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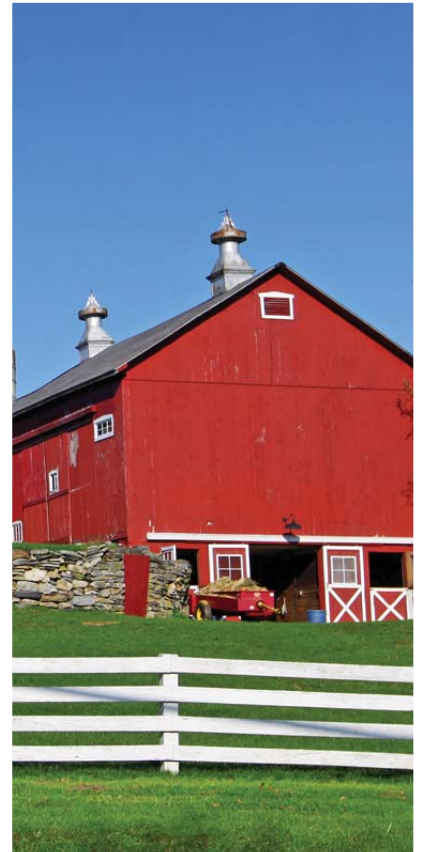
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# Rural Wealth Creation

## Concepts, Strategies, and Measures

John Pender, Alexander Marré, and Richard Reeder



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# Rural Wealth Creation Concepts, Strategies, and Measures

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## Abstract

This report presents a conceptual framework for rural wealth creation, drawing upon the U.S. and international development literature. The framework emphasizes the importance of multiple types of assets (physical, financial, human, intellectual, natural, social, political, and cultural capital) and the economic, institutional, and policy context in which rural wealth strategies are devised. The report discusses the role of wealth creation in the rural development process, how wealth can be created in rural communities, and how its accumulation and effects can be measured.

**Keywords:** wealth creation, rural development, regional development, community economic development, sustainable development, livelihoods, wealth indicators, conceptual framework

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## Summary

### What Is the Issue?

Rural development researchers and practitioners have argued in recent years that investing in a broad range of assets is a critical component of long-term economic growth in rural communities. Wealth can contribute to people's welfare in many ways beyond increasing income, such as providing economic resilience in adverse circumstances or enhancing one's power and prestige. Given the importance of wealth for economic well-being, understanding how wealth is distributed is critical. The marketable wealth of households in the United States is more unequally distributed than income. Understanding the distribution of wealth across and within rural communities is also critical. Despite its importance, efforts to conceptualize and measure rural wealth creation have been limited.

### What Did the Study Find?

Although many Federal and State programs are concerned with wealth creation, this report's focus is on local and regional approaches suited to the diverse situations facing rural communities. Traditional strategies—such as those based on exploiting natural resources, recruiting footloose industries, developing as regional centers or as bedroom communities, or amenity-based development—are suitable in particular contexts. Less traditional strategies—such as promoting entrepreneurship and innovation, industry clusters, and attracting the creative class—are aimed at attaining a comparative advantage in today's knowledge-based economy.

No wealth creation strategy will work in all contexts; therefore, rural regions and communities would benefit from having the capacity to identify strategies that are best suited to their own wealth endowments and local priorities. Approaches to strategy formulation and implementation include community strategic planning and research-based targeted industrial development.

This report presents a conceptual framework for wealth creation, drawing upon the U.S. and international rural development literature. The framework emphasizes multiple types of assets (physical, financial, human, intellectual, natural, social, political, and cultural capital) and the economic, institutional, and policy context in which rural wealth strategies are devised. For example, manufacturers in high-poverty outmigration rural counties often cite the poor quality of local schools as one of the most critical constraints that they face in recruiting and retaining managers and other professionals. Hence, investments in improving the quality of local schools and their staff (physical and human capital) may be a prerequisite for a strategy focusing on attracting manufacturing firms.

**Rural wealth creation is highly context-dependent.** For example, policies to promote biofuel production have created wealth in communities with fertile farmland, adequate water supplies and transportation infrastructure, and an entrepreneurial class of farmers or other investors capable of organizing and managing such investments. Where these factors are absent,

efforts to promote biofuel production may be unsound and could deplete local wealth.

**Different types of capital are often complementary.** Investing in one type of capital can increase the returns to investing in another. As such, planning and coordinating across a range of investments is more likely to result in long-term success of rural development efforts.

**Investments always involve economic risks, and diversifying the portfolio of investments may help to reduce such risks.** Broader diversification of the local economy into activities that are not highly dependent on the same market trends, resource base, and government policies may more effectively address risks associated with changes in any of these economic drivers.

**Local ownership can contribute to increased local returns from investments, but involves risks.** Locally owned businesses are often thought to provide greater local economic benefits than absentee-owned businesses due to dividends earned by local owners and a tendency for locally owned businesses to hire from the local labor force. However, the increased returns associated with local ownership may be associated with greater risks than diversified investing in non-locally based assets.

**It is important to consider the multiple types of outcomes that can result from any investment, such as environmental and social impacts.** For example, increased local tax collections resulting from new business development may enable public investments in local roads, schools, or other infrastructure, which can spur future wealth creation. On the other hand, negative environmental impacts such as depletion of local groundwater supplies may impair a community's ability to attract or retain residents.

Strategies to promote rural wealth creation face numerous challenges, as well as offering the potential to contribute to sustainable and broadly shared rural prosperity. The report discusses several traditional (industrial recruitment, regional centers, bedroom communities, amenity-based development) and non-traditional (small business growth and entrepreneurship, cluster-based development, rural innovation and knowledge-based development, and attracting the creative class) strategies, how they can contribute to wealth creation, and the contexts where they may be well suited.

The report also discusses why and how wealth indicators can be measured. To diagnose problems and identify and target interventions, we consider approaches to measuring comprehensive wealth using an aggregate monetary value. Considering the stringent assumptions and data requirements of this approach, we conclude that a more practical approach for measuring rural wealth is to measure a set of wealth indicators. We review the few prior efforts that exist to measure wealth indicators in rural areas of the United States, and then provide information on additional indicators of different wealth types and data sources that could be used for this purpose.

To help improve the design and monitoring of interventions, various methods can be used to clarify the logic of the intervention and its hypothesized outcomes and impacts. We discuss the use of impact pathway evaluation

as one method for this, and illustrate how this approach could be applied to derive wealth and other indicators for a few example rural development interventions. To assess the impacts of interventions, we discuss how measuring wealth indicators could help in addressing attribution problems.

Measuring wealth creation and its outcomes also creates many challenges, including the difficulty of conceptualizing and measuring intangible and nonmarketed wealth, the cost of measuring a broad array of wealth indicators, difficulties in evaluating outcomes along multiple dimensions, and challenges in how to scale up the knowledge gained from assessment efforts in different contexts.



## Introduction

Policymakers and rural development practitioners increasingly recognize that a short-term focus on creating jobs or increasing income is insufficient to generate sustainable rural development or achieve a long-term reduction in rural poverty. A focus on creating and maintaining wealth offers the potential to achieve more lasting rural prosperity.

Scholars have studied wealth creation at least since the time of Adam Smith's *Inquiry into the Nature and Causes of the Wealth of Nations* (1776), and several Nobel prizes have been awarded to economists for their work on wealth. Ecologists, sociologists, and political scientists have assayed broader wealth concepts such as natural, social, and political capital. Many rural development researchers, foundations, think tanks, and advocacy groups argue that investing in a broad range of assets is critical for long-term economic growth and prosperity in rural communities (Kretzmann and McKnight, 1993; Castle, 1998; Green and Haines, 2002; Flora and Flora, 2004; Ratner, 2010). Despite the importance of this topic to policymakers and practitioners, and the broad and deep foundation of knowledge about it, efforts to conceptualize and measure rural wealth creation have been quite limited.

The report demonstrates why wealth creation is important for rural development, how it can be created in rural communities, and how its accumulation and effects can be measured.

## What Is “Wealth”?

Some definitions of wealth emphasize the value of marketable assets, while others include all valued assets, regardless of their marketability. For example, Arrow et al. (2010) defined comprehensive wealth as “the social worth of an economy’s entire productive base,” which “consists of the entire range of factors that determine intergenerational well-being.” We also define wealth comprehensively, as the stock of all assets, net of liabilities, that can contribute to the well-being of an individual or group. Unlike Arrow, et al., we do not use the term “social worth,” which suggests that all types of wealth can be measured using a single metric of social worth. We think it is useful to consider many different types of assets as wealth, even if they cannot all be aggregated into a single measure.

We focus on types of wealth that can be considered “capital.” In classical economics, capital referred to durable physical assets—such as machinery and buildings—that increase the value of production. Economists also traditionally refer to financial assets as capital. Alfred Marshall, the founder of neoclassical economics, defined capital as “that part of wealth which is devoted to obtaining further wealth,”<sup>1</sup> or wealth that has a productive return.

The concept of capital has since expanded to include other assets besides physical goods and financial assets. Economists have long accepted the concept of **human** capital—defined by Becker (1962) as resources embedded in people, such as their education, skills, and health—and have incorporated it into economic growth theory (Uzawa, 1965; Lucas, 1988; Romer, 1990; Barro and Sala-i-Martin, 1995). Accumulating knowledge or **intellectual** capital has also been emphasized as essential to longrun economic growth (Romer, 1986, 1990).<sup>2</sup> More recently, sociologists and political scientists have defined **social** capital as “features of social organization, such as networks, norms and trust that facilitate coordination and cooperation for mutual benefit” (Putnam, 1993) and have argued that it is critical for achieving prosperity. Ecological economists have argued that investing in **natural** capital—defined by Costanza and Daly (1992) as “a stock [of natural resources] that yields a flow of valuable goods and services into the future,” including renewable resources such as ecosystems and nonrenewable resources such as fossil fuel and mineral deposits—is essential for sustainable economic development. Others have argued that other types of capital are also important for community development, including **cultural** capital—people’s understanding of society and their role in it, and their values, symbols, and rituals; and **political** capital—“the ability of a group to influence the distribution of resources within a social unit” (Flora and Flora, 2004).

All types of capital (1) are durable assets, (2) can be accumulated or depleted through investment and consumption decisions, and (3) can contribute to the value of production, or more generally, to well-being. Capital is therefore different from exogenous determinants of well-being, such as the amount of solar radiation, and from the flows of goods and services that result from capital, such as income. Not all capital is tangible or directly marketable, although the flows of services from capital may be marketable even if the capital itself is not (e.g., human capital). Measuring the value of nonmarketable capital can be difficult or impossible. Such unmeasured wealth has

<sup>1</sup>Alfred Marshall. Great-Quotes.com, Gledhill Enterprises, 2011. <http://www.great-quotes.com/quote/1443341>, accessed Thu Jun 2 10:07:38 2011.

<sup>2</sup>Romer (1990) distinguished knowledge from human capital by arguing that knowledge, such as the design of a new good, is not tied to specific people and is therefore non-rival in nature (i.e., its use by one person does not reduce its availability for use by someone else). Human capital, by contrast, is imbedded in particular people and therefore rival in nature. This distinction is important because the non-rival nature of knowledge can lead to increasing returns to scale, which is a source of longrun growth in an economy (Ibid.). Investments in human capital can also contribute to longrun growth by offsetting the diminishing returns to investments in physical capital (Barro and Sala-i-Martin, 1995), causing spillovers of knowledge that result in increasing returns to scale (Lucas, 1988) or serving as an essential input in the production of knowledge (Romer, 1990).

been labeled “intangible capital,” and efforts have been made to measure its value indirectly (World Bank, 2006; World Bank, 2011). Such assets can be considered capital even if their value cannot be readily measured in monetary terms.<sup>3</sup>

Wealth is analogous to the level of the water in a bathtub, while income is analogous to the flow of water into the tub (fig. 1). Wealth can generate income, and income can contribute to increased wealth over time. If consumption (including direct consumption and wealth depreciation)—analogous to outflows of water from the bathtub—exceeds income, then wealth will be drawn down over time. The difference between income and consumption represents net savings, which increases wealth over time if positive and depletes it if negative.<sup>4</sup>

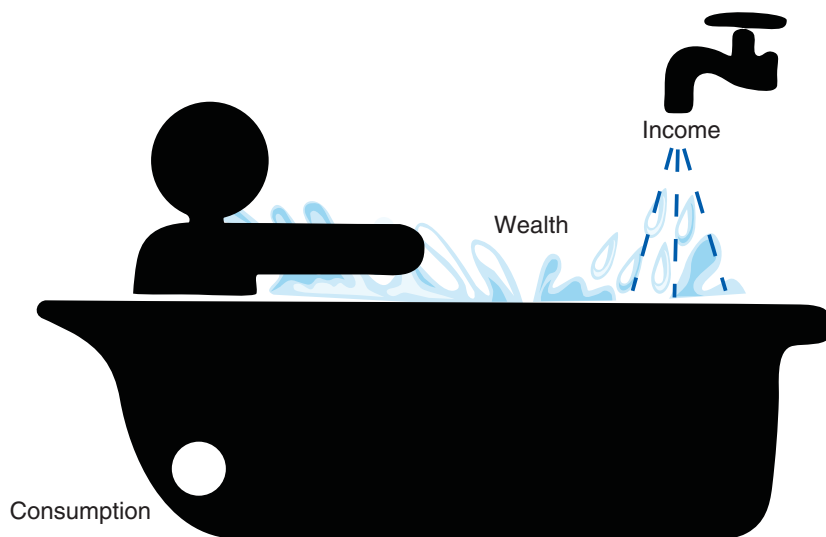
People may have high wealth and low income or low wealth and high income, as well as the more common positive association between the two. Considering only income or consumption as indicators of well-being without also considering wealth can be misguided and can misdirect policy. For example, many farmers in the United States are wealthier than the average person (in terms of the net value of their marketable physical and financial assets), even if their incomes are at times lower than average (El Osta and Morehart, 2008). Ignoring farmers’ wealth can lead to poorly targeted policies to address rural poverty. Conversely, households that lack adequate net wealth, perhaps because of high debt loads, may face financial hardship despite having high incomes.

The expectation that wealth and income are positively correlated is because greater wealth often contributes to greater income. Indeed, people invest in many kinds of wealth in anticipation of returns or income, as when financial assets appreciate in value or yield dividends.

<sup>3</sup>We discuss important characteristics of different types of wealth—including tangibility, marketability, measurability and others—in appendix A.

<sup>4</sup>In a closed economy (i.e., without borrowing), savings equals investment. In an open economy, investment can be financed by borrowing as well as saving. In this case, investment doesn’t necessarily represent an increase in net wealth, since the increase in assets may be offset by increased liabilities.

Figure 1  
**Simple bathtub model of wealth and income**



Source: Adapted from Hoffer and Levy (2010).

Wealth can contribute to income, but it also provides the leverage to take advantage of new opportunities and an economic safety net. This is certainly true for “liquid” forms of wealth (i.e., assets that are easily marketable and convertible to cash) such as financial assets, but can be true for nonmarketable forms as well. For example, social capital may enable access to critical resources in the face of adverse events or new opportunities, due to reciprocal obligations within a social network (Coleman, 1988). In another example, politically connected communities may be better able to access resources through Federal or State programs as a result of their political capital.

Many types of wealth can generate nonmarket benefits. For example, human capital can confer consumption benefits, like a greater capacity to appreciate or influence their environment (Schultz, 1961), whereas natural capital can provide environmental amenities like scenic views or clean air and water (Costanza and Daly, 1992). Even financial wealth may have many nonmonetary welfare benefits (Sherraden, 1991), such as heightened aspirations, social influence, or political sway.

The concepts of wealth and wealth creation apply to individuals, households, businesses, communities, regions, States, and nations. Accumulating net wealth requires net savings and investment across all scales, though the attention devoted to different types of assets will depend on the decisionmaker involved. For example, an individual is alert to his or her own private physical, financial, and human capital assets, while local government leaders may be most directly concerned about investments in local public infrastructure and facilities.

Wealth creation concepts apply in all contexts, although rural wealth creation involves opportunities and constraints that are distinct from wealth creation in urban areas. This report focuses on wealth creation in rural areas, particularly the means by which it is created. In part, this is because promoting sustainable rural development is one of the main missions of USDA. Furthermore, the opportunities, constraints, and requirements of wealth creation are often different in rural contexts than in urban ones. For example, natural resources and amenities are generally more important as a form of wealth and as a contributor to economic development in rural areas than in urban areas. On the other hand, many rural areas lack access to infrastructure and facilities that are common in urban areas—such as airports, highways, hospitals, universities, wastewater treatment systems, and high-speed Internet—due to their low population density, distance from population centers, and the fixed costs of such assets. Rural areas often lack other kinds of assets, particularly human capital, for similar reasons. Rural economic development strategies must take these different asset endowments into consideration.

This is not to argue that rural wealth creation should be pursued in a vacuum. Indeed, development of rural areas may depend upon broader development in the regional economy, with urban centers as a hub.

## Why Is Wealth Creation Important for Rural Economic Development?

Since wealth as we have defined it is the stock of all assets that can contribute to well-being, increasing well-being is almost synonymous with increasing wealth. Indeed, Arrow et al. (2010) proved that an increase in their concept of comprehensive wealth is necessary and sufficient for an increase in intergenerational well-being. This follows from using “shadow prices” on each asset to measure the value of comprehensive wealth.<sup>5</sup> Our definition avoids this nearly tautological implication by allowing for the possibility that investments in assets *may not* increase the well-being of some (or any) people.

Whether investments in wealth improve the well-being for some or all people in a community depends upon the distribution of costs and benefits among community members and whether the social benefits of the investment exceed the social costs. These impacts depend upon many factors, such as uncertainty about the benefits and costs of the investment, who is making the investment, who is entitled to the flow of benefits from it, and the costs and benefits that the investment may impose upon non-investors. For example, an investment in a new factory in a community will benefit the owners of the factory if the investment is profitable, and will also benefit people directly employed by the factory and others whose incomes are indirectly increased by the demand generated by the investment. The investment may also increase the wealth of local landowners if it results in increased property values. This, in turn, contributes to increased local government property tax revenue, causing additional benefits and costs to community members depending on how this revenue is used.

But business investments also may displace workers, especially if the investments are in labor-saving technology, or may undermine the competitiveness of existing firms and the returns earned by their workers and assets.<sup>6</sup> Increases in property values can impose higher costs on renters. Furthermore, if the owners of the firm making the investment live outside the community, the profits earned do not necessarily benefit the community where the investment is made. Investments can also reduce property values; for example, the investment may cause pollution, noise, congestion, or otherwise reduce the attractiveness of the community.

Although simply increasing the aggregate wealth of a community may not be sufficient to improve the well-being of everyone in the community, wealth creation in a broad sense is necessary to sustain economic development. Without increases in comprehensive wealth, growth in income and consumption cannot be sustained over the long term (Arrow et al., 2010). For example, a community may achieve near-term increases in income by depleting its mineral wealth, but unless the rents received are invested in reproducible capital, such growth will not be sustainable (Hartwick, 1977). Even without depleting natural capital, economic growth theory has shown that economic growth eventually stagnates as a result of diminishing returns to produced capital (Solow, 1956), unless investments are made in a broader span of capital, such as human capital and knowledge (Barro and Sala-i-Martin, 1995).

<sup>5</sup>“Shadow prices,” as defined by Arrow et al. (2010), are the marginal contribution of an increase in the stock of an asset to intergenerational well-being, measured in monetary terms. If all assets are valued at such shadow prices, it follows that an increase in the stock of any asset leads to an increase in intergenerational well-being. Well-being can only increase if the shadow value of all assets increases, according to Arrow et al., because they assume that the set of assets included in comprehensive wealth includes everything that influences well-being. Consideration of exogenous non-wealth factors would presumably change this proposition slightly (i.e., the proposition would hold if exogenous factors are held constant).

<sup>6</sup>This is an example of the process of “creative destruction,” through which investments in new products, technologies, or other innovations undermine the profitability of existing firms and assets, potentially leading to obsolescence, bankruptcies, or other manifestations of the forces of innovation and competition. Schumpeter (1975) argued that this concept is “the essential fact about capitalism.” This concept has been influential in modern endogenous economic growth theory (Aghion and Howitt, 1992).

Since people's income and consumption prospects depend upon their wealth, long-term solutions to poverty require efforts to generate and use wealth effectively. People with low wealth may get locked in poverty because of their inability to cope with risks or to invest in high-return assets and activities (Carter and Barrett, 2006). Unfortunately, many social policies in the United States have ignored the importance of wealth, instead subsidizing the income or consumption of the poor in lieu of wealth accumulation (Sherraden, 1991). Without income support, poor people would undoubtedly be worse off, but wealth accumulation remains critical to achieving long-term reductions in poverty.

Given the importance of wealth for economic well-being, understanding how wealth is distributed is critical. The marketable wealth (net worth of physical and financial assets) of households in the United States is more unequally distributed than income. In 2007, the top quintile of wealth holders owned 85 percent of total household marketable wealth, while the top quintile of income recipients in 2006 received 61 percent of total income (Wolff, 2010, p. 44). Blacks continue to lag Whites in marketable wealth, even among groups with similar levels of education and income, limiting their ability to achieve economic parity (Shapiro, 2004).

Understanding the distribution of wealth across and within communities is also critical if community-level interventions are to be most effective in building on existing assets. Unfortunately, information on the distribution of assets across and within U.S. communities is limited. (We discuss data sources on regional distribution of wealth later in the report.)

