I consider it a real privilege to be here. And I want to thank Mark Drabenstott, Tom Hoenig, and the rest of the staff of the Federal Reserve Bank for the invitation and for this conference.

Both Mark and Tom are graduates of Iowa State—two of many outstanding economists who have studied at Iowa State. My congratulations to Tom, Mark, and others also for beginning an important new initiative for rural America—the Center for the Study of Rural America.

We consider this center a valuable new partner with us in helping to shape the future of rural America, which will continue to be a cornerstone of our nation and our society.

While I am honored by this opportunity, I have to tell you that I feel a little like Mark Twain’s “Connecticut Yankee in King Arthur’s Court.”

I’m not an economist; I’m an engineer. I’m not a policymaker; I’m an educator. I’m not in business—agricultural or otherwise; however, I am in the business of serving students and others—including business—agricultural and otherwise.

That’s one of the things a land-grant university does. It serves others—students, first and foremost, because that’s our most important responsibility. But we also serve many other segments of our society, including farmers, business and industry, cities and towns, families and individuals—through our educational programs; through our research and technology transfer programs; and through our outreach and extension programs.

At Iowa State, we believe we are measured by how well we serve others, and we point to one of our most famous alumni, George Washington Carver, as our role model in this effort. For it was Dr. Carver who said: “It is simply service that measures success.”

So here I am—an engineer and an educator in an economist’s court, and I’m delighted to be here.

I’m going to offer some thoughts today—thoughts from the perspective of an engineer and educator. They are also the thoughts of someone who has been involved in public higher education—and more broadly public service to a variety of people—for nearly 35 years. And for most of those 35 years, my constituency has included a substantial rural constituency.

When I came to Iowa nine years ago, the agricultural economy was just starting to climb out of the most serious depression it had experienced in half a century.

The Iowa lottery was brand new, and the joke going around was what the farmer said he would do...
after winning the multimillion-dollar prize. He said, "I guess I'll just keep farming 'til it's all gone."

We've come a long ways since that time. Agriculture is stronger, although we still suffer through periods of severe economic difficulty. And overall, rural America is stronger, largely because it is more diversified economically.

However, it is clear that rural America continues to lose ground, and in a couple of ways.

We continue to lose actual ground—soil—to erosion, but I believe we have begun to get that loss under control.

More serious, however, is the ground we are losing in terms of the most important resource we need to continue the way of life that is rural America—people.

Throughout most of the 20th century, rural America has steadily lost its human capital—its people. It has been exported to urban and suburban America. And with that loss of human capital has come a declining population and relatively lower standard of living.

So how do we stem this loss, and more importantly, turn it around—to boost human capital in rural America?

That is a critical issue for rural America as we enter the new century, and I believe we have the resources to tackle this question—at research enterprises, such as the Center for the Study of Rural America; at our public universities; and in the rural areas themselves.

I would like to address this issue of boosting human capital in rural America in three parts:

First, a kind of "state of the state of rural human capital";

Second, a discussion of ways we might enhance rural human capital;

And third, some comments on how our rural areas might take advantage of enhanced human capital.

THE STATE OF THE STATE OF RURAL HUMAN CAPITAL

Not being an economist, I first head to be comfortable with what is meant by the term "human capital."

One of our ISU economists gave me this definition: Human capital is the stock of skill embodied in a person that can be "rented" on the labor market. This makes human capital distinct from other kinds of capital, such as financial capital, physical capital, even social capital.

Another question: How do we measure human capital? That turns out to be a very interesting question—and one without a simple answer.

It is not simply formal education, although that is one important measure that is often used to assess human capital. It also involves other qualities, such as: job training, years of experience on the job, skills possessed—all of which are, to some degree, measurable; and others, such as work ethic, entrepreneurship, innovativeness, creativity, and business acumen—which are more difficult to measure, but which definitely affect the quality of human capital.

