

Summary

The connections between education and the economy are complex and interdependent. The economy affects the attractiveness of education by creating incentives or disincentives to continue schooling. Family structure and emphasis on and access to learning resources and experiences also help determine educational success. The 1990s witnessed increasing rewards to higher education and heightened economic incentives for additional schooling. Given this increased demand for education, access to and supply of higher education underpin the future productivity of American workers and long-term economic health and growth of our country.

The 1890 land-grant universities (1890s) help to ensure a more equitable distribution of educational opportunities. They were established by the Second Morrill Act in 1890 to provide equal educational opportunities for African-American students who had been denied admission to their States' original 1862 land-grant universities. The 1890s have developed teaching, research, and extension programs that serve mainly rural communities. African-American students receive undergraduate and graduate education at the 1890 universities in an environment particularly attuned to the needs of minority students. Research and extension programs address issues of special interest to minority rural communities and small-scale and limited-resource farm operators, as well as more traditional topics reflecting the expertise and interests of the 1890 faculty and graduate students.

USDA has strengthened links to the 1890 institutions by building a stronger base of funding support. USDA's Economic Research Service (ERS) entered into cooperative agreements in 1997 with four 1890 institutions to study outcomes and benefits of USDA investment in the 1890 institutions' food and agricultural programs. The collaboration has explored core issues of the programs' funding and achievements, the best indicators by which to measure those achievements, and the development of conceptual models for estimating the future returns to investments in these programs.

Many studies have described the programs of the 1890s, but there has been no systematic effort to measure the economic contribution of their teaching, research, and extension programs to human capital development and to improving the well-being of the population they serve. As public funding of research and development falls under increasing scrutiny and worthy educational investment opportunities multiply, linking identifiable outcomes and measurable indicators with public investments in the 1890s is increasingly important.

The 1890 land-grant universities began receiving Federal funds for research in 1967, which totaled \$283,000 per year through 1971. From 1972 to 1978, annual appropriations for research and extension increased from \$12.9 million to \$23.5 million; and they began to receive specifically authorized research formula funds (section 1445) and extension formula funds (section 1444) with the enactment of the National Research, Extension, and Technology Policy Act of 1977. This statute provided permanent formula funding authorization for research and extension in the 1890s similar to funding research and extension at 1862 land-grant universities. Total USDA funding of the 1890s—including funds for research, extension, and general support—rose from about \$1.4 million in 1967 to about \$100 million in 2000.

Federal research funding to land-grant universities has been through formula funds, which provide guaranteed funding according to a specified formula, special grant funds, and competitive grants. Federal sources constitute 83 percent of the total research funds at the 1890s; extension programs at the 1890 universities are almost entirely supported by Federal funding through the Cooperative State Research, Education, and Extension Service. Financial support for teaching has come largely from State governments. Federal support is still significant, however, for funding scholarships and for enhancing the capacity of 1890 institutions to develop and improve teaching programs.

Traditional administrative indicators of benefits associated with teaching, research, and extension require clear statements of expected outcomes and measurable indicators that allow monitoring of investments. Assessments of teaching programs in food and agricultural sciences have been limited to measuring the number of successful graduates that pursue further education and become leaders in their professions. Studies of research outcomes often use publication and/or patent counts. These methods may underestimate the research accomplishments of the 1890s. Research at the 1890s has focused on small-scale farmers and limited-resource families, including research on minor livestock species, such as goats and rabbits, that are suited to small-farm operations. Many of the research outcomes associated with the 1890 universities are not published or patented, and most institutions do not have a working paper series. Other indicators that better capture the contribution of the 1890s need to be designed. Ideally, these indicators would capture not only benefits to traditional agricultural stakeholders, but also impacts on economic development in the 1890s' target rural areas.

Similarly, improved indicators of extension programs are needed. Extension programs have typically documented and reported program inputs: the number of people participating, number of workshops and meetings held, number of educational materials distributed, and number of hours of volunteer service delivered. Extension programs, however, have not documented outcomes (e.g., changes in knowledge, skills, or aspirations; newer and more efficient methods adopted as a result of the program; or changes in social, economic, or environmental conditions).

The Human Capital Model (HCM) provides, at least for measuring benefits of teaching, an alternative to traditional administrative approaches. Education helps people capitalize on technological and social changes, making them more productive and efficient. It raises their incomes, thereby generating measurable impacts (e.g., earnings gaps between 1890 and high school graduates) that can be attributed to the colleges.

However, several issues must be addressed to apply such an approach to measuring human capital benefits of the 1890s. The models must be structured to disentangle the effects of inherent ability, other personal characteristics, and job location from the effects of an 1890 education, a challenge for any attempt to estimate the value of higher education. Also, because available data sets that cover earnings, level of education, personal characteristics, and other variables needed to estimate the value of higher education may not indicate the college attended, it may be necessary to survey 1890 graduates in order to complete an empirical evaluation.

Economic returns to investments in research and extension programs at the 1890s can be measured by estimating the value of productivity gains using one of two approaches: economic surplus analysis and production function estimation. The economic surplus approach evaluates productivity changes that can be attributed to research. The production function approach relies on statistical relationships between agricultural output and expenditures on research (and extension). However, the contribution to productivity change of a specific institution or group of institutions, which is needed to apply economic surplus analysis, is difficult to identify, particularly for small programs like those at the 1890s. Similarly, production function estimation would be difficult because research and extension at 1890s is a relatively small portion of total agricultural research and extension in the United States. Given the limitations of the two standard approaches, a more pragmatic approach to estimate economic impacts of research and extension at 1890s is to conduct case studies. These studies would rely on cost-benefit analyses of a sampling of specific programs or projects to draw broader conclusions.

As a next step in developing these frameworks for measuring investments in 1890 programs, a team of researchers from ERS, Virginia State University, Virginia Polytechnic Institute and State University, University of Arkansas – Pine Bluff, and Langston University has begun work, with the support of USDA's National Research Initiative, on further developing a human capital model applicable to the 1890s' teaching programs and on pursuing a series of cost-benefit analysis case studies of 1890s' research and extension projects.

The 1890 land-grant universities play a significant role in training students from various ethnic minorities in agricultural and food sciences, engineering, mathematics, and other disciplines. Photo courtesy Keith Pope.