The distribution of wealth—or more generally (for assets that are not privately owned or whose costs and benefits are not appropriated fully by their owners), who receives the flows of services emanating from wealth and who pays the costs of creating and maintaining it—is critical not only because this determines the distribution of well-being. Whether individuals or businesses have the incentive and ability to create wealth depends upon how these costs and benefits are distributed. Economists theorize that two characteristics of any good or asset largely determine whether private individuals or firms have adequate incentive to produce or invest in them: whether others who do not pay for providing the good can be excluded from the benefits that the good generates (“excludability” of the benefits), and whether use of the services from the good reduces its availability to others (“rivalry” of the benefits) (Cornes and Sandler, 1996). Goods whose benefits are non-excludable (or excludable only at high cost) are likely to be underprovided by private markets because of the potential for “free riders” who do not pay for the services provided. Goods whose benefits are nonrival (or that require small additional costs to provide to additional people once initial fixed costs of provision are paid) tend to favor production by monopolies (like electric companies) rather than competitive markets, which can also lead to inefficient provision. Goods that are both non-excludable and nonrival are considered pure public goods and may require government provision (the classic example is national defense).<sup>7</sup>

Many types of assets are both excludable and rival in use, and thus are provided by competitive private markets. Examples include many physical assets (houses and buildings, vehicles, machinery and equipment) and

<sup>7</sup>Public goods may be provided by private agents rather than by governments under certain circumstances. If property rights to the good can be assigned and enforced at low cost as a result of changes in technology or institutions, a public good could then become a private good. For example, improvements in technologies to collect tolls on highways (increased excludability), together with increased congestion of many highways (increased rivalry), have encouraged conversion of some freeways to toll roads (Cowen 2008).

financial assets (stocks and bonds). Many other types of assets involve some degree of non-excludability and thus may be underprovided due to free-rider problems. For example, natural capital stocks provide many environmental services—such as clean air, scenic beauty, and preservation of biodiversity—that are difficult to exclude people from. Intellectual capital investments, such as technical innovation, are often at least partly non-excludable (Romer, 1990), although intellectual property protections seek to increase the excludability for a defined period of time. The benefits that result from social networks may not be limited to those participating in the network (Putnam, 1993). For example, a network of mothers that organizes to improve local schools benefits all who attend the schools (Coleman, 1988). Similarly, investments in political and cultural capital often benefit people other than the investor, such as the constituents of a politically powerful member of Congress or future generations who benefit from the cultural legacy of their ancestors.

For assets that are non-excludable or nonrival, other actors besides private individuals and firms may be needed to ensure that socially profitable investments are made. In some cases, such as national defense, this requires Federal involvement. However, in many cases, the non-excludability or nonrivalry is relevant mainly at a local level (e.g., local roads), in which case a local government or community-based organization may provide the asset or can facilitate its provision by private actors. For many other assets involving some degree of non-excludability or nonrivalry at the local level—like investments in local parks, primary/secondary education, or preservation of local cultural heritage—local governments and civic organizations often play a critical role in creating wealth.

## How Can Wealth Be Created in Rural Communities?

The creation of wealth requires savings and investment, which presume a willingness and ability to forgo consumption in the present for the sake of increased well-being in the future. However, patience and thrift alone are insufficient to accumulate wealth.<sup>8</sup> Investing in assets that yield low or negative returns can impoverish rather than enrich. Economic growth theorists often abstract from this concern by assuming that (1) decisionmakers have perfect foresight about the future; (2) only a single type of capital exists, with a very high rate of return at low levels of capital stock; and (3) constant returns to scale are in effect, implying diminishing returns to capital investments and the possibility of perfect competition (Solow, 1956). If more than one type of capital exists, growth theorists often assume the marginal net returns to investments in different types are equalized through perfectly competitive markets (Barro and Sala-i-Martin, 1995).

Reality is of course much more complex, with investments in many different types of capital possible, complicated relationships among different types of capital that affect the returns to investments, economies of scale for many investments, missing or imperfect markets for many types of capital and for the goods and services that they generate, financial constraints limiting many people's ability to make profitable investments, and uncertainty about the returns to all investments. Furthermore, not everyone who makes investment decisions is a private firm seeking to maximize the net present value of profits.<sup>9</sup> Other actors such as households, governments, and nonprofit organizations also make investment decisions based upon varying objectives and decision rules. And the impacts of investments may include nonmonetary costs and benefits, such as impacts on the environment or on the social fabric of a community.

Creating wealth in rural communities therefore requires not only that decisionmakers be willing to save and invest, but also that they be able to identify, finance, and implement socially profitable investments through a continuous learning process. Which investments are profitable, or even feasible, is likely to depend on the wealth endowments of the local actors and upon the economic, institutional, and policy context within which such decisions are made.

### Conceptual Framework for Wealth Creation

Understanding how wealth can be created and sustained in rural areas requires a conceptual framework that encapsulates the diverse contexts and complex set of factors influencing the process and its outcomes (fig. 2). Our framework for wealth creation draws upon other frameworks in the rural development literature,<sup>10</sup> and includes eight types of wealth—physical, financial, natural, human, intellectual, social, cultural, and political capital (see box, “Definitions of Types of Wealth”). There is arguably some overlap among these types of capital; for example, political capital could be viewed as a special type of social capital in that it involves networks, reciprocal obligations, and mutual trust among actors in the political realm.

<sup>8</sup>Technically, patience and thrift are not even necessary to increase wealth, if we consider capital gains resulting from increases in the price of assets. The increase in wealth of U.S. households resulting from the housing and stock market booms during the 1990s and early 2000s contributed substantially to increased consumption and low savings during this period, according to numerous studies (see Wilkerson and Williams (2011) for a review). Nevertheless, the fallout from subsequent stock market and housing busts indicates that reliance on such asset price booms to finance consumption can be risky and unsustainable.

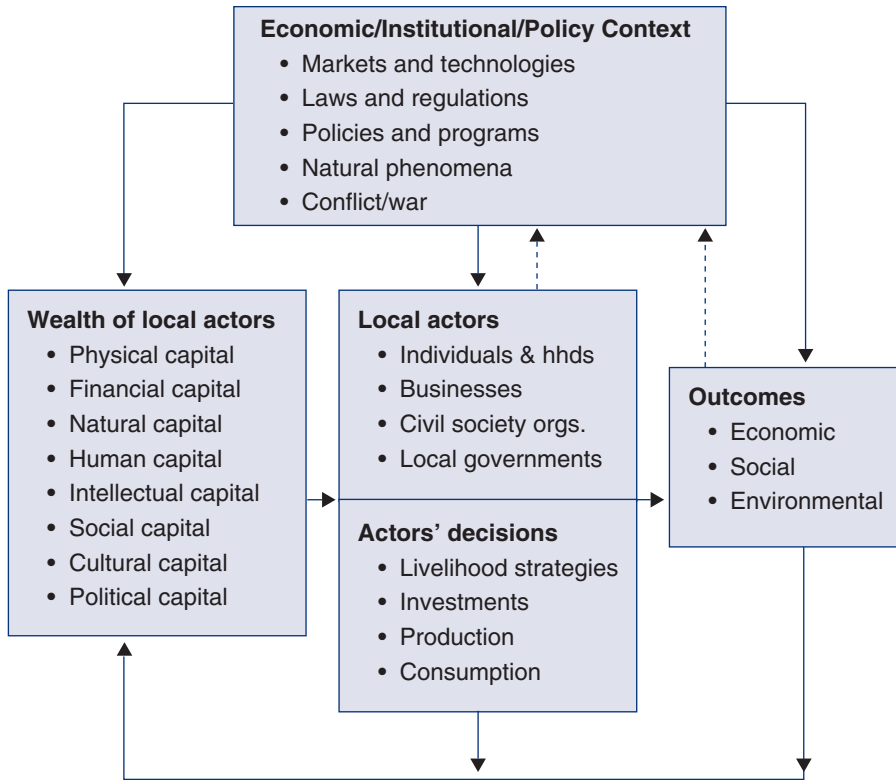
<sup>9</sup>Profit-motivated private firms and individuals do not necessarily seek to maximize the expected net present value of profits, if confronted with uncertainty and imperfect insurance markets, unless they do not care about risk (i.e., they are “risk neutral”). Even risk-neutral private investors will not invest based on the net present value of profits if they are credit constrained, or if investments involve “sunk costs” (i.e., costs that can't be fully recouped later by selling the asset) and future profits are uncertain (Fafchamps and Pender, 1997; Dixit and Pindyck, 1994).

<sup>10</sup>Kretzmann and McKnight, 1993; Carney, 1998; Castle, 1998; Bebbington, 1999; Green and Haines, 2002; de Janvry, 2003; Flora and Flora, 2004; Pender et al., 2006; Reimer, 2006; Ratner, 2010. See appendix B.



Figure 2

**General wealth – decisions – outcomes framework**



Source: USDA, Economic Research Service.

In our framework, we focus on assets that are owned or controlled by actors in the rural community, including individuals, households, businesses, nonprofit civic organizations, and local governments. At the local level, the assets controlled by these actors are “endogenous,” meaning that decisions made by local actors directly affect the accumulation or depletion of the assets. Other assets that affect local decisions but that are controlled by external actors—such as Federal and State lands and highways, electrical and telecommunications systems, and universities—are treated as part of the local economic, institutional, and policy context (not local assets).

At the center of the framework are the decisions made by local actors. Key economic decisions include long-term choices about livelihood strategies, such as what business enterprises and occupations to pursue and where to live; what investments to make; how much of particular goods and services to produce or provide and what inputs to use in their production; how much of different goods and services to consume; and what incentives, supports, or regulations may be used by local governments to influence private investments.

Local actors’ endowments of different types of wealth determine what opportunities are available and the attendant costs, returns, risks, and constraints (indicated in figure 2 by the arrow from the wealth box to the local actors and decisions box). These decisions are also affected by the economic, institutional, and policy context, such as the functioning of markets and the prices determined for various goods and services; technological innovations affecting the feasibility of economic opportunities; local laws, regulations,

and policies; Federal and State programs; and even natural phenomena such as natural disasters or climate change.

Conditional upon actors' endowments and local context, wealth creation decisions lead to outcomes such as changes in employment, income, property values, and tax revenues (economic); changes in poverty, education, health, and nutrition (social); and changes in air and water pollution, land quality, biodiversity, and carbon stocks (environmental).

## Definitions of Types of Wealth

**Physical capital** – Includes the stock of produced capital goods (i.e., buildings and equipment) used by firms to produce outputs; infrastructure used by firms and households to reduce costs of commerce (e.g., roads, bridges, waterways, telecommunication networks); and durable goods used by households for either production or consumption purposes (e.g., buildings, vehicles, household equipment).

**Natural capital** – The stock of naturally occurring assets that yield a flow of valuable goods or services into the future (e.g., air, water, land, minerals, flora and fauna) (Costanza and Daly, 1992). Natural capital includes renewable natural resources such as ecosystems and non-renewable resources such as fossil fuel and mineral deposits.

**Financial capital** – Money and other liquid financial assets (assets that can be readily sold and converted to money), such as stocks, bonds, futures contracts, and letters of credit, net of financial liabilities.

**Human capital** – Human capital investments were defined by Becker (1993) as investments that “improve skills, knowledge, or health, and thereby raise money or psychic incomes” of people. Examples of human capital include the level of education, training, and health of workers.

**Intellectual capital** – Knowledge and innovation. Unlike human capital, which is embodied in individuals, intellectual capital exists separately from individuals and is thus “nonrival” in nature, meaning its use by one agent does not reduce its availability to others (Romer, 1990). Examples include knowledge and innovations stored in books, articles, patents, etc.

**Social capital** – Defined by Putnam (1993) as “features of social organization, such as networks, norms, and trust, that facilitate coordination and cooperation for mutual benefit.” Examples include formal organizations and informal associations and networks, such as networks of migrant workers and the social relationships that bind them.

**Cultural capital** – Defined by Flora and Flora (2004) as people’s understanding of society and their role in it, values, symbols, and rituals. An example is the “Protestant work ethic,” which Weber (1905) argued was an important factor contributing to the rise of capitalism in the West.

**Political capital** – Defined by Flora and Flora (2004) as “the ability of a group to influence the distribution of resources within a social unit.” An example is the political strength held by farm lobbies and agribusiness companies in agricultural policy circles.

These decisions and outcomes often change the level of capital stocks—like depletion of natural capital stocks resulting from water pollution or improvement in human capital stocks resulting from investments in education and health—with consequences for future wealth creation (indicated in figure 2 by the arrows from the decisions and outcomes boxes to the local assets box). Over a larger scale and longer period of time, local wealth decisions may also affect the community’s economic, institutional, and policy context (indicated by the dashed arrows).

### ***Applying the Framework: An Example Based on Corn Ethanol Production***

Many local actors have played important roles in the expansion of ethanol production in rural areas. Local individuals and businesses, particularly farmer cooperatives, invested in ethanol plants in the past decade as the demand for ethanol boomed (Low and Isserman, 2009; Bain, 2011). The number of U.S. ethanol plants quadrupled from 54 in 2000 to 204 in 2010, mostly in rural areas, while the production capacity increased nearly eightfold (Renewable Fuels Association (RFA), 2011). Many of these investments were made by local investors. Between 2002 and 2006, 21 of 35 new ethanol plants were owned by local farmers ([http://www.afdc.energy.gov/afdc/data/docs/ethanol\\_plant\\_ownership\\_capacity.xls](http://www.afdc.energy.gov/afdc/data/docs/ethanol_plant_ownership_capacity.xls)). However, since 2006, owners of new ethanol plants have been primarily nonlocal, and locally owned plants’ share of production capacity has declined from 39 percent in 2006 to 15 percent in 2011 (RFA, 2011).

Ethanol investments have been facilitated by local government actions like provision of tax increment financing, land donations, tax-funded land improvements, and property tax abatements, in addition to Federal and State incentives (Koplow, 2006). Assistance by local governments to help identify a suitable site, improve infrastructure, change zoning regulations, provide water and other public services, and obtain the necessary environmental permits is often critical to an ethanol plant’s startup (Karetnikov et al., 2008). Support or opposition by local community members can influence whether and where plants are sited and what concessions are required to satisfy local stakeholders. For example, in 2006 community members in Cambria, Wisconsin, opposed construction of an ethanol plant in their town due to concerns about noise pollution, traffic congestion, and water supply, based on the record of an ethanol plant in a neighboring town (Karetnikov et al., 2008).

Local wealth endowments have been critical in enabling local actors to invest in ethanol production. Ethanol plants have mostly been built in rural areas having productive farmland and sufficient rainfall/irrigation water for corn production and water for ethanol processing (Low and Isserman, 2009). Ethanol plants usually purchase the corn feedstock from within a 50-mile radius. Proximity to livestock feeding operations enables ethanol producers to sell the byproduct, wet distillers’ grain. Local human capital—particularly entrepreneurial talent, managers, and other professional staff—have also been important in establishing locally owned plants (Urbanchuk, 2006).

Farmer-owned cooperatives spearheaded investments in ethanol plants early on, indicating the importance of these organizations’ financial capital (Bain, 2011). However, as the scale of ethanol plants has increased, fewer plants

are local farmer-owned. The social capital of farmer organizations may have helped to instill local support for these investments, but the trend toward corporate ownership may be undermining such support. However, a recent study of community attitudes toward ethanol plants (two communities in Kansas and one in Iowa) found that the ownership structure did not matter as much as the plant's civic performance (Selfa et al., 2011).

Investments in ethanol plants have been affected not only by local assets and inclinations, but also by contextual factors like proximity to urban markets, interstate highways, and railroads; the price of ethanol relative to corn and other inputs in ethanol production; and Federal/State policies to promote ethanol production (Low and Isserman, 2009). Three-fourths of U.S. ethanol plants are within 10 miles of a major U.S. highway or interstate highway, and most are located on a railroad to economize on shipping costs. Influential Federal policies include the Renewable Fuels Standard (RFS) enacted in the Energy Policy Act of 2005 and amended by the Energy Independence and Security Act of 2007 (RFS2); a Federal tax credit for ethanol-blended gasoline and an additional tax credit for small ethanol producers; and a tariff on imported ethanol.

State policies promoting ethanol include partial or complete bans on the use of methyl tertiary butyl ether, an oxygenate that has been replaced by ethanol in gasoline; ethanol producer incentive programs; and renewable fuel standards. Many States provide exemptions from fuel taxes or sales taxes for ethanol blends (Koplow and Steenblik, 2008).<sup>11</sup> Several States also provide production payments or tax credits for ethanol producers, as well as capital grants, credit guarantees, tax-exempt bonds, regulatory exemptions, and other assistance to ethanol producers and consumers. In some States, farmer-owned ethanol refineries receive preferential support. Koplow and Steenblik (2008) valued Federal and State support to the ethanol industry in 2008 at an estimated \$9.2-\$11.1 billion (mostly due to Federal policies).

Despite government subsidies, the profitability of ethanol refining has declined dramatically since 2006 (fig. 3), with estimated profit margins of a typical ethanol plant in Iowa averaging less than 10 cents per gallon in the first 6 months of 2011 (Hofstrand, 2011). Although ethanol prices have rebounded after a decline from mid-2008 through mid-2010, corn prices have also rebounded, leaving thin margins for the industry. Not surprisingly, as profits have decreased, ethanol plant expansion has slowed (RFA, 2011).

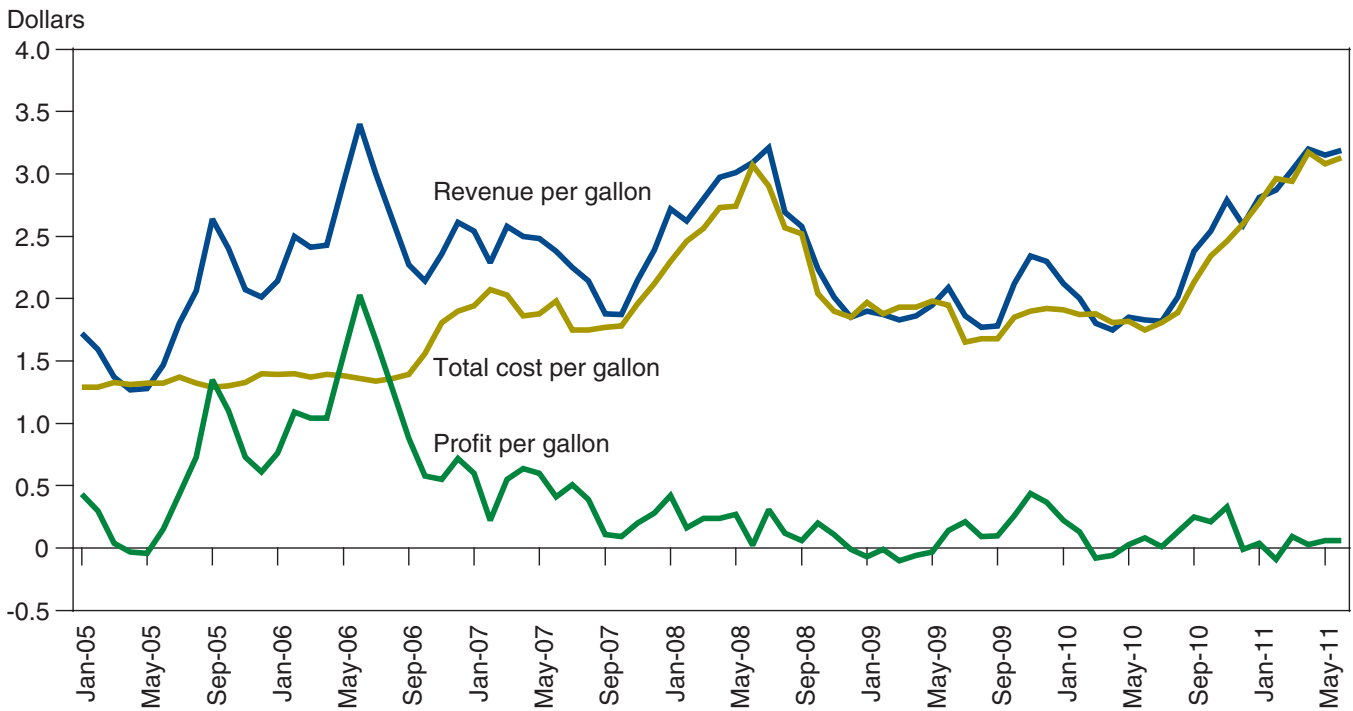
The profitability of ethanol production has also been affected by technological changes within the industry. Since the 1980s, ethanol production has become much more efficient as smaller plants failed and were replaced by larger ones. Several new processing techniques reduced input requirements—particularly energy and water use—and increased yields per bushel of corn, cutting costs. Ever larger plants have further reduced production costs since the late 1990s (Shapouri and Gallagher, 2005).

Ethanol plant investments have led to a variety of economic, environmental, and social outcomes. A plant producing 100 million gallons per year (MGY) of ethanol has been estimated to generate \$203 million in annual sales, employ 39 full-time-equivalent workers, and pay \$2.4 million in annual wages (Low and Isserman, 2009). These direct economic effects lead to

<sup>11</sup>The fuel tax exemptions averaged 11.5 cents per gallon across States studied for gasoline with 85% ethanol (E85) in 2007 (Koplow and Steenblik, 2008).

