in the late 1990s, attempting to change planning laws and to make U.S. development more orderly and conserving.

State and local governments use a variety of tools to protect farm and forestlands as production resource bases. These tools include agricultural zoning, differential farm tax assessments, right to farm laws, agricultural districts, purchase and transfer of development rights, comprehensive land-use planning, and urban growth boundaries. In addition, the USDA complements the purchase of development rights programs of state and local governments with the Farmland Protection Program for agricultural lands and the Forest Legacy Program for forestlands. The purchase of development rights provides government agencies with the option of conserving open space for future use in farm or forest production without necessitating government acquisition. The land will not necessarily be required to stay in a current farm or forestry use, but under a program that purchases development rights, a land owner will not be allowed to develop the parcel. Because the cost of cultivating undeveloped land is considerably less than the expense associated with reversing development, purchasing development rights is viewed as an investment in food and forestry security for future generations. Conservation easements and other partial interests in land have also been increasingly used to accomplish particular natural resource protection goals such as maintaining open space that provides scenic beauty and wildlife habitat (e.g., Wiebe et al. 1996).

Agriculture and Forestry Policies

The role of government in the agriculture sector is pervasive. Various types of farm support have been in place since 1933 (after the Great Depression), and are aimed

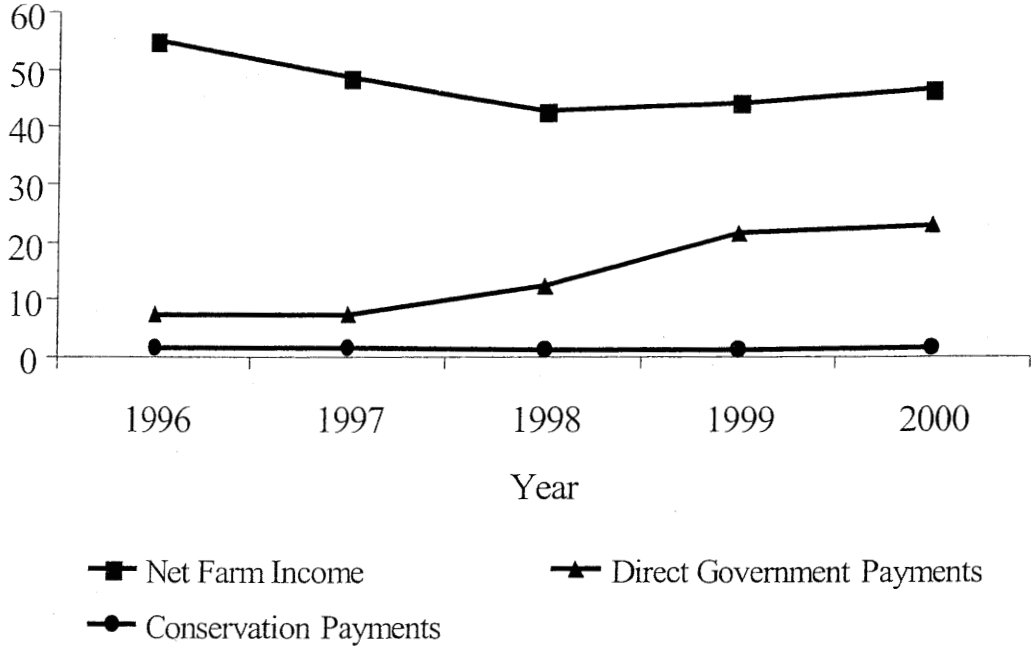

Figure 3.2 Farm income and government payments in the United States, 1996–2000 ($ billion)

between 1982 and 1997, relative to the level that would have resulted without such government farm payments. Lubowski also reported that the government is directly competing with itself in providing incentives for landowners to retire environmentally sensitive crop lands. This involves government crop payments reducing the incentive for farmers to enroll acreage in the Conservation Reserve Program.

Environmental Policies

Federal programs, such as the Endangered Species Act, can also be used to promote conservation on private lands. Among the many competing interests in land-use policies, there is perhaps none more fundamental than the potential conflict between the presumed rights of private property owners and the received rights of the general public. Recent years have seen a substantial debate over how to balance these interests. This debate has included the emergence of a property rights movement in response to the increasing emphasis on protecting environmentally sensitive land.

From a planning perspective, Schiffman (1996) sees the property rights question as the central legal (and political) issue in the making of planning and environmental policy. This issue is of particular importance, and the subject of increasing controversy, in the rural and urbanizing communities of America. Planning officials wrestle with the challenge of how they can address the process of land development so as to protect the environmental, cultural, aesthetic, and

increasingly affect the application of technology, as in the case of genetic modifications. Policy debates affect public land-use and management decisions, as in the case of public forest policy in the U.S., and are also increasingly affecting private land use and the associated use of technology.

A confluence of economic, environmental, and social forces has influenced how the nation's fixed land base is used. As drivers of land-use change within a market-based economy, policy and technology are influenced by other exogenous factors, such as world political events, and by potential changes in related global conditions such as climate change (Sohngen and Alig 2000). It may not be sufficient to simply extrapolate from experience to look at the future implications of major economic and technological forces. As with all future gazing, one's understanding of future technology becomes murkier the further into the future one attempts to look. The interplay between the policy environment and technological change can be important. An example of such interplay in a global climate change context is Edmonds et al.'s (2000) finding that technological innovation can be 'induced' by policies to stimulate research and development expenditures, energy prices, taxes, and subsidies. While we understand some parts of the innovation process, the science of understanding the full process of induced technological change is in its infancy.

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