For example, we know from experience that young people brought up on farms often have a very strong "can do" attitude. It may very well have to do with the nature of family farm life, where responsibility comes early in life and everyone contributes; and a farm being a kind of innovator's laboratory. If you need something—and you need it quickly—you fabricate it or create it. You can't wait to have it delivered from town.
I have no reason to doubt this, because I have seen it among our own students at Iowa State.

There is also strong anecdotal evidence that Midwestern young people have a relatively strong work ethic. The evidence comes from the employers who hire our graduates. And, indeed, there is additional evidence from employers who have operations in different parts of the country, who say the Midwestern work ethic is strongest.

And yet it is hard to quantitatively assess this “can-do” attitude and this “work ethic,” so most measurements of human capital are incomplete.

Nevertheless, there are ways to measure human capital, and they include wage and earnings data—particularly as correlated against formal education, which we in higher education especially like to do because it supports the importance of our activities.

We know, for example, that bachelor’s degree recipients earn, on average, 77 percent more per year than high school graduates. Advanced degree recipients earn 180 percent more. Both figures are increasing, and, in fact, the differences have doubled since 1980. Over a lifetime of work, that can mean a difference of more than $750,000 between a high school diploma and a bachelor’s degree—and nearly $2.5 million more with a professional degree.

This supports our contention that we are indeed in a knowledge-based society and economy; that education enhances human capital by developing skills that lead to higher income. Knowledge and adaptability—as developed through formal education—are rewarded in today’s economy.

There is evidence that human capital in rural areas lags that in urban areas, although that gap appears to be closing, not so much because of gains in the rural areas, but because of continuing problems in core urban areas. And the gap in human capital between rural and suburban areas is, in fact, widening.

This gap is due in part to the fact that rural America has exported human capital to urban America, something that has been happening consistently throughout most of the 20th century with the industrialization of America and the availability of more economic opportunities in urban areas than rural areas. And while there is recent evidence to indicate that this rural “export” of human capital may be slowing, it appears to be slowing only in rural areas that are adjacent to urban areas. It appears to be tied to urban growth, which means that truly rural areas are still declining.

We also try to compare human capital in the United States with that of the rest of the world. These kinds of data are less well developed; however, it is clear that countries with high per capita income and high GNP also correlate with higher levels of human capital as measured by levels of formal education.

Countries at the low end of the education scale—Mali, Niger, Guinea, Mozambique, for example—whose citizens receive, at most, four years of education on average—are at the low end of the per capita GNP. Conversely, the countries at the high end of the GNP scale—the U.S., Netherlands, Switzerland, New Zealand, for example—are also at the high end of average education at 15 or more years. And the scale is remarkably well correlated in terms of per capita GNP position relative to expected years of education.

Also, internationally, we are beginning to see evidence of lesser developed countries increasing their GNP and per capita income, and they’re doing it on the basis of increasing their human capital. Korea and Taiwan are examples.

There is further evidence that returns to investment in human capital are growing in the United
States. Increased college-going rates in this nation—which are at an all-time high—illustrate this point.

There is little question that knowledge and adaptability—highly developed human capital—are valued in advanced economies, and students and their families understand this.

There is a widespread belief that locations with high-growth, high-wage economies have several common factors. These economies are based on robust technologies with widespread applications; computer and information technology; biotechnology and materials are examples.

They are based on technologies that add significant value, and these areas have the capacity to stay at the leading edge of change, largely because of a robust research and development infrastructure.

They also have ready access to intellectual talent—high-end human capital; a kind of "critical mass" situation which enables them to stay at the leading edge.

In the U.S., the importance of access to research and talent makes the modern research university a potent asset for this kind of economic development. We all know the examples, such as: "Silicon Valley" in California, Route 128 in Massachusetts, and "Silicon Gulch" in Austin. There are some international examples as well: software development in the Madras, India, area; and new materials development in Nagoya, Japan.

Several American universities are attempting to do the same with the new biology, which has stunning possibilities in medicine, biotechnology and, of course, value-added agriculture. Iowa State University is one of these universities. We have launched a major plant sciences initiative, to build a "critical mass" of human capital in the plant sciences so we can be a leader in the development of new technologies—bio-technologies—to support the most important industry in Iowa—agriculture. We make no apologies for this. In fact, we are proud of our role in the development of modern agriculture.