Figure 3

**Estimated revenues, costs, and profits of a typical ethanol plant, Iowa**



Source: Estimates from Hofstrand (2011)

indirect effects on the local economy as a result of local purchases of goods and services by the plant and by the local firms that supply the plant and induced economic effects due to increased consumption expenditures by employees of the plant, its suppliers, and their suppliers. The size of these indirect and induced effects depends on many factors, including the size and diversity of the local economy, the relative integration of the local economy with the broader economy, the profitability of ethanol production, and the share of ethanol plants owned by local people. Across four proposed plants in Illinois and Nebraska, Low and Isserman (2009) estimated that the number of jobs induced by an ethanol plant could range from as few as 65 to as many as 211, and that the indirect or induced economic output could range from \$8 million to \$33 million per year. These results are consistent with local impacts estimated by several other studies, although a few studies have estimated much larger impacts.<sup>12</sup>

Even though the aggregate amount of ethanol produced is likely driving up total demand for corn, crop prices, production, and land use (USDA, 2007; Fortenbery and Park, 2008; Searchinger et al., 2008; Hertel et al., 2010), a single corn ethanol plant likely has limited impact on local corn prices and production (Swenson, 2007b). Still, a small local price premium for corn has been observed near 12 ethanol plants in the Midwest, averaging about \$0.125 per bushel at the plant site (ranging from \$0.05 to \$0.19 per bushel), with a positive price impact as far as 68 miles from the plant (McNew and Griffith, 2005). Low and Isserman (2009) estimated that local impacts from the corn

<sup>12</sup>For example, studies by Petersan (2002); Peters (2007), and Swenson (2007a) have similar employment multipliers. By contrast, in a report for the Renewable Fuels Association, Urbanchuk (2008) estimated that a 100-MGY ethanol plant would lead to 1,137 additional jobs in the local economy and 1,790 jobs statewide. The higher impacts were due to Urbanchuk's assumption that local ethanol production would lead to much higher local corn production. Swenson (2007b) argued this is not tenable because the corn used for local ethanol production would come primarily from reduced corn exports from the State, rather than from increased production.

price premium were much smaller than the effects of plant operations on local income and employment.<sup>13</sup>

An ethanol plant also affects local property values; rents, royalties, and dividends received by local residents; and local tax revenues. Henderson and Gloy (2009) estimated that farmland values in the Great Plains were significantly higher closer to an ethanol plant, consistent with the local corn price premium. Impacts of ethanol plants on residential property values are less clear.<sup>14</sup> A few studies have estimated positive impacts on property income and tax revenues.<sup>15</sup>

Locally owned plants likely generate greater local economic impacts for two reasons: (1) locally owned plants tend to spend more in the local economy to hire professional staff and borrow more from local banks; and (2) local owners spend some of their plant dividends in the local economy (Urbanchuk, 2006).

Local ownership does not guarantee that most of the benefits of the plant will be received by local stakeholders, however. The profit margins of ethanol plants have recently shrunk; dividend payments to local owners have likely declined as well. At the same time, a greater share of ethanol returns has gone to corn farmers in general as corn prices have risen (Hofstrand, 2011). Thus, except for local benefits caused by the local corn price premium (which doesn't depend on local ownership of the ethanol plant), the benefits of increasing corn prices resulting from ethanol production are felt widely by farm communities, while many of the economic and environmental costs of living near a plant are felt locally, especially if residential property values fall. As a result, the net benefits that most local stakeholders perceive from ethanol plants—even locally owned ones—may be limited and could change fairly quickly. Case studies of community perceptions of ethanol plants confirm that the greatest perceived beneficiaries are local farmers, investors, and plant employees, with limited economic benefits (and some quality-of-life infringements) envisioned for other community members (Bain, 2011; Selfa et al., 2011).

Local environmental impacts of ethanol plants may include air pollution, increased demand on freshwater supplies, and water pollution. Air pollution can result from the fermentation process and from burning fossil fuels or biomass to boil liquids and dry the distillers' grain byproducts.<sup>16</sup> The total amounts emitted are very small compared to current national emissions, although impacts near ethanol plants for particular pollutants can be significant (EPA, 2011). Corn ethanol plants typically consume about 3-4 gallons of freshwater for each gallon of ethanol produced. The amount of water consumed by a 100-MGY ethanol plant is comparable to the water consumed by a town of 5,000 people (NRC, 2008). This demand can have locally significant impacts, especially where groundwater supplies are increasingly scarce, such as in the high plains of south-central Nebraska (NRC, 2008). Water quality issues can result from the discharge of effluents from cleaning salts that build up in cooling towers and boilers, and from the disposal of brine water that results from water purification measures, although the Environmental Protection Agency does not consider corn ethanol plants to cause any major effluent quality issues (EPA, 2011).

<sup>13</sup>For example, the maximum impact estimated by Low and Isserman (2009)—assuming a corn price premium of \$0.35 per bushel—was to increase total employment by 28 jobs in the largest county considered, compared to an impact of 250 additional jobs from plant operations in the same county.

<sup>14</sup>We found only two unpublished studies of the impacts of ethanol plants on residential property values. Turnquist et al. (2008) found statistically insignificant associations between residential property values and distance to an ethanol plant in Wisconsin. Hodge (2011) found that residential property values were as much as 18 percent lower near an ethanol plant (as far as 2 miles away) in Michigan, but that these impacts varied across locations.

<sup>15</sup>For example, the Clean Fuels Development Coalition estimated that a 100-MGY ethanol plant in Nebraska would increase local annual property income by \$4.45 million and pay \$1.06 million in property and other taxes, plus an additional \$0.49 million in local tax collections due to the additional economic activity resulting from the plant (CFDC, 2008).

<sup>16</sup>Ethanol production also affects emissions of greenhouse gases, though these impacts result mainly from the aggregate impacts of replacing fossil fuel combustion with renewable fuel sources and the associated changes in use of agricultural land and other agricultural inputs, rather than ethanol plant operations (Searchinger, 2008; Hertel et al. 2010; USEPA, 2011)

The social impacts of increased ethanol production on rural areas of the United States have been less well studied than the economic and environmental impacts. The literature concerned with social impacts has focused on impacts of aggregate biofuel production on people in developing countries, particularly food consumers in low-income developing countries (e.g., Naylor et al., 2007; Rosegrant et al., 2008; Cushion et al., 2010). Consumers in the United States are also affected by food price impacts of biofuel production, although the impacts are generally considered to be small. For example, EPA (2010) estimates that annual food expenditures of U.S. consumers would be increased by \$10 per capita as a result of implementation of the Energy Independence and Security Act's biofuel standards. EPA (2010) also estimates adverse health impacts resulting from increased air pollution due to biofuel production, with annual costs valued at \$600 million to \$2.2 billion (less than \$10 per capita). A few case studies reveal community concerns about noise and traffic congestion from ethanol plants, along with concerns about water use, odors, and air pollution (Karetnikov et al., 2008; Selfa et al., 2011). Estimates of other potential social impacts of ethanol production in rural areas—such as impacts on the distribution of income and wealth, poverty rates, and education—are not available.

Decisions made by local actors related to ethanol production may affect local wealth endowments, altering the prospects for future wealth creation. For example, increased local tax collections resulting from a new ethanol plant may enable public investments in local roads, schools, or other infrastructure, which can spur future wealth creation. Increased farm income and farmland values may enable farmers to invest in new farm equipment or other private assets. On the other hand, negative environmental impacts such as depletion of local groundwater supplies or air pollution may impair a community's ability to attract or retain residents. Failure of the proponents of an ethanol plant to address citizens' concerns about adverse social or environmental impacts can undermine future efforts to achieve local support for such investments.

Over a larger scale and a longer term, the aggregation of decisions by local actors and their impacts may influence the economic, institutional, and policy context for local ethanol production. For example, increased ethanol production is contributing to increased corn prices, which has reduced the profitability of ethanol processing since 2006. Accumulating experience with the benefits and costs of ethanol processing, including the costs of subsidies, can cause people's attitudes and State and Federal policies to evolve, sometimes to the detriment of existing plants. Thus, the dynamics of wealth creation related to ethanol production, as with other economic opportunities in rural America, may respond in complex ways to changing assets and contexts, resulting in part from the initial investments made in response to the opportunity.

### ***Implications of the Framework***

This framework and example illustrate several key points about the process of rural wealth creation. For one, the process is highly context-dependent: its success is largely fueled by the wealth endowments of local communities, businesses, and households and contingent on the existing economic, institutional, and policy context. For example, policies to promote biofuel

production have created wealth in communities with fertile farmland and water, transportation infrastructure, financial resources, and an entrepreneurial class of farmers or other investors capable of organizing and managing such investments (Low and Isserman, 2009). Where these factors are absent, efforts to promote biofuel production may be unsound and could deplete local wealth. Even where these conditions are present, changes in market conditions (such as rising prices of corn relative to ethanol) or in policies (such as elimination of subsidies and trade protections for ethanol) could render investments in biofuels unprofitable.

The ethanol example illustrates another key point. Different types of capital are often complementary; investing in one type of capital can increase the returns to investing in another. For example, prior investments in transportation infrastructure likely increase the returns to ethanol investments. As such, planning and coordinating across a range of investments is likely critical to the success of rural development efforts.

Many investments occur sequentially, as the returns from one investment enable subsequent investments to take place. For example, if ethanol production leads to increased local tax revenues, this may enable increased investments in local schools or other facilities. Realizing the potential to stimulate a positive and sustainable cycle of investment requires adequate consideration of such dynamic linkages in local development planning efforts.

Even if different types of investments are not complementary, it is important to consider all types of capital investments in order to achieve a desired outcome at lowest cost or with fewest undesirable side effects. For example, it might prove cheaper to reduce net greenhouse gas emissions by planting or protecting trees (natural capital) than by promoting investments in ethanol plants (physical capital), considering that the net benefits of corn ethanol production in that regard are controversial (e.g., Farrell et al., 2006; Searchinger et al., 2008; Hertel et al., 2010; EPA, 2010; USDA ERS, 2011).

The biofuels example illustrates that investments in rural wealth creation are risky, as evidenced by the declining profitability of ethanol processing since 2006. One way to reduce exposure to risks is portfolio diversification, or investing in different types of assets and ventures that have uncorrelated or negatively correlated risks.<sup>17</sup> For example, an agricultural community that invests in both ethanol and corn production will have offsetting risks associated with corn prices (holding ethanol prices constant). However, this strategy would not address risks associated with changing demand for ethanol. Broader diversification of the local economy into activities not much affected by ethanol demand (such as natural amenity-based development) or that benefit when corn and ethanol prices fall (such as livestock production) would more effectively address this type of risk.

The ethanol example also demonstrates the importance of who owns the assets that are being invested in, who bears the costs, and who receives the benefits. Locally owned ethanol plants led the expansion of the sector for several years, but are becoming less common. As a result, the local economic impacts of ethanol production may be diminishing.

<sup>17</sup>There is a substantial literature on the risk-reducing benefits of industrial diversification of regional economies and potential tradeoffs with economic growth, dating from Conroy (1974). For a recent example and review of this literature, see Spelman (2006).



Local ownership also relates to the issue of risk. If local investors focus primarily on local assets, they are likely to face greater risks than if their portfolio included assets located outside of the community. A local plant's closing would devastate the assets of community-focused investors more so than those of more diversified investors. Furthermore, local investors may miss opportunities to invest in assets elsewhere that offer higher returns. In a few case studies of ethanol plant investment, community leaders have acknowledged that dividends earned by local investors can benefit the local economy regardless of their source (Bain, 2011; Selfa et al., 2011).

In summary, the ethanol example illustrates many challenges associated with efforts to promote rural wealth creation. The challenges of context dependence, the risks associated with a changing context, complex and dynamic relationships among different types of wealth, and the multidimensional impacts and dynamic feedback effects of wealth creation strategies explain why rural wealth creation is not an easy task. Yet, the approach offers the potential to contribute to sustainable and broadly shared rural prosperity through well-focused investments in wealth creation that are suited to the local context. Ethanol production is of course only one of many possible strategies to promote rural wealth creation. The next section discusses a broader set of strategies, the assets that they build on and build up, and their suitability to different contexts.

## **Economic Development Strategies and Rural Wealth Creation**

Economic development strategies are only a subset of possible approaches to rural wealth creation, though efforts to create wealth benefit greatly if they are part of a coherent strategy based on local comparative advantages and community priorities. Coherence and coordination of investments across different types of assets are particularly important given the frequent need for sequencing: i.e., infrastructure before industry.<sup>18</sup>

Some development strategies, particularly regional ones, can give communities access to some of the wealth in neighboring communities. Such intercommunity collaboration, as well as collaboration among various stakeholders within a community, can create synergies in wealth creation over time. Economic collaboration and sustainability is particularly important for rural areas because so many rural communities are sparsely populated, and the closing of one or two key local businesses can hurt the local economy, leading to wealth depletion. To improve local economic resilience, many rural economic development strategies emphasize diversification, integration with the broader (and presumably more stable) regional economy, or establishment of industries with a comparative advantage in the national or global economy.

### ***Traditional Approaches***

Several longstanding approaches to rural economic development—industrial recruitment, regional centers, bedroom communities, and amenity-based development—have the potential to create and perpetuate wealth. The success of each strategy is highly dependent on the local and regional context (see table 1 for local attributes associated with each of these strategies).

<sup>18</sup>Our focus is on local or regional strategies and policies. Federal and State government programs and policies are also very important for rural wealth creation. These include policies that are independent of local and regional strategies (such as tax incentives to encourage individuals to save) and policies that interact directly with local and regional strategies (such as those that help finance these strategies).

Table 1

**Rural development strategy typology**

Strategy	Approach	Places most suited to strategy
<b>Traditional</b>		
Industrial recruitment	Attract traditional export-based industry using tax breaks and other concessions	Places with low-cost, low-skilled labor force and convenient transport to sources of inputs and markets.
Regional center	Expand retail and services sectors to attract workers and consumers from nearby towns	Places centrally located in rural regions, having good transportation access to rest of region
Bedroom community	Provide good schools and residential amenities to commuters to larger cities	Places located near large and growing cities with good transportation to the cities
Amenity-based	Provide public services desired by tourists, seasonal migrants, retirees	Places with good natural and/or cultural amenities, good transportation connections with population centers
<b>Nontraditional</b>		
Small business entrepreneurship	Provide training, loans, tax incentives, and technical assistance to small business entrepreneurs; Use entrepreneurial development systems to establish an entrepreneurial culture	Any rural community with access to education, training, and technical assistance providers
Cluster-based	Provide training, loans, and technical assistance to networks of similar firms	Any place that already has a concentration or cluster of similar firms with growth potential or having properties that could help establish such a cluster
Innovation and knowledge	Promote increased use of local educational and technological resources by local businesses	Any place with convenient access to higher education or technology resources
Creative class	Attract well-educated or creative people with goods and services they like, add amenities sought by well-educated or artistic people, assist their starting or growing of local businesses	Places with amenities, close to cities, with a concentration of small businesses/self-employed working population

Source: USDA, Economic Research Service.

*Industrial Recruitment*

Historically, the approach most commonly taken to diversify a local economy has been to recruit businesses into the community. Local officials often do this by promoting their rural community's appeal to businesses, such as low-cost labor and cheap land, or by offering business incentives (tax breaks, free land, etc.) to incoming firms. This approach can create wealth because most of the targeted businesses export their products outside the locality, with a portion of the return flowing back to the community in the form of wages, purchases of local inputs, and increased local tax revenue—which can then be used to acquire various forms of public and private wealth. This approach often exploits the local economy's comparative advantages or local assets, such as mineral deposits or proximity to major transportation modes, and it

can also be used to help diversify the local economy. Although this is consistent with optimal industrial location theory (Dawkins, 2003, p. 136) and “export-base” development theory advocated by economists such as North (1955), the industrial recruitment strategy has been criticized as being either ineffectual or too costly in terms of incentives provided to the firms. It nevertheless remains popular in many rural areas, even as larger business establishments—the most common targets of such strategies—increasingly locate overseas to achieve cost savings.

### *Regional Centers and Bedroom Communities*

Another traditional approach to rural development involves integration with the surrounding region by emphasizing a specialized function. For example, central places with relatively large rural populations and good transportation access may position themselves as regional centers (Duranton and Puga, 2004). These regional centers are consistent with central place theory, which assumes a hierarchical system of central places (or cities) in which smaller cities import goods and services from larger cities (regional centers) in the region, while providing various inputs to the same larger cities (Dawkins, 2003, p. 133). This strategy involves encouraging the growth of public and private goods and services that attract residents of neighboring communities to purchase these goods and services, providing an inflow of money and wealth to the regional center community.

In contrast, rural communities on the fringes of growing metropolitan areas may find it advantageous to become bedroom communities from which residents commute daily to cities for employment.<sup>19</sup> This strategy can be advanced by improving transportation infrastructure and making sure that the quality of housing and basic services suits the demands of commuters and their families (Heimlich and Anderson, 2001; Hayden, 2003). Because these commuters tend to have relatively high-wage jobs in urban areas, their incomes can add significantly to the local tax and economic base, and the things they demand, such as high-quality schools, can also add to local wealth.

### *Amenity-Based Development*

For places with significant natural (or cultural) amenities such as mountains, lakes, and beaches, it may be possible to increase local income and wealth, diversify the economy, and achieve more sustainable rural development through increased tourism, recreation, and retirement development (Reeder, 1998; Reeder and Brown, 2005; McGranahan, 1999).<sup>20</sup> This amenity-based approach brings in visitors and can attract residents, providing the community with access to their wealth. The strategy involves promoting and improving the quality of, or access to, the amenities (natural and cultural capital), as well as improving public goods and services used by tourists, recreationists, and retirees. In addition to providing jobs, tax base, and income for business and property owners (financial capital), amenity-based development can lead to improved public infrastructure and facilities (built capital) for all residents. This approach can also help integrate the community with the surrounding region if many of the visitors or retirees come from the surrounding area.

<sup>19</sup>Karl Fox’s “functional economic areas” emphasize the importance of this kind of spatial dependence of large cities upon workers in adjacent employment centers. This concept has been integrated into the U.S. Department of Commerce, Bureau of Economic Analysis (BEA) concept of economic areas and metropolitan statistical areas (Dawkins, 2003, pp. 133-134). This concept has also influenced the definition of other geographic types by Federal agencies, such as the classification of Rural-Urban Commuting Areas by the USDA Economic Research Service.

<sup>20</sup>More information on this kind of development is available in the ERS website ([ers.usda.gov](http://ers.usda.gov)) material on rural development policy.

As with the industrial recruiting approach, each of these other traditional development strategies has potential drawbacks. Most notably, they have the potential to increase population significantly, which can cause increased sprawl, pollution, traffic congestion, and related problems. To be successful, these strategies might pursue other policies aimed at preventing or mitigating these problems.

### *Nontraditional Approaches*

In the first decade of the 2000s, many rural areas—including some places that had grown rapidly based on traditional strategies—suffered population loss and increased unemployment and poverty rates. This led to a call for nontraditional or alternative economic development strategies. Most of these strategies emphasize innovation to compete better in the global economy and greater collaboration among businesses and between public and private sector entities, including encouraging greater use of self-supporting networks. These somewhat overlapping nontraditional strategies include promoting small business growth and entrepreneurship, cluster-based development, rural innovation and knowledge-based development, and attracting the creative class, all of which require and improve social and human capital.

#### *Small Business Growth and Entrepreneurship*

Whereas industrial recruitment generally targets larger businesses, many of which compete in the global economy, small businesses are typically more tied into the local economy and less vulnerable to global competition. Entrepreneurial small business owners—who develop new products or devise new services—are considered to be more innovative than other small business owners, with greater growth potential. Small business entrepreneurs often live in the communities where their businesses are located, so more of the profits are retained locally than would be expected from the branch plants of larger nationwide or global businesses. These characteristics make this strategy conducive to sustainable development and wealth creation (Dabson, 2005; Drabenstott, 2005). Entrepreneurial development strategies go beyond traditional small business assistance approaches by employing venture capital (a riskier form of financial capital that involves equity investments in firms) to help entrepreneurial businesses grow, using entrepreneurial development systems (EDS) that promote and empower self-supporting networks of local entrepreneurs, and by trying to improve the entrepreneurial culture in the community (Edgcomb, 2008, Goetz, Partridge, and Deller, 2009; Macke and Markley, 2006).

#### *Cluster-Based Development*

The cluster strategy builds on the economic advantages of collaborative and competitive networks of existing local or regional businesses and institutions (Porter, 1990; Rosenfeld, 1995; Dawkins, 2003; Woodward and Guimaraes, 2009; Shields et al., 2009). This approach focuses on clusters of businesses related to one or more industries that are thought to have a local comparative advantage in the national or global economy. This advantage can be heightened by improving local or regional networks that support the industry and its innovation process. This strategy involves two basic steps: the identification of the most desirable clusters for the region and the targeting of assistance

to those clusters. Rural examples include local food chains in southeastern Ohio, carpets in northern Georgia, and aquaculture along the Maine coastline (Rosenfeld, 2009, p. 38).

### *Rural Innovation and Knowledge-Based Development*

This approach enlists local educational institutions and research or high-tech firms in developing innovative products or services that have a better chance to compete in the global economy than traditional goods and services. Such strategies try to promote greater collaboration between local businesses, knowledge/innovation organizations, and local governments. A knowledge-based local economy tends to employ higher skilled workers who make high wages, leading to greater local wealth (Drabenstott, 2005; Dabney, 2005). In addition, the innovative products can evolve with local educational and research support, thus remaining competitive over time and giving rise to more sustainable development and wealth.

### *Attracting the Creative Class*

Unlike the preceding “nontraditional” approaches that foster greater innovation by directly assisting individual entrepreneurs, businesses, or networks of businesses and research institutions, the “creative class” strategy aims to attract or retain the creative people who are most likely to become entrepreneurs and start or work for such innovative businesses. These people tend to be highly educated and skilled. Such individuals often seek particular characteristics in communities, such as good schools and natural or cultural amenities, so creative class strategies might attempt to improve or promote such assets and provide assistance to creative entrepreneurs in starting and growing businesses. If successful, these approaches have the potential to foster more sustainable growth and wealth creation by increasing the innovative component of local industry, as well as attracting and retaining creative class individuals who bring with them higher levels of personal wealth (McGranahan and Wojan, 2007; McGranahan et al. 2010b). A good example is Grand Marais (Cook County), Minnesota, which has developed various community assets—such as a center for the arts, a music association, a playhouse, and an “Art Colony”—and combined these cultural assets with business assistance to entrepreneurs to promote innovative business development (McGranahan and Wojan, 2007).

These represent only a few examples of alternative, nontraditional economic development strategies that might lead to greater and more sustainable wealth creation. For other examples of new or alternative rural development strategies, see Dabson (2010), Flora and Flora (2004), and Galston and Baeler (1995).

## **Local Development Strategy Formulation**

How does a locality arrive at a particular strategy that might lead to sustainable development and wealth creation? The traditional approach is to appoint or hire an individual to come up with a strategy. While this method can work, it also can result in strategies that are narrowly focused, infeasible, or lack broad local support. In recent years, rural development experts have

increasingly supported two new approaches to strategy formulation: strategic planning and research-based industrial targeting.

### *Strategic Planning*

Also called community visioning, this is a process that ideally engages all elements of a community (the rich, the poor, minorities, businesses, churches, schools, government entities, nonprofits)—often assisted by an outside facilitator—in identifying community goals and conceiving a workable development strategy, with specific steps to achieve those goals (Green and Haines, 2002). This approach, originally employed in the private sector after World War II, began to be used for local economic development in the 1980s. Early efforts to use strategic planning for local development were sometimes limited by planning efforts that ignored political realities, organizations that lacked the capacity to undertake strategic planning, and efforts that focused too much on process and not enough on outcomes (Blair and Reed, 1995). Recent strategic planning approaches have been focused more on the idea of “strategic doing” and the action steps a community must take to effectively implement the vision of the strategic plan (Hamm and Walzer, 2010).

Strategic planning has been used by regional organizations such as the Appalachian Regional Commission (ARC) and the Delta Regional Authority (DRA), as well as the national Economic Development Administration (EDA). Several studies have shown these organizations to have achieved positive economic outcomes (Martin and Graham, 1980; Isserman and Rephann, 1995; Burchell et al., 1998; Arena et al., 2008; Pender and Reeder, 2011), suggesting the value of strategic planning.

Strategic plans are designed to build on local assets, shore up local liabilities (where necessary), and exploit or achieve a comparative economic advantage that will lead to sustainable development. For example, a community might identify an underutilized lake on the outskirts of the county as a community asset and an underperforming high school that is producing too few college attendees as a community liability. The strategic planning process might devise a way to improve access to the lake, leading to lakefront development that produces a windfall of local property tax revenues. These new revenues might then be used to finance new distance-learning telecommunications facilities and equipment for the high school so it can add science and language classes, which could lead to improved school performance and greater college attendance. Although such projects might have been feasible without strategic planning, the planning process can help to get community support behind each project, either one of which might have failed to gain traction on a stand-alone basis. In addition, the planning facilitator might suggest ways to finance the projects, such as through impact fees on the lake-side residences or tax increment financing.<sup>21</sup>

In addition, strategic planning is dynamic: it gauges success so that strategies can be modified over time. For example, if the lake/school project was deemed successful, the community might undertake other amenity-related improvements in order to attract higher income residents.

<sup>21</sup>Tax increment financing is a method to finance public investments using future increases in tax revenues.

## ***Research-Based Industrial Targeting***

Quantitative methods exist to help identify industries best suited to a local community's economic development strategy. Such methods vary from simple to sophisticated and comprehensive.<sup>22</sup> The more sophisticated methods attempt to ascertain not only the likelihood that the industry might flourish locally, but also the extent to which the industry fits with the community's goals, which might include providing higher income, more stable jobs, or environmental sustainability. Research-based industrial targeting is therefore most useful when combined with some form of strategic planning, which identifies such goals in steering the industrial targeting.

Although research-based industrial targeting efforts date back to the 1980s, interest has grown among State and local development officials because of Porter's work on cluster analysis (Goetz et al., 2009). This industrial targeting/cluster approach requires the use of sophisticated computer models, and experts are typically employed to conduct the analysis. However, Extension researchers at various land-grant universities have set up models to cover various States or regions (e.g., Kansas, Montana, Northeast Wisconsin, and the Great Plains), and efforts are underway to implement these models at the local level.

One such effort is the new SET (Stronger Economies Together) initiative, begun by USDA's Rural Development mission area in partnership with four regional rural development centers. Under SET, pilot projects were initially launched in 23 multi-county regions in 9 States (Arkansas, Arizona, Kentucky, Louisiana, Missouri, New Mexico, Ohio, Pennsylvania, and West Virginia).<sup>23</sup> Under this initiative, university Extension experts conduct economic analyses for each region, identifying the regional comparative economic advantages and emerging economic clusters. Technical assistance and training are provided to the local entities to assist in the process.

Such regional approaches emphasize collaboration among local governments, businesses, and nonprofit groups in order to make the most of the region's collective wealth. For example, one community may have established a community college, while another may have established a research park and business incubator. These resources combined can better help entrepreneurs innovate, with economic benefits for both communities in the region. This illustrates an important point about wealth—access to wealth can be as important as possession of wealth, and collaboration, typically on a regional level, is often the key to gaining access to this wealth.<sup>24</sup>

## **Wealth Creation Approaches To Combat Poverty**

Poverty concerns have been a particular focus of wealth creation efforts. Historically, most government policies addressing poverty have aimed at providing a minimal level of subsistence, including welfare cash payments, low-rent public housing, food stamps, and emergency medical treatment. These approaches, though important for the survival of the poor, have been criticized for not enabling or encouraging the poor (both individuals and communities) to accumulate the wealth needed to raise themselves out of poverty (Sherraden, 1991). Poor people and communities are also eligible for many economic development programs, such as USDA's infrastructure,

<sup>22</sup>For a good discussion of the various methods available, see Goetz et al. (2009).

<sup>23</sup>In 2011, SET was expanded to about 20 more regions in 2 more States, with plans to cover up to 30 States over time.

<sup>24</sup>Access to wealth is also manifest in the availability of Federal or State economic development assistance, or the availability of assistance from a nonprofit foundation. Key to gaining access to such assistance, as well as to assistance from neighboring communities within a region, is local leadership and planning capabilities, which vary greatly from one rural community to another.

housing, and business loan programs, which have more potential for creating wealth. Nevertheless, many poor people and communities underutilize these programs because of various barriers like incomes insufficient to pay off loans, even at subsidized interest rates. The poor may also lack a means of reliable transportation to get to a job, or be unfamiliar with ways to responsibly manage their money and debt. In addition, local government officials in poor rural communities are often unaware of available assistance or lack the resources to successfully apply. This has led to a number of proposals for asset-based welfare policies to address poverty concerns (Sherraden, 1991, 2000, 2003; Sherraden and McBride, 2010; Saegert et al., 2001).

Many of these ideas—like capacity building for local governments through leadership training—have existed for a long time and apply to all rural communities (Honadle, 1981). In recent years, wealth-based efforts targeted to poor communities and individuals have been championed by nonprofit foundations. For example, the Annie E. Casey Foundation has proposed improving access to affordable cars for low-income families or providing a manual to help families threatened with deportation to protect children's assets. Individual development accounts (IDAs)—in which the poor are provided matching funds by government to save and invest in homes, education, and small businesses—began in the early 1990s at the local level. Most States have passed IDA-enabling legislation, such as raising asset limits for welfare recipients (Sherraden, 2000, p. 3). In addition, financial literacy programs that educate residents or employees about ways to reduce debt and increase savings/investments can help the poor in both rural and urban areas (Corporation for Enterprise Development, 2011; Lopez, 2011; Edmiston et al., 2009).

More comprehensive regional approaches have also promoted wealth creation as a means to combat rural poverty. For example, the Appalachian Regional Commission (ARC) was created in the 1960s with the idea of helping an entire region to escape poverty. The ARC and other more recent regional development commissions (such as the Denali Commission and the Delta Regional Authority (DRA)) emphasize wealth creation through infrastructure improvements (see box, "Regional Development Programs" for a description of these programs). On a national level, the Economic Development Administration's (EDA) programs also target infrastructure improvements and apply strategic planning using multi-county planning districts.

Wealth creation also underpinned another Federal anti-poverty program that began in the 1990s but which has since been discontinued. The Federal Empowerment Zone/Enterprise Community (EZ/EC) program, available only to the poorest urban and rural communities, emphasized many of the concepts associated with wealth creation, such as increasing local employment and training, capital access, infrastructure development, environmental sustainability, and affordable housing. Applicants were required to conduct strategic planning and build on assets in forming a coordinated strategy with community-based partnerships. Several evaluations of rural EZ/ECs—and the "Champion Communities" that participated in the program but received less Federal assistance—found that the program stimulated wealth creation in poor rural communities (Aigner et al., 1998; Aigner, 2001; Flora, 2001).

More recently, the Northwest Area Foundation partnered with university Extension programs in Idaho, Iowa, Minnesota, Montana, North Dakota,



## Regional Development Programs

The Appalachian Development Commission (ARC) and the Economic Development Administration (EDA) got their start in the 1960s. Both employed multi-county regional planning entities that established local plans and received Federal support to implement those plans. Both emphasized investments in infrastructure, but they have also financed other kinds of projects fitting into local strategic plans. And both were meant to target investments to distressed areas, though the latter was a national program while the former focused only on the Appalachian region.

Around 2000, two new regional development programs were created. The Denali Commission, authorized in 1998, focused on remote communities in Alaska and emphasized infrastructure such as power generation and transmission facilities, advanced telecommunications, water and sewer systems, and health care facilities. The Delta Regional Authority, established in the early 2000s, focused on the multi-state region along the lower half of the Mississippi Delta. The DRA also had a focus on infrastructure, and like the ARC and EDA, made use of multi-county districts to do strategic planning for its federally supported projects.

The 2008 Food, Conservation, and Energy Act (PL 110-246) authorized the creation of several additional regional development programs: the Northern Border, the Southeast Crescent, the Northern Great Plains Regional Authority, and the Southwest Border Commissions, all patterned on the ARC model. To date, of these new regional entities, only the Northern Border Commission has had a Federal Chair appointed and confirmed.

For more information on these regional developments, including research assessing their economic impacts, see Pender and Reeder (2011).

South Dakota, and Washington in a program called *Horizons*. The goal is to reduce local poverty and increase wealth through locally devised strategies and enhanced social capital. Facilitated community visioning meetings are aimed at developing action agendas. *Horizons* also includes leadership training, technical assistance, and the fostering of networks with other local and regional entities. The end result is a list of two to five priority action areas, along with a list of community volunteers and leaders (social capital) to work on each priority (Hoelting, 2010).

A recent spinoff from this *Horizons* approach was begun by the Southern Rural Development Center (SRDC), with funding support from the Kettering Foundation, Farm Foundation, and Everyday Democracy. This Turning the Tide on Poverty (TIDE) project created 30 study circles in 5 Southern States (Alabama, Georgia, Louisiana, Mississippi, and Oklahoma) to develop community action plans to deal with problems leading to poverty, such as failing schools and community violence. For this effort, SRDC created a study circle guide, adapted to the Southern region, to assist local participants.

The Ford Foundation has a regional program to promote wealth creation in poor rural communities, which was launched in 2008 and is supporting projects in rural Appalachia, the deep South, and the Rio Grande Valley.

Ford’s approach emphasizes a flexible demand-driven approach to identifying wealth creation opportunities, focusing on promoting local wealth creation “that sticks” and is linked to particular value chains such as those associated with local and regional food systems, community forestry, and others. It asks grantees to measure impacts of projects on seven forms of wealth, including intellectual, social, built (physical), natural, individual (human), political, and financial capital.

## Why Measure Wealth Indicators?

Arguments exist both for and against measuring wealth indicators, given that many other indicators of rural development inputs, outputs, and outcomes are already commonly available. Measuring wealth can help diagnose areas for improvement and monitor and assess the impacts of wealth creation programs. However, in some cases, the difficulty and costs of measuring wealth indicators may outweigh the value of the information obtained.

### General Purposes of Indicators

Before measuring indicators of wealth, it is important to consider the purposes for which such indicators will be used. There are many possible uses for indicators.

**Identifying and diagnosing problems or opportunities.** Indicators can be used to track general changes in conditions over time, to identify emerging problems or opportunities as they arise, and to track progress in addressing problems or pursuing new opportunities. A good example of tracking changes in wealth conditions is indicators of farm households' financial well-being as derived from USDA's Agricultural Resource Management Survey (ARMS) (Park et al., 2010). As another example, the World Bank has attempted to measure "genuine national savings," taking into account the value of investments in human and natural capital as well as physical and financial assets (World Bank, 2006, 2011). Such efforts could be adapted to measure wealth at the community, State, or regional level, although many types of wealth can only be measured using existing public data sources at larger scales.

**Deciding where and how to target interventions.** Indicators of wealth can help to identify which programs and projects are best suited to particular places or circumstances and how best to target these interventions. For example, indicators of income, unemployment, and other local economic conditions are used to identify distressed counties where some rural development programs focus their efforts. Indicators of wealth could similarly identify places where the need or potential for wealth creation is greatest. However, such indicators would need to be available at as small a geographic scale as possible.

**Improving the design of interventions.** Wealth indicators can help in the program or policy design process by clarifying the program theory and hypothesized impact pathways, leading to better chances of success (Douthwaite et al., 2003). Thinking through the potential impacts of wealth creation and how to facilitate that may be as important as measuring these impacts. Interventions that intentionally seek to create multiple forms of wealth benefit from measures that focus resource allocation, provide ongoing feedback on effectiveness, and produce accountability, but only if measures are integral to the design and intervention process (Ratner, 2010).

**Monitoring the implementation and performance of interventions.** Indicators of program or project inputs and outputs are typically available in project accounting and monitoring systems and useful in assessing performance. Some of these are indicators of wealth, such as the amount of

physical infrastructure constructed. Also important but less commonly available are indicators of outcomes—such as changes in health status, environmental quality, or asset distribution—that are affected by many factors other than the intervention.

**Assessing the impacts of specific interventions.** One cannot observe what would have occurred in the absence of the intervention, and wealth indicators by themselves cannot address this attribution challenge (Imbens and Wooldridge, 2009). Wealth indicators can be useful in helping to select a comparison group that is similar to the participant group at the outset of an intervention and tracking relative changes in outcomes.

## Specific Reasons To Measure Wealth Indicators

Marketable wealth can provide people with economic opportunities and resilience in the face of low or uncertain flows of income, and this is not reflected in income measures. Therefore, wealth indicators assess benefits not measured by flow indicators. As such, **marketable wealth** is a minimum wealth indicator that should be measured.

Funds from an intervention may be allocated toward projects that increase wealth, but with **unobservable outcomes** (by traditional measures). For example, building a water treatment facility will result in cleaner water, which improves the health and well-being of people in the community, but this benefit may not be reflected in changes in income. Measurements of the physical capital produced (the treatment facility), the human capital (improved health status, increased net migration), and natural capital (increased water quality) that this project contributes to will better demonstrate its success. This reason is relevant for performance monitoring and impact evaluation of interventions.

It may be difficult to attribute a change in wealth outcomes to a new investment because the causal links are uncertain. For example, a new school is built and the community's population increases notably over the next 10 years. To what extent did the improved school facilities attract new immigrants? This **attribution problem** may be addressed in part by measuring changes in the stock of human capital the new school provides to the community (e.g., educational attainment of the children) and using statistical methods to demonstrate that this form of wealth helps attract new residents.

## Reasons Not To Measure Wealth Indicators

It may not always be necessary or cost effective to measure wealth or all of its components. In some cases, the concept of wealth being considered is difficult to define or measure precisely, while the relevant outcomes may be more obvious. For example, an important aspect of social capital may be the ability of communities to plan, coordinate, and implement development projects at a regional level. However, defining and measuring this aptitude or endowment may be difficult. If the main concern is with assessing the outcomes of investments and not with understanding the factors that contributed to their successful implementation, measuring social capital may not be necessary.

Ultimately, the selection of which indicators to measure will depend upon local values. For example, a Native American community may wish to emphasize measures of cultural wealth and continuity. Communities of any type may use a strategic planning process to arrive at the wealth indicators they most value. Indicator selection will also depend on the development strategies being pursued in a community or region, such as promoting manufacturing, exploiting natural resources, or pursuing amenity-based development.

## How Can Rural Wealth Creation Be Measured?

In this section, we first discuss a few prominent efforts to measure comprehensive wealth at a national level using a single monetary indicator, arguing that measuring a single value of comprehensive wealth in rural areas is neither advisable nor feasible. Different wealth indicators and methods of measuring them are likely needed for different purposes. For example, to target a wealth creation program at rural communities with low levels of, say, human capital, an indicator of that type of wealth should be selected that is readily available for rural regions and counties across the Nation. On the other hand, if the purpose is to assess a program, wealth indicators should be selected that relate to the program's desired outcomes and are measurable in places where the program was implemented. Stakeholders, policymakers, and program staff need to identify the set of indicators and methods that best suits their own purposes.

A selected set of indicators should accurately capture the relevant types of wealth over appropriate timeframes.<sup>25</sup> However, measurable wealth indicators are in most cases imperfect proxies for the concepts they seek to measure. Single indicators rarely reflect the entirety of a wealth concept or form of capital (see box, "Definitions of Types of Wealth"). Thus, sets of multiple indicators are likely necessary to reflect the nature of particular types of capital and to capture the multiple types of capital that make up comprehensive wealth. Qualitative and subjective indicators may be needed since not all aspects of wealth are objectively and quantitatively measurable (cultural or political capital, for example).

Also uncertain is how to measure community outcomes that result from wealth creation. After all, accumulating wealth is a worthy goal only insofar as it allows individuals, communities, and regions to achieve their goals. There is a large body of existing work on outcome measurement. For example, the North Central Regional Center for Rural Development has published a workbook that helps communities to determine outcomes and develop metrics to assess progress (Flora et al., 1999).

We focus here on measures and indicators of wealth, recognizing that the outcomes of interest may differ depending on the people, institutions, and organizations that are seeking to increase wealth at different geographic scales. For clarity, we organize wealth indicators by three sets of purposes, each with a particular set of methods and data:

1. Identifying and diagnosing problems and opportunities, and deciding where and how to target interventions;
2. Improving the design of interventions and monitoring their implementation and performance; and
3. Assessing the impacts of interventions.

<sup>25</sup>Some policies or programs may affect wealth over different periods of time. For example, constructing a school in a rural community will, by definition, immediately increase the stock of physical capital available to the community. Over a period of years, the new school may increase educational attainment and/or the quality of education that, in turn, leads to an increase in the community's stock of human capital. Numerous empirical studies show how human capital can affect desired outcomes. For example, Henry et al. (2004) found that high initial stocks of human capital in 1970 increased annual growth rates in per capita income for counties in the South.

## Identification, Diagnosis, and Targeting

To diagnose problems and opportunities and target interventions in rural communities, indicators of wealth and outcomes are needed. But should a single aggregate wealth indicator be used, or a set of different indicators? If all forms of wealth were readily measurable in value terms and could be easily substituted for each other, a single measure of the value of wealth would be both simple and reflect aggregate well-being, as proven by Arrow et al. (2010).<sup>26</sup> However, developing such a measure presents numerous conceptual and practical problems.

### *Aggregate Measures of Comprehensive Wealth*

There have been no efforts to estimate a single aggregate measure of comprehensive wealth for rural areas of the United States. However, the World Bank (2006, 2011) has estimated the value of national wealth for 120 countries, considering total wealth and the value of natural, produced, and “intangible capital.” The World Bank estimated the value of total wealth as the net present value of sustainable consumption, assuming that future consumption will grow at a constant rate, using consumption and savings data.<sup>27</sup> Produced capital was estimated using historical investment data from national income and product accounts, using the perpetual inventory method (PIM).<sup>28</sup> The value of natural capital was estimated as the net present value of future resource rents, using data on current resource rents of different types of natural capital and assumptions about the future growth of these rents. Intangible capital was estimated as total wealth minus produced and natural capital.

The World Bank’s approach in estimating comprehensive wealth may be useful at the national level, but it relies on data (such as estimates of consumption) that are not readily available at a local or regional (rural) level in the United States. It also relies on many stringent and questionable assumptions—that production is deterministic and involves constant returns to scale, that a perfect credit market exists with a constant real interest rate, that all people have identical preferences, and that future resource rents grow at a known constant rate. This approach also combines wealth estimates based on inconsistent methods; for example, the value of produced capital is considered to be the sum of the depreciated value of past investments, while the value of natural capital is estimated as the net present value of future rents. Some scholars have criticized the PIM method for estimating the value of the public capital stock because public investment spending may not translate wholly into productive public capital due to problems such as government inefficiency (Pritchett, 2000). Uncertainty and inefficiency could also imply divergence between the cost of cumulated private investments and the net present value of future profits that result.<sup>29</sup> Furthermore, estimating total wealth as the net present value of future consumption ignores the value of nonmarketed goods and services, such as amenities provided by natural, human, and social capital.<sup>30</sup>

Arrow et al. (2010) estimated the value of comprehensive wealth and changes in wealth for five countries, including the United States. They estimated the value of natural, produced, and human capital and changes in these assets, based on estimates of stocks and shadow prices of each asset type. The value

<sup>26</sup>This issue relates to the debate in the sustainable development literature between advocates of “strong” vs. “weak” sustainability perspectives (Stiglitz et al., 2009). The weak sustainability perspective assumes that many possibilities exist for substituting among different types of assets, so that what matters for sustainable development is the aggregate value of wealth of all types, rather than individual asset types. From this perspective, depletion of natural capital stocks is not necessarily unsustainable, as long as sufficient investment in other forms of capital occurs (e.g., Hartwick, 1977). Advocates of a strong sustainability perspective argue that substitution possibilities face physical limits, especially for natural capital stocks providing basic life-support functions. For such stocks, critical minimum thresholds may be necessary to maintain environmental resilience and human well-being (Stiglitz et al., 2009).