The importance of research to stay ahead of the wave is a very strong argument for this kind of technology-based development around universities in the United States, for that is where the majority of basic research in this nation is conducted. And it is largely public research—publicly funded and publicly available—which promotes more widespread development. It gives us this capacity to stay ahead, and it opens up many more economic opportunities.

These areas with high-growth and high-wage economies are also areas of very high human capital, which, many argue, supports the notion that human capital is even more important in this kind of development than other kinds of capital—even financial capital, because financial capital is quite mobile and our capital markets are relatively efficient in being able to put financial resources where they are needed.

I was going to say that I believe another indicator of just how important this technology part of our economy is becoming can be seen in comparing the rapid growth rate of the technology-rich NASDAQ with the relative flatness of the more traditional service sector-laden Dow Jones Industrial Average; however, recent developments show that it’s not wise to rely on short-term stock market movements to support a particular position.

Still, one conclusion I draw from this is that knowledge and adaptability—in terms of human capital—are highly valued in advanced economies; that is, economies typified by high wages and rapid growth.

So what are the implications of this economic evolution, and, more importantly, for our purposes, what are the implications for rural America?
There are many; however, I would like to mention five.

Number 1: In today’s and tomorrow’s economy, human capital is more important than ever, which makes education—as our most powerful societal tool for increasing human capital—more important than ever.

That means we—as a nation, and individually as states and regions that wish to remain competitive in the new century—must make investment in education a top priority. Without it, rural areas will not grow.

And in the 21st century, the kind of education our young people will need to be successful must be broadened. Not only must it be up to date in science and technology, it must be made more global and international, and it must increase their capacity for innovation and change; become better entrepreneurs, if you will.

Number 2: Historically, the mobility of people who have high human capital has made them one of the most exported resources of rural America. We educate them, and they leave for better opportunities. In a way, it’s like value-added agriculture; however, in the case of human capital, exporting it is more like seeing your topsoil erode and wash down the Missouri River. In this sense, education is more like a value-added resource than a value-added product.

Given the mobility of human capital—and with it—financial capital, only those areas that offer other things—namely, physical and social capital, as well as amenities—things that are necessary to attract and retain these high human capital people—will succeed.

On the other hand, this very mobility also offers the opportunity to enhance human capital by importing it—if an area is attractive to high human capital people and their enterprises. That which attracts such people will also help keep them.

This is not without precedent, and on a very large scale. Iowa, and many other states were originally settled by attracting human capital with incentives, such as 160 acres and a promise for a better life. We may need a modern equivalent of the Homestead Act—with new incentives—to bring people back to rural America.

Number 3: If you pay attention to only human capital, you’re missing a bigger picture.

Human capital is necessary but is not, in and of itself, sufficient for growth and development. Other kinds of capital—financial, physical, and social capital, as well as social amenities—must be harnessed and developed so that human capital can be used to its fullest, to create growth, wealth, and opportunity.

For example, the infrastructure—from highways and airports to internet access—must be developed, and we need coherent, cohesive strategies for their development, more likely on a regional scale, rather than community or even county strategies.

There is often a critical mass that is needed in order to provide these kinds of infrastructure, and at a scale that is efficient for today’s economic development. In Iowa, for example, we have had a tradition of excellent schools and high human capital development in rural areas. However, our people—especially our young people—have left rural Iowa because we haven’t developed these other types of capital to the extent that we are competitive in the recruitment and retention of these people.

Returns to human capital also are positively correlated with the existence of physical capital. Presumably, one of the reasons for the rural to urban migration has been the access to the physical capital that is more plentiful in cities, and which leads to higher returns to human capital. You can earn...
more with more and better tools. Quality of life in rural America is important, but so is easy access to a T-1 line.