<sup>27</sup>Hamilton and Hartwick (2005) proved that the value of current wealth is equal to the net present value of future consumption in a deterministic optimal growth model including an exhaustible resource and producible capital, constant returns to scale production technology, and a perfect credit market. If the real market interest rate does not change over time, this model implies that consumption grows at a constant rate and that wealth is equal to current consumption multiplied by a factor that depends in general on the interest rate and people’s preference parameters. Under certain simplifying assumptions (i.e., the elasticity of marginal utility of all individuals equals 1, and all people have the same pure rate of time preference), this factor depends only on the rate of time preference, and total wealth can be estimated based on current consumption and an estimate of the rate of time preference (World Bank, 2006, p. 144). The World Bank used average per capita consumption over 3 years for current consumption to address the volatility of consumption, adjusted consumption downward for countries having negative rates of adjusted net saving (i.e., savings rates were adjusted to account for depletion of natural resources), and assumed the pure rate of time preference is 1.5 percent.

of human capital was estimated as the value of education and health. The value of education was estimated using an assumed rate of return to human capital investment (8.5 percent), the average wage level in each country, and the level of educational attainment. The shadow price of health was estimated using estimates from the literature on the value of a statistical life, and combined with data on age distribution and mortality to estimate the national value of health. The value of oil, natural gas, and mineral resources was estimated as the difference between the market price and per-unit extraction costs, multiplied by proven reserves. The commercial value of forest resources was estimated similarly, although Arrow et al. also included estimates of the wealth due to non-timber forest benefits, such as recreation, erosion control, water filtration, and habitat service, using estimates of the World Bank (2006). They also included the value of non-urban land as estimated by the World Bank. They used a similar approach as the World Bank to estimate the value of produced capital, except that they account for the net ownership of these assets with respect to the rest of the world.<sup>31</sup> In estimating changes in wealth, Arrow et al. incorporated the effects of population and total factor productivity growth, transnational externalities (due to greenhouse gas emissions), and capital gains on nonrenewable resource stocks. Remarkably, their measure of comprehensive wealth was dominated by the estimated value of health capital, which accounted for more than 90 percent of comprehensive wealth in all countries.

The approach of Arrow et al. (2010) has some advantages over the World Bank's approach. It does not rely on the stringent assumptions or consumption data needed by the World Bank to estimate total wealth, instead estimating comprehensive wealth based on estimates for particular types of assets. Their estimates of human capital wealth are innovative and, since they find that this type of wealth is the dominant form in terms of value, significant. Their approach appears more feasible to adapt and use for measuring wealth in rural areas of the United States than the World Bank's approach, since their estimates are based on shadow prices multiplied by wealth stocks. To the extent that shadow prices for particular assets are similar across U.S. regions (which may not be the case, however), national estimates of shadow prices (or estimates adapted to different regions based on available literature and data) could be used in estimating regional or local wealth, combined with data on local stocks of assets. Their finding that human capital is the dominant form of wealth suggests that a critical first step to measuring the value of rural wealth would be to value the human capital in rural areas, which could be based upon indicators of human capital (e.g., educational attainment, mortality, and life expectancy rates) that are readily available for local units from the Population Census, the American Community Survey, and other data sources (see appendix C).

However, many types of assets are not included in the Arrow et al. measure of comprehensive wealth, including social capital, political capital, and cultural capital. Arrow et al. (2010) expressed concern over the dominance of health capital in their estimates and whether this finding was theoretically and empirically robust. They also cited concerns about the limitations of available data; aggregation of various kinds of consumption and capital goods, which may cause biases of unknown magnitude; and the application of concepts such as the value of a statistical life across widely differing countries.

<sup>28</sup>The PIM estimates the value of a capital stock as the depreciated cumulated value of past investments, using the equation:

$$K_t = \sum_{i=0}^N I_{t-i}(1 - \alpha)^i + K_0,$$

where  $K_t$  is the capital stock in year  $t$ ,  $I_{t-i}$  is the real value of investment in year  $t-i$ , and  $\alpha$  is the rate of depreciation (World Bank, 2006).

<sup>29</sup>Even without uncertainty or inefficiency, there is no reason that the total costs of investments should equal the net present value of the benefits of investments. In general, without uncertainty, efficient investors will only invest in projects whose net present value of future returns is at least as large as the cost of investment. Hence the value of wealth estimated using cumulated investment costs could be expected to be less than the value estimated using the net present value of future returns, without uncertainty and with efficient investment.

<sup>30</sup>The World Bank's estimates of the value of natural capital include an estimate of the net present value of non-marketed forest benefits such as minor forest products, hunting, recreation, watershed protection, and option/existence values, based on a estimates provided in the literature (World Bank 2006, p. 151) and the opportunity costs of land in protected areas. However, the World Bank's total wealth estimates do not include these values, since they are based on the value of consumption.

<sup>31</sup>The World Bank's most recent wealth estimates (World Bank, 2011) also account for net holdings of produced capital.



The approach of Arrow et al. has other weaknesses too. Estimating shadow prices of assets can be quite difficult, requires numerous assumptions, and is difficult to validate. In a wide-ranging review of methods for measuring sustainability, the Commission on the Measurement of Economic Performance and Social Progress (CMEPSP) argued that when market failures cause observed prices to lose their informative power about the shadow values of assets, “the quantification of sustainability cannot proceed without explicit predictions of future economic and environmental trajectories, and without some explicit normative choices about values to be attached to such or such kind of trajectories” (Stiglitz et al., 2009, p. 234). In other words, one needs to model the future and make normative choices about what is to be sustained and for whom in order to estimate the social value of assets. This criticism applies also to the World Bank’s approach or any other approach to estimating an aggregate measure of the value of comprehensive wealth.

Given the shortcomings seemingly inherent in measuring an aggregate value of comprehensive wealth, an approach that does not rely on a single indicator seems warranted. After considering the options for measuring sustainability and their strengths and weaknesses, the CMEPSP recommended using a “dashboard of indicators,”<sup>32</sup> including separate indicators of quantity and quality for several types of assets (Stiglitz et al., 2009). The Commission suggested focusing monetary aggregation on assets for which reasonable valuation techniques exist and among which substitutions are possible; and combining this with physical indicators for other items that are more difficult to value and less substitutable, such as environmental indicators. An argument could be made to include in the dashboard indicators of other types of assets that are also not readily measured in value terms, such as social, political, and cultural capital.

### ***Measuring a Set of Wealth Indicators***

There have been few efforts to define and measure a set of wealth indicators covering rural communities of the United States. The Federal Reserve Bank of Kansas City (FRBKC) has developed regional indicators of several types of assets using publicly available county-level data, including indicators of bank deposit depth and evolution (Low, 2005a), household financial assets (Low, 2005b), entrepreneurship (Low, 2004), surplus skills (Moore, 2005), innovation, the creative workforce, human amenities (such as access to health care, recreation, restaurants, and scenic amenities), and infrastructure.<sup>33</sup> The FRBKC has mapped each of these indicators for a specific time period, but changes over time have not been mapped in most cases. In some cases, proxy variables were used to indicate wealth. For example, Low (2005b) provides three indicators of household financial wealth: median home values; the mean value of agricultural land; and interest, dividend, and rental income. Interest, dividend, and rental income is not an asset value, but rather income earned from assets, and therefore may be a reasonable proxy for the value of the assets that generate this income.

The Ford Foundation has supported development of wealth indicators for selected rural areas. In one study, Hoffer and Levy (2010) proposed, for 14 counties in eastern Kentucky, indicators of 6 types of community capital: individual (the stock of healthy weight people), social (the stock of residents with broadband availability and access), intellectual (the stock of patents

<sup>32</sup>Drawing an analogy to the dashboard of a car, CMEPSP argued that “a meter that added up in one single number the current speed of the vehicle and the remaining level of gasoline would not be of any help to the driver” (Stiglitz et al., 2009, p. 17).

<sup>33</sup>All of these indicators are documented at: [www.kansascityfed.org/publications/research/mse/regional-asset-indicators.cfm](http://www.kansascityfed.org/publications/research/mse/regional-asset-indicators.cfm)

in use), built (stock of electric generation capacity), financial (the stock of financial assets and liabilities), and natural (the stock of agricultural land and food produced for local consumption). For some indicators, county-level data were not available (e.g., financial assets and liabilities), so Hoffer and Levy used related indicators that were available at the county level (e.g., median household income and median home value). Some of the indicators seem tenuously related to the concept they are meant to reflect (e.g., broadband access as an indicator of social capital), or are questionable indicators in the context of rural Kentucky (e.g., patents as an indicator of intellectual capital). Nevertheless, many of these rural wealth indicators could be useful for specific purposes, and most are based on publicly available data.

Various studies have constructed indicators of particular types of capital at different scales. For example, Rupasingha et al. (2006) used county-level data on the number of membership organizations of different types, the percentage of voters who voted in presidential elections, the county-level response rate to the decennial population census, and the number of tax-exempt nonprofit organizations to construct an index of social capital. Many studies on the political determinants of Federal spending and economic performance have constructed indicators of political capital at the State or Congressional district level—such as the share of voters who participated in past elections, the seniority and leadership positions held by Members of Congress, whether Members of Congress are part of the majority party, and the percent of the vote carried by Members of Congress in past elections (e.g., Levitt and Poterba, 1999; Besley and Case, 2003; Lee, 2003; Hoover and Pecorino, 2005; Knight, 2005; Rupasingha and Goetz, 2007).

These efforts could serve as a springboard toward developing a dashboard of rural wealth indicators. Appendix C lists indicators of different types of assets, indicating publicly available data sources that could be used to construct them and the smallest geographic unit and time period for which such data are available. We focus on indicators that can be constructed using public data available for all of the United States. For wealth creation efforts at the regional, State, and community levels, these indicators may be supplemented by more localized data from primary sources, such as administrative records or survey results. For example, a proposed community development strategy may require improvements in a community's level of social capital. Secondary data on the number and size of charitable contributions could be supplemented by a community survey designed to assess the connectedness among residents.<sup>34</sup> The geographic scale of the indicators used will depend on what stakeholders require.

Some indicators can be estimated using publicly available data for all eight asset types in our conceptual framework (appendix C), although the ability to construct local indicators varies widely across asset types. For example, indicators of many different aspects of physical, natural, and human capital can be constructed for local geographic units such as counties, ZIP Code areas, census tracts, school districts, or other units. Fewer indicators of financial, intellectual, social, political, or cultural capital can be estimated for local units using public data. In part, this reflects the historical emphasis of government agencies on collecting particular types of data needed to carry out their mission, such as collection of geographically explicit data on highways by the U.S. Department of Transportation, on land and soil quality by USDA, on

<sup>34</sup>See the Social Capital Community Benchmark Survey at [www.cfsv.org/communitysurvey/](http://www.cfsv.org/communitysurvey/) for an example.

air quality by the U.S. Environmental Protection Agency (EPA), on mineral resources by the U.S. Geological Survey (USGS), on population and demographic characteristics by the Census Bureau, and on school quality by the National Center for Education Statistics (NCES). It may also reflect difficulties in conceptualizing and using indicators of less tangible aspects of wealth, like social capital.

The feasibility of constructing indicators for particular characteristics varies widely within asset types as well. For example, data on access to various types of physical infrastructure—such as highways, broadband, and water and sewer systems—and on the value of residential houses are available at a detailed geographic level. However, data on the physical assets of businesses or of households (other than houses) are generally available only at higher geographical scales, such as metropolitan areas or States. In most cases, the sources of information on these assets are sample surveys designed to be representative only at a national or regional level. Confidentiality concerns also limit the ability of government agencies to provide data on business assets for smaller geographic units.

In some cases, allocation and imputation methods could be used to estimate assets at a more local level. For example, Munnell (1990) used the U.S. Department of Commerce Bureau of Economic Analysis (BEA) estimates of private physical capital stocks at the national level for major industries and allocated these across States based upon each State's share of certain proxy variables for capital stock in major industries.<sup>35</sup> Garofalo and Yamarik (2002) estimated State-level private capital stocks by apportioning the national capital stock for each major industry to States based on the share of income earned by each industry in each State. A similar approach could be used to estimate private capital stock at the county level, based on the county's share of earnings or employment by industry using BEA county-level data on earnings and employment.<sup>36</sup> This assumes that capital-earnings or capital-employment ratios are similar within industries across counties. County-level variations in these relationships, as well as missing or undisclosed data on earnings and employment for particular industries at the county level, would pose estimation problems.

In some cases, asset values could be estimated from publicly available data on the flow of investments. For example, the value of the public physical capital stock could be estimated using data on public investments at the county level and the perpetual inventory method. This is the method used by BEA to estimate national public and private physical capital stocks (BEA 2003) and used by numerous researchers to estimate public capital stocks at the State or metropolitan level (e.g., Munnell, 1990; Garcia-Mila and McGuire, 1992; Holtz-Eakin, 1993; Baltagi and Pinnoi, 1995; Crihfield and Panggabean, 1995; Beemiller, 1999).

The quality of available data on public expenditures within local jurisdictions would need to be carefully assessed before using this approach to estimate local public capital stocks. For example, the Consolidated Federal Funds Report (CFFR) of the Census Bureau provides annual data on all categories of Federal expenditures by county, based on reports from all Federal agencies. However, the quality of these data varies substantially across agencies and programs. A 2006 review by the U.S. Government Accountability

<sup>35</sup>Munnell (1990) allocated the national stock of private capital in the agricultural sector to States according to each State's share of the value of land, buildings, and equipment in agriculture, using data from the Census of Agriculture. For the manufacturing and construction sectors, the national stock of private capital was allocated to States based on each State's share of the gross book value of depreciable assets taken from the Census of Manufacturers and Census of Construction. For other sectors, the State's share in value of production, sales, banking deposits, or other proxies was used.

<sup>36</sup>This approach is used by the IMPLAN group to estimate investment by county (Douglas Olson, personal communication).

Office (GAO) of the quality of census data on Federal economic development grant programs found “significant problems with agencies’ reporting of their program obligation data” (GAO, 2006, p. 4). GAO cited the inability of the Census Bureau to ensure that agencies submit data, lack of knowledge among program officials of data reporting requirements, and poor oversight and coordination at the agencies as major reasons for these data quality problems. In addition, it can be difficult to allocate program investments to local jurisdictions. For example, funds for many programs such as block grants go directly to State capitals or regional centers that redistribute money to local areas; often such funds are reported as received by the State capital or regional center rather than the local jurisdictions where the investments actually occurred.<sup>37</sup>

Of course, the quality of any of the data sources cited in appendix C must be considered when considering whether and how to use indicators based on these data. In general, data that are based on census information, such as many indicators of human capital, are likely to be more reliable for local geographic units than estimates based on sample surveys since they are less subject to sampling error.<sup>38</sup>

There is often a tradeoff between the quality or local specificity of data and its timeliness. For example, data collected by the decennial Population Census have zero or low sampling error and are available for small geographic units, such as census tracts, but are only available at 10-year intervals. More timely information on the population and its demographic characteristics is available from surveys such as the ACS or Current Population Survey, but the ability of these surveys to represent smaller geographic units is more limited.

Another issue related to developing indicators of wealth is the distinction between the location of the assets and that of the assets’ owners (see box, “Measuring the Wealth Located in a Region Versus the Wealth Owned by Residents of the Region”). For human capital, the assets are bound to their owner. For most assets, however, the location of the owners of the asset may be different from the location of the asset itself. For example, the mineral resources of a county may be vast, but if mineral deposits are owned mainly by people who live outside of the county, the mineral wealth owned by county residents may be much smaller. Both concepts of wealth (by location of the assets or by residence of the owners of the assets) can be useful. Unfortunately, data on local ownership of assets are generally not available, so measuring the local assets owned by local residents in rural areas is difficult.

## Improving Design and Monitoring Interventions

Indicators of wealth creation and the outcomes resulting from it are also needed to improve the design of rural development interventions and to monitor their performance. A logic model—a model of how a program will achieve its objectives—is especially helpful in linking program inputs, outputs, and outcomes (McLaughlin and Jordan, 1999). Such models are used frequently in the planning and sometimes evaluation stages of economic development programs. For example, Cranwell Schmidt et al. (2006) use a logic model to show the theorized connection between program inputs,

<sup>37</sup>For further discussion of this and other quality issues related to Federal funds data, see the ERS’ research on Federal funds data: [www.ers.usda.gov/](http://www.ers.usda.gov/)

<sup>38</sup>Much of the data published by the Census Bureau from prior population censuses was based on the census long form, which was administered with a large sample, but not the full population of the United States, and thus is subject to some sampling error. The census long form was discontinued after the 2000 Population Census and has been replaced by the American Community Survey (ACS), which collects similar information but annually and for a smaller sample. As such, the ACS data are published annually only for counties with a population of 65,000 or more. For counties with a population of 20,000 to 65,000, 3-year moving average estimates are available starting with 2005-07. For counties with a population of less than 20,000, 5-year moving average estimates are available starting with 2005-09.

## Measuring the Wealth Located in a Region Versus the Wealth Owned by Residents of the Region

The difference between where assets are reported or located and where the owners of assets reside raises a key conceptual issue with regard to measurement of wealth in a particular region. Is the goal to measure the wealth that is physically located within the region or to measure the wealth owned by the residents of the region? This difference is analogous to the difference between the concept of Gross Domestic Product (GDP), which measures the value of goods and services produced by labor and property located within a nation or region, and Gross National Product (GNP), which measures the value of goods and services produced by labor and property supplied by the residents of a nation or region.

The first concept – wealth located physically within the region – does not include the value of financial assets because, for the most part, such assets do not exist in physical form (except for currency) and are not tied to a particular location. The second concept – wealth owned by residents of the region – does include financial assets and liabilities (as well as other assets and liabilities) owned by residents of the region, regardless of whether they are physically located in the region or whether they exist in physical form at all. Financial assets owned by some residents that are claims against liabilities held by other residents of the same region do not add to the net worth of the regions' residents as a whole; only assets net of liabilities with people outside of the region affect the total net worth of the regions' residents. This second concept excludes physical and other assets that may be located in a region but whose owners reside elsewhere. Thus, depending on which wealth concept is to be measured, it may or may not be necessary to measure financial assets or identify the shares of all assets and liabilities owned by residents of the region of interest.

For a closed economy (such as the world as a whole), there will be no difference between these two concepts of regional wealth, since all assets and liabilities located within the region will be owned by residents of the region. For a wealthy country such as the United States, the share of assets and

liabilities that are with other countries may also be relatively small compared to the total, so differences between these concepts may not be that large in relation to the scale of the economy. However, for small open economies, such as counties or regions within the United States, the differences between these concepts may be large and important. For example, coal-producing counties in Appalachia may have large stocks of wealth per capita, considering the wealth located within those counties. However, the per capita stocks of wealth owned by county residents may be much smaller, since much of the coal is not owned by residents of these counties. Nevertheless, since county residents benefit economically from coal mining jobs, the coal rights owned by absentee owners are relevant to the economic well-being of local residents, even if this wealth is not locally owned. In fact, local residents may prefer more rapid depletion of the coal resource than if they were owners of it, since they benefit directly and in the near term from depletion (abstracting from the social and environmental costs associated with mining) and may discount the cost of declining resource wealth that they do not own.

Both concepts of regional wealth may be relevant to local decisionmakers, and comparing changes in measures of these concepts may yield valuable information. For example, the residents of a coal mining (or other natural-resource-dependent) community may be getting wealthier as a result of income and savings resulting from exploiting the resource, while the total value of assets located within the community is declining. Finding such a pattern of changes in wealth would suggest that the increasing wealth of community residents may not be sustainable, unless they are investing sufficiently in other assets that will yield at least as great a return as coal mining in the long run. If such productive investments are occurring and helping to diversify the local economy, there may be no need for concern (from the local policymakers' perspective, and still abstracting from the social and environmental costs of mining) even though local resources are being depleted.

activities, outputs, and immediate and long-term impacts of Vermont's Micro Business Development Program. The logic model provided guidance in selecting indicators of key program outputs and outcomes, such as the number of sources of capital accessed, the number of positive attitude gains among participants, overall satisfaction with services, the change in household income, and changes in receipt of Temporary Assistance for Needy Families (TANF) and/or unemployment benefits.

Two examples show how coordinated efforts to develop and foster entrepreneurship in rural communities and regions can be evaluated by using wealth indicators. The Appalachian Regional Commission's (ARC) Entrepreneurship Initiative invested \$43 million in communities from 1997 to 2005 to "increase the number of entrepreneurs establishing businesses in the region, to increase the survival rate of such ventures, and to increase the proportion that develop into high growth businesses that create jobs and wealth in Appalachia" (Markley et al., 2008). The metrics used to evaluate this initiative fell under five categories: capital access, sectors, incubators, entrepreneurship education, and technical assistance. Output and outcome indicators for each broad category mainly involved primary or administrative data from the program. Increased access to financial capital was a key part of the entrepreneurship program and the efforts made to provide this funding represented an increase in the financial capital available to the entrepreneur and the community. Markley et al.'s (2008) evaluation used the number and amount of funds loaned, the average loan size, and the sectoral distribution of loans as indicators of capital access.

The Ford Foundation's Rural Entrepreneurship Development program, started in 2008, began with a wealth creation framework and "triple bottom line" approach in mind.<sup>39</sup> In a preliminary report describing 17 entrepreneurship "interventions" in rural communities, Stark and Markley (2008) report the goals of each project; how each is expected to affect economic, environmental, and social outcomes; and how each project is expected to build intellectual, social, individual, natural, built, and financial capital. For example, an intervention in central Louisiana, called the Cenla Entrepreneurial League System (Stark and Markley, 2008, pp. 19-20), offers skill assessment and training for entrepreneurs. While the potential effects of this program on natural and built capital are unclear, the effects on intellectual, social, and individual capital are readily apparent. By increasing the knowledge and skills of each participating entrepreneur, the program is likely to increase intellectual capital. Social capital is likely to increase, too, as entrepreneurs, coaches, and public officials are brought together to achieve common goals. As the business assets available to the participating entrepreneurs increase, so does individual capital, called human capital in our conceptual framework. Although none are proposed in the report, a series of indicators could be developed to help determine the program's effect on wealth, with the data most likely coming from primary sources such as a survey of program participants.

The Ford Foundation is currently promoting the identification and use of wealth indicators for seven types of capital (individual, social, intellectual, natural, built, financial, and political) using a wealth matrix, which asks grant recipients to develop indicators, measures, and baseline conditions for each type of capital. Yellow Wood Associates and Markley (2010) provide an example of a completed wealth matrix for a project promoting sustainably harvested wood products.

One way to combine logic models and indicator selection comes from the international development literature. Impact pathway evaluation (IPE) posits ways that a program could affect a variety of outcomes, while considering actor decisions and contextual factors. IPE has been used by agricultural and international development practitioners to design project interventions and

<sup>39</sup>The "triple bottom line" refers to the economic, social, and environmental outcomes of an investment. This term originated with the Corporate Social Responsibility movement (Elkington, 1997), but draws upon decades of past work on economic impact assessment, environmental impact assessment, social and environmental assessment, sustainability assessment, strategic impact assessment, and others (Pope et al., 2004; Hacking and Guthrie, 2008).

measure their local effects (Springer-Heinze et al., 2003). A hypothesized impact pathways model may be developed for any rural development program that demonstrates how the program is expected to influence actor decisions and outcomes that in turn affect community wealth (fig. 2). When developing impact pathways, the following questions should be asked:<sup>40</sup>

<sup>40</sup>Adapted from Douthwaite et al. (2003), pp. 251-2.

- What types of wealth and outcomes should the development program affect and to what degree? What are the potential complementary and substitution relationships between the community's existing assets and the types of wealth created by the program?
- What are the factors—including economic, institutional, and policy contexts—that might influence the program's overall objectives?
- Which factors can be influenced by the proposed program and which are outside the scope of the project's influence?
- What performance metrics, or indicators, could be used to target, track, and assess the program's success at increasing the community's wealth and other outcomes?

Impact pathway analysis methods have frequently been used in agricultural research and international development. For example, Douthwaite et al. (2007) use the method to design and evaluate attempts to introduce cropping practices that control an invasive plant in northern Nigeria. The impact pathways in their research project led to three different surveys that informed changes in the overall project design and implementation. IPE's strength is in laying bare the relationships between program inputs, outputs, and outcomes, and in helping decisionmakers identify how a particular program or policy could increase wealth in a community or region.

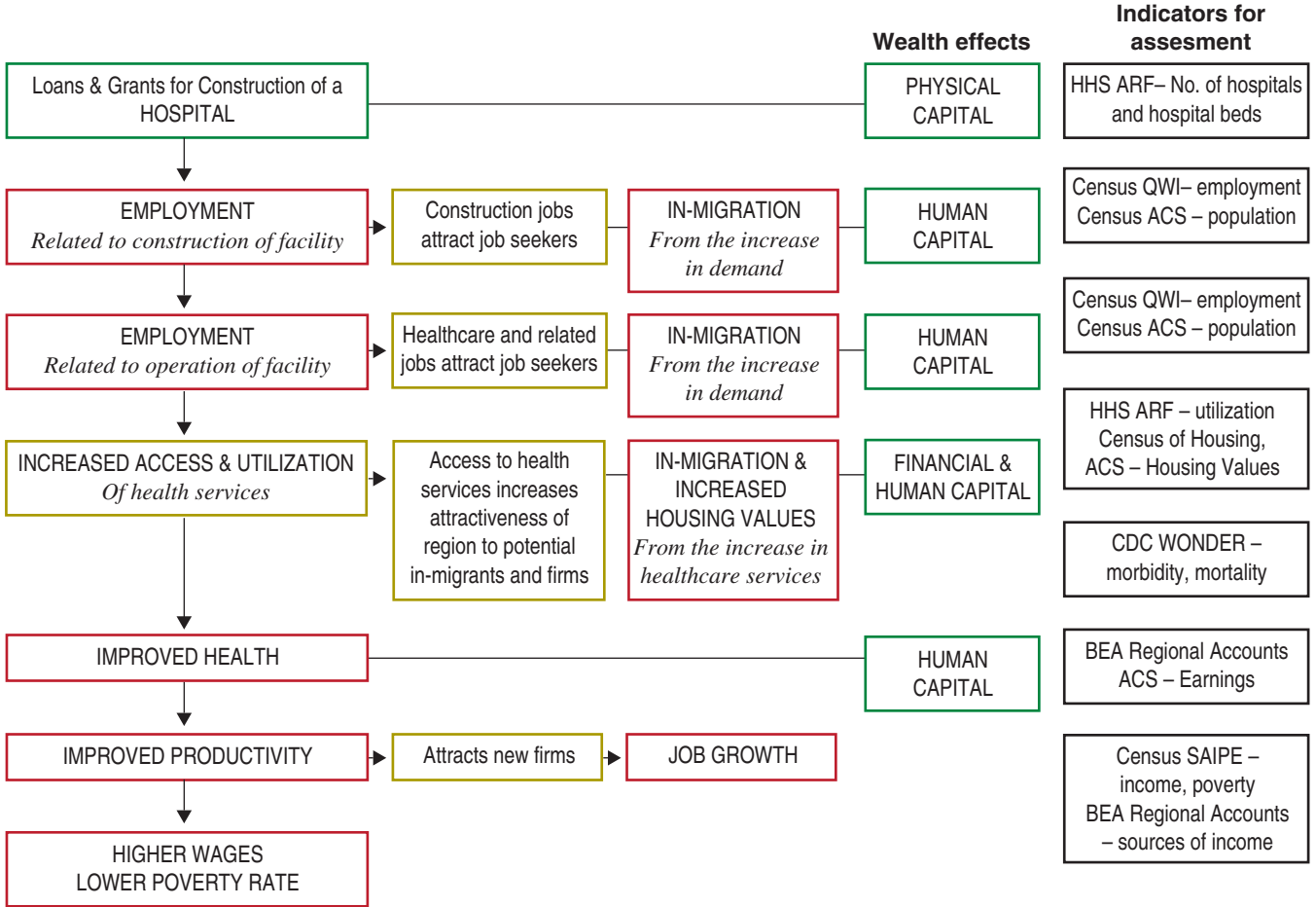
To show how IPE can work, consider the hypothesized impact pathways for two existing USDA Rural Development (RD) programs: the construction of a hospital (fig. 4) and of a biorefinery (fig. 5). The hospital, or any health-related facility, could be the beneficiary of a loan or grant under RD's Community Facilities Loans and Grants program. The biorefinery could be built with or benefit from a Biorefinery Assistance Program loan under RD's Energy programs.

The impact pathways figures are closely linked with the general wealth, decisions, and outcomes framework shown in figure 2. In this framework, communities have stocks of wealth that influence actor decisions and generate outcomes. The nature and extent of the outcomes realized are related to the stocks of wealth used; the economic, institutional, and policy context; and individual, household, and firm decisions. Types of wealth, actor decisions, and outcomes are denoted by green, yellow, and red boxes, respectively, in figures 3-4. Suggested indicators for measuring changes in wealth, shown in black boxes, are all available in public data sources. In addition to these sources, administrative data from RD programs may also provide useful indicators of project outputs and outcomes.

It is important to note two points with respect to both impact pathway diagrams. First, the impact pathways are *hypothesized*. They rely on existing

Figure 4

**Hypothesized impact pathways for usda rural development community facilities program**



Notes:

ACS = American Community Survey  
 ARF = Area Resource File  
 BEA = Bureau of Economic Analysis  
 CDC = Centers for Disease Control and Prevention

HHS = U.S. Department of Health and Human Services  
 QWI = Quarterly Workforce Indicators  
 SAIPE = Small Area Income and Poverty Estimates  
 WONDER = Wide-ranging Online Data for Epidemiological Research

  = Wealth  
  = Actor Decisions  
  = Outcomes

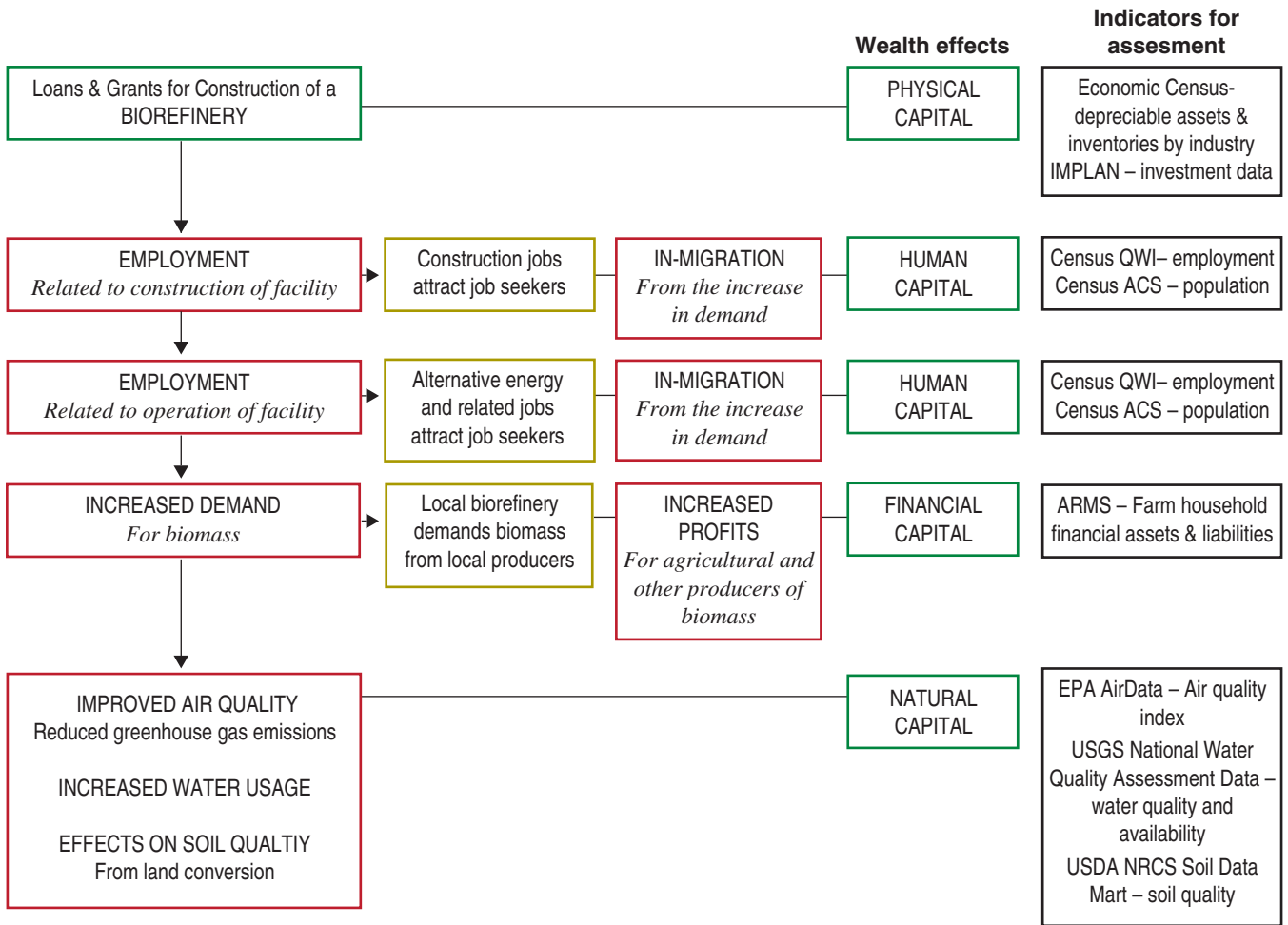
Source: USDA, Economic Research Service.

knowledge from economic and community development theory and previous empirical research, and are subject to uncertainty. Impact pathways can help identify what should be measured at the assessment stage, which in turn can yield empirical results that are helpful in designing future development projects. Thinking through potential impact pathways can help identify factors that are likely to influence project success, possible negative outcomes, and alternative ways of achieving the project objectives. Second, the wealth and outcome effects of an impact pathway may occur over very different time-frames. For example, the construction of a new health facility in a rural community immediately increases the physical capital in the community. However, the effect on the community’s overall health may not be observed for some time.



Figure 5

**Hypothesized impact pathways for USDA Rural Development Biorefinery Assistance Program**



Notes:

- ACS = American Community Survey
- ARF = Area Resource File
- QWI = Quarterly Workforce Indicators
- SAIPE = Small Area Income and Poverty Estimates
- WONDER = Wide-ranging Online Data for Epidemiological Research

- = Wealth
- = Actor Decisions
- = Outcomes

Source: USDA, Economic Research Service.

**Potential Impacts of a New Health Facility**

Construction of a hospital or other health facility is likely to result directly in two types of employment: employment related to the construction of the facility and to the operation of the facility (fig. 4). In the short run, the facility’s construction will likely result in an increased demand for labor in the construction and related industries. A long run increase in the demand for labor across a variety of health care occupations will also occur. Some of these new jobs may be filled by local residents, while others may be filled with immigrants from other communities or commuters from nearby locales (Renkow, 2003). The new job opportunities could lure some migrants to the community. New migrants, in turn, increase the stock of human capital in the community and increase demand for other goods and services (such as retail goods), which can lead to further employment and income effects.

In addition to increasing employment, the construction of a hospital and influx of health care professionals should lead to increased access to health services and improve the overall health of the community. Accessing health services is a challenge in many rural areas, especially in remote and less populated areas (Jones et al., 2009; McNamara, 2009; Ahearn and Mishra, 2009). In some rural communities, lack of good health services may deter immigration or even force older residents to move to nearby urban centers (Cromartie and Nelson, 2009). Altering these trends by increasing health services can add to the community's human capital stock. And the availability of health services is a community amenity that may increase property values, raising the value of the physical capital stock as well.

The provision of health services in a community can also improve the productivity and increase the overall well-being of its residents. Healthier employees are likely to be more productive and require less time off. Economic theory suggests that increases in individual productivity should lead to higher wages. Therefore, there should be a positive relationship between health and wages, a hypothesis with some empirical support (Contoyannis and Rice, 2001). Improvements in the productivity of a local workforce are also likely to attract new firms and promote overall job growth in the community.

Other indicators for hypothesized outcomes from investment in a new health care facility—like morbidity rates and number of hospital beds—are available from public data (fig. 4, right-hand column).

### ***Potential Impacts of a Biorefinery***

As another example, consider the hypothesized impact pathways for the construction of a generic biorefinery (fig. 5). Biorefineries use biomass such as corn, switchgrass, or wood to produce fuels, chemicals, and electricity. In an effort to create new and bolster existing biorefineries in rural places, USDA Rural Development's Biorefinery Assistance Program provides loan guarantees to assist in their startup and upgrade (USDA Rural Development, 2010).

Constructing a biomass refinery in a rural area has immediate and direct effects on physical and human capital. Building a biorefinery increases the physical capital available for the community to produce energy. In the short run, constructing the facility requires labor, which, barring countervailing forces, translates into an increase in the demand for labor at the local level. The new jobs in the area may employ local residents and also draw in new migrants attracted to the available jobs, which could be estimated with input-output analysis. A similar effect is likely over the long run, as the biorefinery begins hiring employees to operate the facility. Both types of employment over an extended period of time promise to bring in new migrants to the area. In addition to expanding the community's tax base and increasing demand for local goods and services, these new residents bring with them skills and abilities acquired in other places that may add to the community's stock of human capital.

A biorefinery also creates demand for feedstock from nearby agricultural producers. High transportation costs make it likely that biomass producers near the biorefinery will benefit more than producers in general (Low and Isserman, 2009). The increase in demand for biomass will likely increase

profits for agricultural firms that provide biomass material. Higher firm-level profits should increase the stock of financial capital available in the community. A biorefinery may also affect natural capital by altering air quality, increasing demands on the local water supply, and changing land use patterns (fig. 4, right-hand column). Biorefineries in aggregate are thought to reduce greenhouse gas emissions, though this effect may not be seen at the local level (Ragauskas et al., 2006; Farrell et al., 2006).

After developing these hypothesized impact pathways, stakeholders can gather data to benchmark a community or region's level of wealth and track changes in it as the program is implemented. All of the indicators for the health facility and biorefinery examples come from public sources. Depending on the geographic scale of the project and the desires of stakeholders, other data from primary sources can be used in selecting indicators. A few practicalities to address in designing an intervention include timing, geographic scale, and the need for additional data collection. With respect to timing, stakeholders should be aware of how frequently relevant data are collected and what to expect in terms of changes over time. For example, some indicators, such as measures of educational attainment, are inherently slow to change. Geographic scale should also be considered. County-level data, for example, may not adequately describe changes in wealth at the community level. Finally, stakeholders may need to collect additional data in order to track the progress of an intervention. For example, the primary issue with interpreting the proposed wealth indicators in the hospital and biorefinery examples is attribution. At every geographic scale, a wide variety of exogenous factors other than the building of these facilities—both observable and unobservable—could affect these indicators.

## Assessing Impacts of Interventions

Indicators of wealth or assets can also help in assessing the impacts of development interventions. Impact assessment is a burgeoning field in the social sciences, with implications for policy design. Identification of the hypothesized impact pathways and indicators of changes resulting from the intervention are helpful in assessing impacts. However, impact pathways alone are insufficient to attribute the observed changes as being caused by the intervention (Douthwaite et al., 2003).

One reason for the attribution problem is that the “counterfactual” situation—what would have happened to program participants had they not participated in the program or to program nonparticipants had they participated—is not observed. Where randomized assignment of participants and nonparticipants is possible, and where the outcomes for one group do not influence the outcomes for the other group, use of a randomized evaluation can address the lack of a counterfactual evaluation, since randomized assignment ensures that the characteristics of the treated and control groups will be statistically indistinguishable. Hence, the distribution of outcomes for the untreated control group should be statistically indistinguishable from the distribution of outcomes that the treated group would have experienced if they had not received the treatment, and vice versa.

Many econometric methods are available for estimating the effects of programs when the ideal of a randomized experiment is not available

(Winship and Morgan, 1999; Rodrik, 2008; Imbens and Wooldridge, 2009). Quasi-experimental methods seek to mimic the experimental approach by selecting program nonparticipant units that are similar to participant units in observable characteristics that are hypothesized to jointly affect participation and outcomes. For example, if initial wealth levels are expected to differ between participant and nonparticipant groups, and if these initial differences are expected to affect the outcomes of interest (such as changes in wealth or income), then selecting nonparticipants with wealth levels similar to participants reduces this potential source of bias.

A recent assessment of a regional development program that used quasi-experimental matching methods is Pender and Reeder (2011), which assessed the initial economic impacts of the Delta Regional Authority (DRA). In that study, changes in economic outcomes in “treated counties”—those participating in the DRA—were compared to outcome changes in similar counties outside the DRA. Indicators of some forms of wealth, such as the educational attainment of the local population, were among the factors used to identify similar counties. Such methods could be used to estimate the effects of various rural development initiatives on rural wealth creation and other outcomes. Implementing these methods requires indicators of wealth and changes in wealth and other outcomes, as well as program data on the location and level of program implementation, to be able to identify program participants, comparable nonparticipants, and the types and levels of program interventions. Identification of the hypothesized mechanisms of impact and appropriate indicators can draw upon the general wealth, decisions, and outcomes framework (fig. 2) and specific impact pathways.

## Conclusions

It has long been recognized that investments in multiple forms of capital are needed to bring about sustainable economic development. In addition to investing in traditional, physical capital goods such as plants, equipment, and infrastructure, investments are also needed in the productive capacities of people (human capital), in knowledge and innovation (intellectual capital), in financial systems and assets (financial capital), in sustaining and improving the natural resource base (natural capital), in social relationships essential for achieving cooperation (social capital), in ensuring adequate representation and voice of actors in political processes (political capital), and in sustaining and building upon the cultural knowledge and values of the people involved (cultural capital).

Considering these multiple forms of wealth and the complex ways that they interact to influence the decisions of households, communities, and other stakeholders, we have developed a conceptual framework that highlights how the process of wealth creation is dynamic, highly context-dependent, and subject to considerable uncertainty. The recent development of the ethanol industry demonstrates that “one-size-fits-all” policies or program prescriptions for diverse rural contexts are likely to be fruitless. Even airtight development plans are subject to unpredictable changes in the social and economic environment, or unanticipated responses to innovations.

Still, those pursuing economic development are not without options. Beyond clarifying the complexity and difficulty of the economic development process, a broad wealth creation perspective can help to identify opportunities to achieve more rapid and sustainable development that would be missed by a more narrow focus. For example, traditional rural development strategies that rely heavily on exploiting the natural resource base or attracting manufacturing industries to achieve near-term employment gains may miss opportunities to promote a more sustainable development pathway building on local natural amenities, creative capacities, or cultural resources.

Furthermore, even traditional development strategies may be more effective if complementary forms of capital are inventoried and, if necessary, upgraded. For example, manufacturers in high-poverty outmigration rural counties often cite the poor quality of local schools as one of the most critical constraints that they face in recruiting and retaining managers and other professionals (McGranahan et al., 2010a). Hence, investments in improving the quality of local schools and their staff (physical and human capital) may be a prerequisite for a strategy focusing on attracting manufacturing firms.

Among the many rural wealth creation strategies that exist, local decision-makers and support agencies must identify those that suit the local context, are most likely to generate wealth sustainably and locally, and are relatively robust to the vagaries of changing economic and social conditions. Research-based approaches, such as those used in the industrial targeting literature, can be helpful in this process, but are not likely to be definitive. What is needed is an approach that identifies and builds upon the assets, preferences, and values of the local population, and that fosters innovation, learning, and adaptation as circumstances change.

Several regional development programs have embraced strategic visioning, planning, and implementation, with successful outcomes. Some of USDA's recent rural development initiatives make use of these methods (research-based industrial targeting and strategic visioning) and encourage communities to collaborate on a regional basis to formulate strategies that have the potential to enhance rural wealth creation and sustainable development. Nonprofit foundations and university extension programs have also recently partnered to use strategic visioning to address poverty issues in various rural communities.

To better target such wealth creation efforts, improve their design, and learn from successes and failures, it is important to be able to measure progress in wealth creation and the economic, social, and environmental outcomes associated with it, and assess how these outcomes are affected by such efforts. Drawing from the literature on environmental and economic accounting, program theory, and impact evaluation, we have identified sets of indicators of different types of wealth, data sources, and methods to analyze their contributions to sustainable economic development outcomes. The methods used recently to assess wealth and "genuine savings" for countries could be adapted to measure some components of wealth for U.S. regions using publicly available data. However, attempting to measure all types of wealth with a single monetary indicator is not advisable.

Such wealth assessments could identify different types of development pathways, including situations wherein (1) wealth depletion is undermining the sustainability of economic development, even if employment is being created in the short run; (2) one type of asset is being depleted but helping to finance investments in other assets with improved long-term prospects; (3) multiple types of wealth as well as incomes are declining (so-called "poverty traps"); or (4) investments in a broad set of assets are contributing to an upward spiral. Diagnosing such types of situations can help to prescribe appropriate policy and investment responses. For example, situation (1) calls for a rethinking of the investment strategy to ensure that people's overall wealth and quality of life can improve over time, whereas situation (2) may be a sustainable pathway that should be continued. Situation (3) requires some kind of intervention to prevent further impoverishment, but calls into question whether profitable investments are possible in the local context. The best response to a local poverty trap may be to invest in local people's human capital to enable them to move elsewhere with better prospects.

In areas where rural wealth creation interventions are to be pursued, methods such as impact pathway evaluation can help to improve the design of interventions and identify indicators for monitoring program performance. However, impact pathway evaluation is insufficient to attribute impacts to a particular intervention. Statistical methods for assessing the impacts of rural wealth creation interventions can often be implemented using public data on outcome measures combined with administrative data on program location and implementation. Impact assessment is much more feasible if the need for such assessment is recognized and the assessment methodology is determined from the outset of the intervention. This is obviously the case when randomized assignment of some potential participants is possible. But even when this is not possible, collection of baseline data on both program participants and comparable nonparticipants (who are not expected to be affected by the

program) prior to program implementation can often yield a valid comparison group for the evaluation at relatively low cost.

The goal of collecting data on indicators of rural wealth creation and its outcomes is not to have data or scientific rigor for their own sakes, but to enable constructive learning to take place from implementation of rural wealth creation efforts. Without sufficient investment in the capacity to learn from such efforts, policymakers and rural development practitioners may be forced to depend on hunches or untested theories about the latest development panacea, rather than basing decisions upon the best available evidence that is relevant to the particular local context.

To be sure, pursuing an agenda focused on promoting and measuring rural wealth creation, broadly defined, will face many challenges. There are problems associated with conceptualizing and measuring many types of intangible and nonmarketed wealth. Measuring a broad array of wealth and outcomes indicators can be costly, and not every conceivable indicator will justify the cost of measuring it. There will be difficulties in evaluating outcomes along multiple dimensions, posing problems of how to assess tradeoffs that different decisionmakers are likely to view differently. There will be challenges in how to scale up the knowledge gained from assessment efforts, given that impacts of interventions are likely to be context-dependent.

In this report, we have only been able to scratch the surface of the difficult issues that must be addressed to implement a rural wealth creation approach. The conceptual framework presented is a first step toward developing a typology of rural development contexts, which could help to address the need for context-specific knowledge. In future research, the typology of rural development strategies presented here could be linked to a typology of rural contexts—hypotheses could be developed and tested regarding which strategies work best in which types of contexts. A major task for future research is to build on existing approaches to measuring wealth levels and wealth creation in rural areas. We have identified sets of indicators and data sources that could be used for this, but this task would require a substantial research investment. Impact pathway evaluation could be undertaken by researchers collaborating with development practitioners on rural development programs at local, State, and national levels. Empirical assessments of the impacts of such programs could also be pursued through similar collaborations.

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## **Appendix A**

### **Characteristics of wealth types**

#### **Endogeneity**

Assets and investments are considered endogenous to local actors' decisions if those actors can influence their levels, and exogenous otherwise. For example, households determine their level of financial savings and individuals decide what investments in postsecondary education to make; hence these investments are endogenous to households and individuals. By contrast, some assets such as access to mountains and rivers are largely predetermined by natural factors, while access to interstate highways and ports are largely determined by actions of actors beyond local actors in rural areas. These assets are considered (mostly) exogenous to local decisions, although local actors can sometimes influence these assets to some extent (e.g., mountains can be changed by mountaintop removal mining, rivers can be displaced or their quality degraded by local land uses, and interstate highways may be degraded or preserved depending on local uses). As these examples illustrate, endogeneity/exogeneity reflects a continuum of possible degrees of local influence on an asset, and it also depends on how "local" is defined and which actors and decisions are being considered.

#### **Tangibility**

Physical and financial assets are the most tangible of assets, meaning that they can be easily observed. Some aspects of natural capital, such as the quantity of land and forests, are also tangible, while others, such as resource quality, biodiversity, and ecological resilience are less so. Human capital is intangible, since it exists in the capacities of people and is not directly observable (Becker 1993), although the costs of producing it and its effects may be observable. Intellectual capital, to the extent that it exists as codified knowledge in books or patents, is tangible; while tacit knowledge is not. Social, political, and cultural capital—like human capital—are also generally not readily directly observable, although their impacts may be.

#### **Marketability**

Related to the notion of tangibility is that of marketability. Tangible assets such as physical and financial capital are generally marketable, although some types of physical assets such as infrastructure may not be due to their nature as local public goods, in which their value in use may be non-rival and non-excludable (discussed further below). Intangible assets are generally not marketable in themselves, although they may be marketed to the extent that they are embodied in marketable assets. For example, the environmental services provided by the quality of land and forests may not be easily marketed (although some markets are developing for such services), but the land itself can be marketed. Human capital assets cannot be bought and sold where slavery is prohibited, but the services provided by such assets are regularly exchanged in labor markets. Social and political capital are not directly marketable, although exchanges of obligations in social or political "markets" may behave in some ways as do markets for goods and services.

Cultural capital is also not generally marketable, though some aspects of cultural capital may have market value; for example, consumer purchases of traditional cultural products of Native Americans and spending on cultural tourism.

## Measurability

The concepts of tangibility and marketability are related to whether and how stocks of capital can be measured. For tangible marketable assets, one way to measure capital stocks is by their market value. This has the advantages of being a fairly simple approach to implement (for assets whose market price data are available) and has theoretical support for assets that are traded in competitive markets and that do not generate non-marketed benefits. For such assets, such as publicly traded stocks and bonds, economic theory predicts that the market price reflects the marginal valuation of both buyers and sellers of the asset. Even in this case, however, the market value could be a substantial underestimate of the average value of the asset to those holding the asset (buyers and other non-sellers).<sup>41</sup>

If the asset generates returns besides those reflected in market prices, this is further reason that market prices could underestimate the average value of an asset. For example, education and other investments in human capital are likely to have benefits to individuals that are not reflected in increased wages or productivity. Schultz (1961) and Becker (1993) argued that this reflects the consumption value of human capital investment (or “psychic income”). Hence, measures of the value of human capital that are based on estimated impacts of human capital investments on the lifetime income of individuals will understate the total value of the investment to those individuals. Furthermore, if the benefits of human capital investment spill over to other people and firms, as argued by human capital and endogenous growth theorists, then the social value of human capital investment will be greater than the value to the direct recipients of such investment. Investments in other types of capital can also yield positive spillover impacts, such as investments in improved natural capital (e.g., improved land management that improves water quality downstream) or social capital (e.g., formation of social organizations that result in unforeseen benefits by facilitating new opportunities). In other cases, investment in assets may generate costs that spill over to other agents (e.g., pollution caused by investments in physical capital).

These examples relate to the excludability of the benefits of investing in a particular type of capital, which we discuss further below. The point here is that such spillover impacts make it more difficult to value the assets that generate them, since market prices may not reflect such impacts. Methods of valuing the non-market costs and benefits of economic activities have been developed by environmental economists and others, including methods based on assessing impacts on property values, transport costs or other affected market activities, stated preference methods, and others (Shiferaw, et al. 2005). All of these methods have drawbacks, including stringent assumptions necessary for the validity of the methods and significant data requirements.

The problems of accurately measuring wealth, as the preceding discussion attests, are significant even for tangible marketable assets, but are more challenging for intangible and non-marketable forms of wealth, such as human,

<sup>41</sup>For a buyer, the marginal value is the value of buying an additional unit beyond the last unit purchased, while the marginal value for a seller is the value of selling an additional unit beyond the last unit sold. In competitive markets, profit-maximizing buyers are predicted by economic theory to buy all units whose marginal value exceeds the market price (since otherwise profits could be increased by buying more units), while sellers are predicted to sell all units whose marginal value is below the price (since otherwise profits could be increased by selling more units). This does not mean that the average value of the asset (total value divided by the total quantity of the asset held) will be the same for buyers and sellers. Since buyers will keep only assets whose marginal value is at least equal to the market price, the average expected value of the assets that they hold will be greater than or equal to the market price; while the opposite is true for sellers. Thus, the total market value of an asset traded in competitive markets is a lower bound estimate of the total estimated value of the asset to those who hold the asset. If there is substantial heterogeneity among market agents or assets and/or large uncertainty affecting future returns to assets, the difference between the market value and the average value of assets to their owners may be quite large.

social, cultural, and political capital. Valuation of many kinds of wealth using a monetary metric is not likely to be theoretically defensible or empirically feasible. This does not mean that no useful measures are possible, even if aggregating all types of wealth using a single cardinal measure such as the net monetary value of wealth is not feasible. Useful indicators may be based on other types of measures, such as ordinal indicators (e.g., whether various types of natural or social capital have improved or degraded) or ranking indicators (e.g., which types of capital are most important to particular actors in a particular context). As one moves away from measuring tangible marketable types of wealth to less tangible and marketable ones, this inevitably involves a greater degree of subjectivity, since perceptions about such indicators may differ across individuals.

## **Liquidity**

Liquidity is related to marketability. Financial assets are generally the most liquid form of wealth, meaning that they can be easily sold. This is a critical characteristic, since liquidity is essential for actors (whether individuals, firms, governments, or other organizations) to be able to manage their cash flow needs and cope with risks. Many other types of assets are not themselves liquid but can be used to obtain credit where well-functioning credit markets are available. For example, equity in land, houses, or other real estate is relatively illiquid (due to the indivisible nature of these assets and the significant costs of sales transactions), but is generally considered a reliable source of collateral where titles to real estate are secure and real estate values are stable or increasing, which can enable owners to use credit to meet cash flow needs and hold fewer liquid assets (which generally yield low expected returns). Social and political capital are not liquid but also may enable actors to access financial capital during critical periods (e.g., individuals borrowing from friends and family during a crisis; farmers obtaining disaster payments from the Federal Government after a drought). Other types of illiquid assets, such as human capital, may not be viewed as good collateral by lenders because the lender cannot take ownership of the asset in the event of a loan default. Lenders may be able to recover loans made on the basis of the value of the borrower's human capital where technologies, institutions, and policies make it feasible to collect from the borrower's future earnings (e.g., by garnishing the future wages of student loan recipients or using reputational penalties through credit ratings systems), though this may still involve significant costs and risks to the lender.

## **Divisibility**

Related to liquidity is the degree of divisibility of the asset. Many financial assets can be obtained in increments of any size and so can be divided and sold in any increment, which enhances their liquidity. Many physical assets, such as houses, plants, and equipment are not divisible in themselves, although financial assets can be created in many circumstances to buy and sell divisible ownership shares of such indivisible assets. It is more difficult to create a market in shares of less tangible assets such as human or social capital. For indivisible assets, investors face a larger cost and risk of investing, since they must achieve a minimum scale of investment to obtain any returns from the asset. The fixed cost of investing in such assets



can make it difficult for small-scale investors to profit from these types of investments. For example, small communities may not be able to profit from investing in costly forms of infrastructure, public facilities, improved legal systems, or other investments that serve primarily local demand, which may be too small to justify the fixed costs of the investments.

## Rivalry and excludability

Two critical characteristics of the flows of services from assets are whether they are rival and/or excludable. These characteristics determine whether these assets and their services are likely to be provided by competitive private markets or must be provided by some other institutional form. According to economic theory, pure private goods have two common characteristics: they are *rival* in consumption—meaning use of the good or service by one person reduces its availability for use by other people—and *excludable*—meaning that it is possible at low cost relative to the value of the good or service to exclude others from use of the good once it is provided (Cornes and Sandler 1996). Such goods are readily provided by private markets; examples include most common goods provided in private markets, including food, clothing, vehicles, housing, etc. Pure public goods, by contrast, are non-rival and non-excludable in consumption, which implies that private agents cannot profit by providing them in competitive markets (due to non-excludability) and that the good is more efficiently provided by a single provider than a large number of competitive producers (due to non-rivalry). Examples of public goods include national security, the quality of the air we breathe, and uncongested public highways. Governments are generally involved in providing such goods.

Two other categories of goods based on this classification are common pool resources such as fisheries and urban roads (under conditions of congestion), which are rival in use but for which exclusion is not possible (or highly costly relative to the value of doing so); and club or toll goods such as satellite television, toll roads, or patented new technologies, which are non-rival in use (if not congested) but for which exclusion is feasible and not highly costly. Common pool resources are subject to problems of overuse (“the tragedy of the commons”) due to the difficulty of excluding users and the costs that overuse imposes on all users (Hardin 1968). Hence governments are often involved in regulating their use, although non-governmental voluntary organizations or associations can also be successful in managing them through cooperative arrangements (Ostrom 1990). Where voluntary cooperation is needed to manage common pool resources, the level of existing social capital is likely to be an important determinant of success. Toll goods are commonly provided by private investors, but may be underprovided due to the monopolistic power held by the providers.

These categories are presented as ideal types, but in reality there is a spectrum of types between these extremes. For example, as suggested above, the classification of a road or highway depends on the degree of congestibility in its use and the costs of excluding users relative to the value of doing so. These characteristics can change as a result of changing demand for the resource (e.g., increased congestion of roads due to population growth) and changing technologies and institutions (e.g., electronic means of charging for use of toll roads that reduce the cost of exclusion).

## Externalities

Related to the concept of non-excludability is the concept of externalities or spillovers. Goods and services that generate beneficial impacts to people or firms who don't directly purchase the good or service are said to cause a positive externality or spillover. For example, workers' or firms' investments in increased intellectual or human capital may generate positive impacts on other workers or firms as they observe and learn from others. According to some growth theorists, this type of spillover may be responsible for enabling longrun economic growth to occur and may explain the divergence of the growth performance of different countries or regions (Romer 1986; Lucas 1988). Positive spillovers within regional economies may also account for the development of large urban centers and the higher productivity of firms and workers within such centers (Duranton and Puga 2004). Besides spillovers of human or intellectual capital, indivisibilities or positive spillover impacts of physical, social, or other forms of capital also could contribute to agglomeration economies.

Negative spillovers involve costs that are imposed on other actors by the economic decisions of one set of actors. Common examples include water and air pollution or, more generally, congestion impacts resulting from overuse of common pool resources. Such impacts can retard the sustainability of the development process as depletion of such resources offsets gains from investments in other types of capital. As suggested above, negative spillovers often affect natural resources, but these spillovers are not necessarily limited to impacts on natural capital. For example, development of physical or human capital may undermine traditional social relationships in communities, depleting the stock of social capital and undermining the ability to attain cooperation among different social groups. An example is where development of roads and increased mobility of the local population undermine the ability to achieve cooperation in providing local public goods, because this increases the opportunity costs of cooperating and the "exit options" of individuals, making it more difficult to punish non-cooperation (Bardhan, 1993).

## Non-income benefits

Another important characteristic of different types of wealth is the objective(s) of the actor making the investment. For many types of physical or financial capital, the objective is primarily to increase income, whether by increasing productivity (e.g., plant and equipment, training) or through dividends, interest, or rent (financial assets, investment real estate). However, many types of assets contribute to well-being in ways other than solely by increasing income, such as investments in residential housing, water and sewer systems, education, health, and social and political relationships. The returns to such investments are thus not fully reflected in their impacts on income. This is an important point to keep in mind when considering indicators of the outcomes of investments of different kinds.

## **Appendix B**

### **Conceptual frameworks for wealth creation and rural livelihoods**

Several conceptual frameworks for wealth creation and rural livelihoods have been proposed in the literature on community or rural development, with all incorporating multiple types of capital and several discussing various contextual factors, policy and institutional influences, livelihood strategy and investment decisions by various actors, and multiple types of outcomes. We review some of these here. We find parallel development of similar concepts and frameworks in the literatures focused on community or rural development in the United States and Canada and on agricultural and rural development in developing countries.

#### **Community and rural development literature in the United States and Canada**

In the U.S. community development literature, Kretzmann and McKnight (1993) proposed a framework for mapping community assets, considering the assets of individuals (and households and families), associations, and “institutions” (defined by Kretzmann and McKnight to include formal organizations such as businesses, schools, and hospitals). Although they did not use the “capitals” terminology, Kretzmann and McKnight’s focus was on building on the human, social, cultural, political, physical, and financial capital available to these different types of community actors to achieve community development. Their main thesis was that community development is more likely to be successful if it is based on the (often unrecognized) assets that exist in a community, rather than the traditional focus on needs, problems, and deficiencies. This “asset-based community development” (ABCD) approach was originally applied to development of urban communities in the United States, but has since been applied in rural and urban communities of both developed and developing countries (O’Leary 2007; Russell 2009).

Drawing on Kretzmann and McKnight’s ABCD framework, Green and Haines (2002) discussed building five types of community assets to achieve community development: human, social, physical, financial, and environmental capital. They emphasized the roles of community-based organizations (CBOs) in building these assets, arguing that CBOs are in many cases better able than private markets or governments to build these assets in a way that benefits communities, particularly low-income and minority communities. Green and Haines focused primarily on urban neighborhoods, but also considered examples of community development in suburban and rural communities and the factors affecting them.

In the U.S. rural development literature, Castle (1998) proposed a conceptual framework for studying rural places incorporating four types of capital—natural, built, human, and social capital. Castle argued that development and conservation of all four types of capital should be the core concept of rural studies, emphasizing the need to understand relationships among all types of capital, the contributions of each, and processes of change among these capitals. He argued that the dynamics of rural economies depend crucially

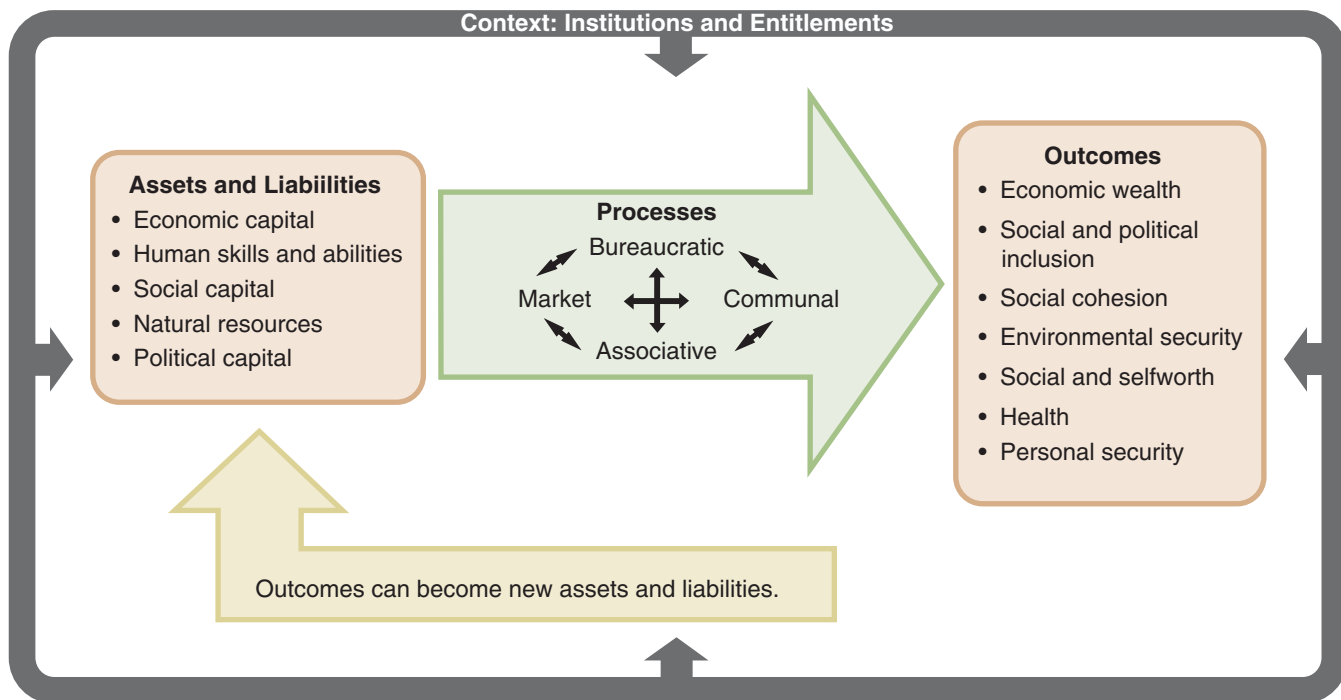
on whether there are increasing returns to scale and path dependence, drawing from the ideas of Romer (1986) and Arthur (1994). Since increasing returns and path dependence can result from processes of innovation, Castle also emphasized understanding how investments in intellectual capital are affected by government policies, such as various forms of regulation.

Also in the U.S. rural development literature, Flora and Flora (2004) defined seven types of rural community capital in what is now referred to as the “community capitals framework” (CCF); including cultural, social, human, political, natural, financial and built capital. They considered the diverse contexts of rural America as affected by factors such as population level and density, degree of isolation from urban centers and infrastructure, ethnicity, natural amenities, persistent poverty, local institutions, history, and other local factors that influence the rural development prospects of each community. They also considered broader trends and processes that influence the transformation of community capitals, such as structural changes in the economy, international trade and macroeconomic policies, and domestic sectoral policies. The roles of different actors and decision processes in community development—including individuals, households, civil society organizations, businesses, communities, and governments at different levels—are also discussed within their framework. The framework and examples provided by Flora and Flora illustrate the complex and context-dependent nature of rural community development in the United States and the roles of a diverse set of actors in defining the meaning and objectives of rural development and in determining its outcomes.

Reimer (2006) proposed a framework for understanding how contextual factors affect the capacity development process in rural communities of Canada, drawing upon the work of Kretzmann and McKnight (1993), Green and Haines (2002), and Flora and Flora (2004). Reimer’s framework includes four types of assets and liabilities—economic capital, human skills and abilities, social capital, and natural resources—and local contextual conditions such as the degree of integration to the global economy, stability of the local economy, metro-adjacency, and institutional capacity. It also considers how these assets and contextual factors influence the action processes (market-based, bureaucratic, communal, and associational) through which communities reorganize their assets to produce economic, social, and environmental outcomes (Figure B1). Reimer applied this framework to study how contextual factors condition the relationship between social capital and outcomes among a sample of 20 rural communities in Canada and found that the correlations between several indicators of social capital and various outcome measures differ across community contexts. Although the small sample size and need for more in-depth analysis limited the ability to draw strong conclusions, Reimer’s study suggests the need to take different contexts into account in studying rural community development processes.

The Ford Foundation is pursuing a rural wealth-creation approach that emphasizes investments in seven types of capital: intellectual (knowledge, innovation, and creativity), social, individual (skills and health of people), natural, built, political, and financial (Ratner 2010). The approach is guided by six principles: (1) wealth is created and “sticks” in low-wealth rural areas through intentional actions seeking to create the different types of wealth without undermining other forms and involving local ownership and control

Figure B1  
**New rural economy capacity model**



Source: Reimer (2006).

of wealth; (2) wealth is tied to place through value chains developed within sectors that connect rural to urban areas and low-wealth people to higher wealth people; (3) wealth-based development is demand-driven, embracing market and policy interventions that stimulate demand in markets with potential for place-based wealth creation; (4) measurement of the different types of wealth is integrated into the process; (5) investments based on “value propositions” that specify the self-interests of value chain participants fuel wealth creation; and (6) flexible strategies for wealth creation are developed in context with committed regional partners, avoiding “cookie cutter” interventions and interventions that damage some types of wealth. The emphasis on a demand-driven and flexible approach to wealth creation is similar to other community development approaches.

## International agricultural and rural development literature

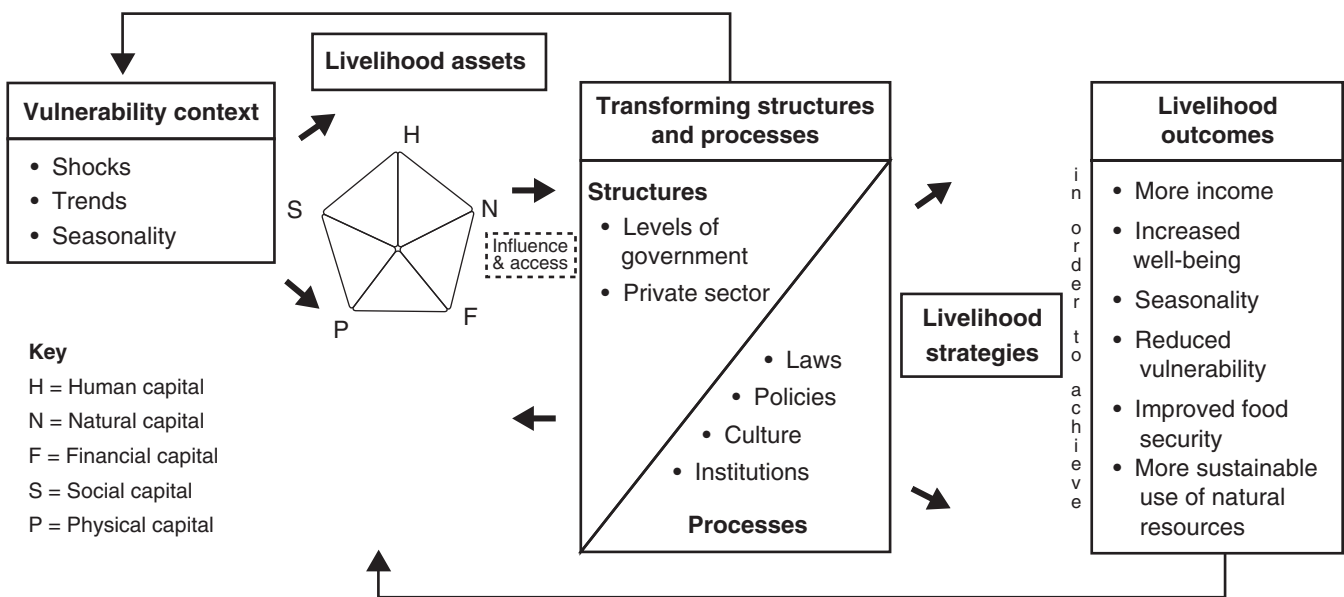
Similar conceptual frameworks have been proposed, apparently independently of the North American literature, in the international agricultural and rural development literature. Scoones (1998) and Carney (1998) developed the sustainable livelihoods framework (SLF), which has been used by the Department for International Development (DFID) of the United Kingdom and other international development organizations. This framework, drawing upon earlier work by Chambers and Conway (1992) and others, considered rural people’s livelihood strategy decisions to be influenced by five types of assets (human, natural, financial, physical, and social capital); by the vulnerability context within which they make decisions, including shocks, trends, and seasonal variations; and by transforming structures and processes, such

as the structure of different levels of government and the private sector, and laws, policies, culture, and institutions (Figure B2). DFID (1999) defined livelihood strategies as “the range and combination of activities and choices that people make/undertake in order to achieve their livelihood goals (including productive activities, investment strategies, reproductive choices, etc.)”. Examples of livelihood strategies pursued by rural households in developing countries include agricultural intensification or extensification, livelihood diversification (e.g., nonfarm activities), and migration (Scoones, 1998). Such strategies are seen as leading to various economic, social, and environmental outcomes, which in turn affect changes in assets over time.

One criticism of the SLF has been that it pays insufficient attention to power and politics (Farrington et al., 1999). In response, some authors have proposed adding political capital to the SLF as one of the types of local assets affecting livelihood strategy options and decisions (Baumann and Sinha, 2001). Others have argued that this is insufficient and that broader structures of inequality and political economy must also be considered (Scoones 2009). Such considerations were meant to be included as part of the analysis of development context and the transforming structures and processes (Scoones, 1998; DFID 1999). However, these were often not incorporated into the analyses that were conducted using the SLF (Scoones, 2009).

Bebbington (1999) proposed a “capitals and capabilities framework” that was similar in many respects to the SLF. Like the SLF, Bebbington’s framework emphasized the importance of local actors (individuals, households, and organizations) having access to multiple types of assets, although the set of assets that he focused on was slightly different: natural, human, cultural, social, and produced capital. Bebbington argued that these capital assets are important to people not only to achieve material well-being, but also to make their livelihoods meaningful and to provide them with capability (in

Figure B2  
**Sustainable livelihoods framework**



Source: Department for International Development (1999).

the sense of Sen (1981)) to “change the rules of the development game.” He argued that cultural capital is particularly important to provide meaning, such as the value attached to living in a particular rural place. Cultural and other forms of capital can also be a source of power, according to Bebbington, enabling them to alter the political, economic, and institutional context affecting their livelihoods, such as by organizing to obtain better terms of trade on their products.

De Janvry (2003) developed a framework for “integral rural development” that apparently was based on the SLF. In his framework, the elements of the SLF (household assets, context, livelihood strategies, and outcomes) are labeled as the well-being determination process. The main innovation in de Janvry’s framework is specification of entry points for rural development programs to influence different components of the well-being determination process (filtered through the program implementation process) and/or the policymaking and program design process. For example, land reform programs can be used to address households’ limitations in access to natural capital; market or governance reforms or investments in local public goods can address limitations in the context; social protection programs can seek to improve well-being outcomes directly; and programs for social incorporation and empowerment can help to improve the policy process and program design and implementation to better serve the poor. This framework helps to address another criticism of the SLF – the need to more explicitly specify the linkages between the internal community factors in the SLF and the more macro-level political factors, policies, and programs influencing them (Scoones, 2009).

Pender et al. (2006) developed a conceptual framework specifying the factors affecting East African rural households’ livelihood strategies and land management decisions and the outcomes of those decisions. Like the SLF and de Janvry’s (2003) framework, their framework incorporated five types of household assets (physical, human, natural, financial, and social capital) and local contextual factors (agricultural potential, population density, access to markets, programs and services, and local institutions and culture). Also, like de Janvry (2003), Pender et al. (2006) considered how government policies, programs, and institutions could affect the development process at different levels through various entry points, such as by affecting household endowments, local market or institutional development, livelihood strategy, and land management decisions, or directly affecting outcomes. They used this framework to generate hypotheses and synthesize findings of a set of research studies investigating the determinants and impacts of rural livelihoods and land management decisions in the East African highlands. Like Reimer (2006), their findings demonstrate how the influence of different types of capital on livelihood decisions and outcomes depends upon the local context.

## Synthesis

The conceptual frameworks reviewed above were developed and have been used for a variety of purposes: some have been used primarily to guide research on development processes (e.g., Castle (1998), Reimer (2006), and Pender et al. (2006)); some have been used mainly to guide

rural development programs (e.g., Ratner (2010)); and some have been influential both with rural development researchers and practitioners (e.g., Kretzmann and McKnight (1993); Flora and Flora (2004); Carney (1998); Scoones (1998)). There are differences of emphasis across these frameworks, including differences in the set of assets considered, which actors and decisions are the focus, which contextual factors and processes are taken into account, which development outcomes are considered, and whether explicit consideration is given to particular policy and program entry points for affecting the wealth-creation and livelihoods-generation process.

Despite these differences, there are many commonalities across these frameworks. All emphasize the importance of building on and building up a broad range of assets. All emphasize the central role of local actors in determining their own development prospects, although some explicitly include a role for external actors such as governments and development programs. Most emphasize the critical role of local contextual factors in conditioning the opportunities and constraints affecting rural wealth creation and improvement of livelihoods. All emphasize the importance of considering multiple outcomes of development processes, including in most cases economic, social, and environmental considerations. All emphasize the dynamic nature of these processes, with outcomes involving changes in assets that affect livelihood options and strategies in the future. Some emphasize that wealth creation yields benefits beyond improving people's material well-being, for example contributing to greater meaning and empowerment. This adds another important dynamic aspect to the framework, since wealth creation may not only affect communities' and individuals' asset endowments but also can affect the policy and institutional context by empowering local actors. Such impacts may only occur over larger scales than individual rural communities and over longer timeframes than a few years, but they may be the basis of larger and more sustainable impacts of rural development efforts.



## Appendix C

### Available data on selected wealth indicators

Concept	Variable	Indicator	Data sources	Smallest geographic unit	Time period
Physical capital	Private physical capital stock	Private capital stock could be estimated by allocating BEA national capital stock data by industry to counties based on each county's share of national employment or earnings by industry	BEA has national estimates of private capital stock, and estimates of employment and earnings by industry and county	County	Annually
	Public physical capital stock	Public capital stock could be estimated using the perpetual inventory method (PIM)	Federal investment data available in Consolidated Federal Funds Report (CFFR); State and local investment data from annual State budgets and Census of Governments (COG); balance sheets of governments in some States	County	Annually for CFFR and State budgets, every 5 years for COG
	Access to broadband internet	% of population with access by number of providers, technology (DSL, fiber, cable, wireless), and speed ranges	National Broadband Map <a href="http://www.broadbandmap.gov">www.broadbandmap.gov</a>	County, Census places, Congressional Districts	As of 6/30/10
		# of community anchor institutions with access and range of download speeds	<a href="http://www.broadbandmap.gov">www.broadbandmap.gov</a>	County, Census places, Congressional Districts	As of 6/30/10
	Access to highways	Population weighted distance to nearest interstate highway on ramps and to other highway intersections	Economic Research Service analysis of highway data	County	
	Access to water and sewer facilities	% of houses lacking complete plumbing facilities	Population Census	County, county subdivision and place, tract	Decennial to 2000
			American Community Survey	County, county subdivision and place, tract	

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Concept	Variable	Indicator	Data sources	Smallest geographic unit	Time period
Physical capital	Residential buildings	Median and distribution of housing values and mortgage status	Population Census	Census block and higher (census tracts, ZIP Code, county subdivision, county, etc.)	Decennial to 2000
			American Community Survey (ACS)	County	
		New housing construction, number of units and value by type	Census Bureau Survey of Residential Building Permits	County or Census Place	Annually
	Household physical assets	Real estate property and vehicles	Survey of Income and Program Participation (SIPP)	State by metro/ non-metro	Monthly for up to 4 years within panels
	Farm household physical assets	Value of land, dwelling, buildings, livestock, non-farm business assets, other	Agricultural Resource Management Survey (ARMS)	USDA National Agricultural Statistics Service (NASS) regions or Economic Research Service (ERS) farm resource regions, 15 selected States	Annually
	Farm real estate value (land and buildings)	Value per acre of farm real estate (land and buildings)	NASS June Area Survey	State	Annually
	Business fixed capital and inventories	Gross value of depreciable assets and inventories in selected industries (mining, construction, manufacturing), beginning and end of year	Economic Census	State (for construction and manufacturing), U.S. (for mining)	Every 5 years to 2007
Financial capital	Household financial assets and liabilities	Savings, stocks, bonds, retirement accounts, etc.	SIPP	State by metro/ non-metro	Monthly for up to 4 years within panels

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Concept	Variable	Indicator	Data sources	Smallest geographic unit	Time period
Financial capital	Farm household financial assets and liabilities	Farm and non-farm financial assets (cash, checking, savings, certificates of deposit, stocks, retirement accounts) and debts (mortgages, loans from businesses, personal loans, etc.)	ARMS	NASS regions or ERS farm resource regions, 15 selected States	Annually
	Business financial assets and liabilities	Financial assets and liabilities of publicly traded corporations	Securities and Exchange Commission	Global, by headquarters of corporation	Quarterly
	Financial assets and liabilities of State and local governments	Cash and security holdings in insurance trust funds, debt offsets, bond funds, other; and long- and short-term debt	Census Bureau, Annual Surveys of State and Local Governments; Census of Governments	States and counties	Annually for States, every 5 years for counties
	Bankruptcy filings	Number of business and nonbusiness bankruptcy filings	U.S. Courts Statistics	Circuits and districts	Annually
Natural capital	Natural amenities	Index of climate, topography, and water area characteristics	ERS natural amenities scale	County	N/A
	Land quality	Land Capability Classification and Prime Farmland Classification	USDA Natural Resources Conservation Service (NRCS), Soil Data Mart	County	2000-2003
	Soil quality	Amenability of land to agricultural production	NRCS, Soil Data Mart	County	Varies
	Cropland value	Value per acre of irrigated and non-irrigated cropland	NASS June Area Survey	State	Annually
	Pasture value	Value per acre of pasture	NASS June Area Survey	State	Annually
	Air quality	Air quality index	Environmental Protection Agency (EPA), AirData system	County and ZIP Code	Annually
		Number of unhealthy air quality days per year	EPA ( <a href="http://www.epa.gov/aircompare/">www.epa.gov/aircompare/</a> )	County	2010

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Concept	Variable	Indicator	Data sources	Smallest geographic unit	Time period
Natural capital		Air quality ranking based on exposure, health risks or emissions, by type of pollutant	<a href="http://scorecard.goodguide.com/">http://scorecard.goodguide.com/</a>	County	Varies
	Water quality	Levels and changes in nutrients, inorganic and organic water pollutants	U.S. Geological Survey (USGS) National Water Quality Assessment Data	Site-level, varies	Annually, monthly, daily
		% of surface water with impaired or threatened uses	<a href="http://scorecard.goodguide.com">http://scorecard.goodguide.com</a>	County	1998-1999
		% of water bodies impaired by specific pollutants	<a href="http://scorecard.goodguide.com">http://scorecard.goodguide.com</a>	County	1998-1999
	Toxic chemicals	% of houses with a high risk of lead hazards	<a href="http://scorecard.goodguide.com">http://scorecard.goodguide.com</a>	County and Census Tract	Varies
		Presence of a Superfund Toxic Waste Site	<a href="http://scorecard.goodguide.com">http://scorecard.goodguide.com</a>	County	Varies
	Mineral resources availability	Availability of minerals	USGS Mineral Resources Data System	Site-level (by geographic coordinates)	Varies
	Mineral resources production	Annual production of minerals by type	USGS Minerals Yearbook	State	Annually
	Energy resources	Availability of oil, gas, and coal; resources and economically recoverable reserves of coal	USGS National Oil and Gas Assessment, Coal Assessments (e.g., National Coal Resource Assessment, USGS, 2009)	USGS Regions (e.g., coal basins)	Varies
	Wind energy potential	Mean wind speed at 80 meters above ground Land area with good potential for wind generation	U.S. Department of Energy (DOE)  <a href="http://www.windpoweringamerica.gov/wind_maps.asp">http://www.windpoweringamerica.gov/wind_maps.asp</a>	2.5 km resolution  State	N/A
	Forest resources	Forest area, volume, net growth, and removals	U.S. Department of Agriculture, Forest Service, Forest Inventory Data Online	County	Varies

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Concept	Variable	Indicator	Data sources	Smallest geographic unit	Time period	
Natural capital	Recreational opportunities	Number of establishments and employment in arts, recreation and entertainment businesses	Census Bureau, Economic Census	County and Census Place	Latest 2007	
			Census Bureau, County Business Patterns (CBP)	County	Annually	
Human capital	Population	Total population	Population Census	Census block and higher	Up to 2010	
			American Community Survey (ACS)	County	a	
	Educational attainment	Distribution of adult population by educational attainment	Population Census	Census block and higher	Decennial to 2000	
			ACS	County	a	
	School and student quality	Public school enrollment and graduation rates, pupil/teacher ratio	National Center for Education Statistics (NCES)	School district	Annually by school year	
			Dropout rates, per pupil spending	www.localschooldirectory.com	School district	Annually
			Reviewer ratings of school quality	www.localschooldirectory.com	School	Up to present
			Students' scores on state proficiency tests and ranking within state	www.city-data.com	School	Recent year(s)
	Age distribution	Distribution of population by age	Population Census	Census block and higher	Decennial to 2000	
			ACS	County	a	
	Labor force and employment status	Distribution of population by labor force and employment status	Population Census	Census block and higher	Decennial to 2000	
			ACS	County	a	
	Occupation	Distribution of population by occupation	Population Census	Census block and higher	Decennial to 2000	
ACS			County	a		
Disability	Distribution of population by disability status	Population Census	Census block and higher	Decennial to 2000		

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Concept	Variable	Indicator	Data sources	Smallest geographic unit	Time period
Human capital	Health	Mortality rates, change in mortality rates	Centers for Disease Control and Prevention, Wide-ranging Online Data for Epidemiological Research (WONDER)	County	Annually
		% of population with specific diseases	Healthstatus2010.com	County	2007
		% of mothers with specific diseases, health risks	Healthstatus2010.com	County	2007
		Deaths due to mental disorders, suicides	Healthstatus2010.com	County	2007
		Mortality rates by sex, race, and major causes	Healthstatus2010.com	County	2007
		% obese, adults and youth	Healthstatus2010.com	County	2004-2007
		Reproductive health indicators	Healthstatus2010.com	County	Various to 2007
		Rates of violent crimes by type	Healthstatus2010.com	County	Various to 2006
Intellectual capital	Inventions	Number of patents	U.S. Patent and Trademark Office	City and State of inventor and assignee	By year since 1976
Social capital	Civic, social, and other voluntary organizations and associations	Number or number per capita of organizations, number or number per capita of paid employees, and total payroll or payroll per capita, by type of organization	CBP	ZIP Code and county	Annually
	Public charities and other tax exempt organizations	Number of organizations, revenues, expenses, balance sheet by type of organization	National Center for Charitable Statistics (NCCS)	ZIP Code	Annually
	Volunteer work	Share of population participating in volunteer work	Census Bureau, Current Population Survey (CPS)	State and metro/nonmetro	Annually

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Concept	Variable	Indicator	Data sources	Smallest geographic unit	Time period
Social capital	Good citizenship	Share of households responding by mail to Census	Population Census	Census block and higher	Decennially
	Participation in blood donation programs				
	Trust	Share of survey respondents agreeing that "most people are honest"	Annual "Life Style" surveys conducted by commercial polling firm Market Facts (Knack 2002)	State	Annually
Political capital	Voting participation	Percent of eligible voters who registered and who voted in Federal elections	CPS, Voting and Registration Supplements	State and metro/non-metro	Every two years
	Seniority of Congressional representatives	Seniority ranks of Senators and Representative	Almanac of American Politics (AAP)	State and Congressional District	Every two years
	Leadership positions of Congressional representatives	Positions of Senators and Representatives in party leadership or positions on key committees	AAP	State and Congressional District	Every 2 years
	Majority party	Whether Senators and Representatives are in the majority party	AAP	State and Congressional District	Every 2 years
	Competitiveness of voting	% of vote to winning candidate in past elections	AAP	State and Congressional District	Every 2 years
Cultural capital	Ethnicity	Distribution of population by ethnicity	Population Census	Census block and higher	Decennial to 2000
			ACS	County	a
	Language and origin	Distribution of population by language spoken at home; distribution by region of origin	Population Census	Census block and higher	Decennial to 2000
			ACS	County	a

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Concept	Variable	Indicator	Data sources	Smallest geographic unit	Time period
Total wealth	Present value of future sustainable consumption expenditures	Present value of future sustainable consumption can be estimated by the equation: $W_t = \int_t^{\infty} C_t e^{-\rho(s-t)} ds,$ where $C_t$ is sustainable consumption (consumption plus change in net worth) in year t, and $\rho$ is the rate of time preference (World Bank 2006)	Data on consumption expenditure and changes in assets and liabilities are available in the Bureau of Labor Statistics Current Expenditure Survey	Rural U.S. as a whole, or metro/non-metro by BLS region (and for some States using Consumer Expenditure Survey public use microdata)	Annually for rural U.S. as a whole, biannually for metro/non-metro

<sup>a</sup>Annually starting 2005 for counties with population of 65,000 or more, 3-year moving average for counties with population of 20,000 or more, 5-year moving average for smaller counties. BEA = Bureau of Economic Analysis.