Number 4—and this is specifically for agriculture and the implications for human capital for agriculture, and I hope the title of this conference—“Beyond Agriculture”—does not mean without agriculture, for agriculture remains important to many of us, and a number of rural areas: Make no mistake that successful farmers in this new century will bring high human capital to their work.

They will need it to be successful, in terms of: management, including the management of risk; marketing; coping with an increasingly complex regulatory environment; and adapting to new technology.

Agricultural biotechnology offers special opportunities for farming intensive rural areas. As the productivity of agriculture continues its seemingly never-ending growth, our capacity to sustain the infrastructure farming and farmers need for success in rural America will require the expansion and diversification of the rural economy.

Farmers and those who support farmers will not be able, by themselves, to sustain the schools, hospitals, recreation areas, and other amenities needed for a vibrant rural America. If that expansion and diversification is to take place, we must also confront the special challenge of dealing with the compatibility between agriculture and the new economy, for while there will be overlap, there is also the possibility of conflict.

One of the advantages of rural America is land—open land, and lots of it. Rural areas can also have a special attraction in terms of social capital—“neighbors helping neighbors,” and a safe place to live, with special opportunities for recreation.

However, how can we attract more people to rural America for these amenities if we don’t address—and solve—the conflicting aspects of agriculture, such as odor, air, and groundwater pollution from intensive agricultural operations? As we think about the assets of rural America, we must begin to look at them in new ways. For example, it’s no longer the smell of money.

Location—in the new economy—will often be as much an amenity issue as an economic one, unless, of course, that growth relies on proximity to the source of raw materials, such as the biotech industry.

Number 5: The same forces that are driving globalization—technology, information, communication—if embraced productively, offer opportunities to rural areas to develop in new ways.

However, to compete globally will require specialization and focused strategies.

Rural areas must make strategic choices so that the capital needed for a specific audience or opportunity can be developed. No area can be all things to all people. A central question for each rural area will thus be: What is it we want to be, and what sorts of capital—human and otherwise—are needed?

Done well, such an approach offers the possibility of rural growth and development—the movement of population from urban areas into rural areas—to the benefit of rural America.

What are some of the possible strategic choices for rural areas?

Again, there are many, but here are some of the more traditional ones: retirement communities; bedroom communities for urban areas; technology-driven niches deriving from biology, information, or manufacturing; and activities that derive from the one abundant resource that rural areas do have, which include: land, activities such as recreation,
agriculture, mining, and distribution and ware-
house services, especially for those areas fortunate
to be located along major transportation routes or
facilities. For example, even the closing of an Air
Force base could be a blessing in disguise for a rural
area. That’s because a military base usually provides
mostly low-paying jobs for the area, while its clos-
ing might free up the airport so that it could be the
catalyst to create a major warehousing and distribu-
tion center for the area.

In making such strategic choices, we must also
understand more clearly the competitive advantages
of rural America. Among them are: safety, cost of
living, availability of land, low congestion costs, rel-
atively higher social capital, and a high-quality work
force—a work force with the potential for high
human capital.

ENHANCING RURAL
HUMAN CAPITAL

If rural America is to realize the potential of high
human capital, how do we go about it? How do we
boost the human capital in rural areas?

Here are some of my thoughts and recommenda-
tions—four to be exact.

1. Strategically build the human capital of the exist-
ing work force with continuing education and distance
education

Universities, community colleges, extension, the
Internet, and various state and local government
training and development programs are all avenues.
Lifelong learning must be a reality for rural Amer-
ica, as it must be everywhere else. There should be
increased incentives for individual businesses and
industries to develop their own human capital,
instead of waiting for a major industry layoff or
shutdown. And these efforts should have a focus
that derives from a larger strategy for growth and
development.

2. Develop the human capital of young people

Strengthen educational programs and training
opportunities that ensure high human capital skills,
again with an emphasis on innovativeness and the
other skills that are needed to be successful globally
and are competitive globally.

3. Import human capital

This may be an overlooked means of boosting
human capital in rural areas. In many of our
states—including Iowa—we have a shortage of
human capital at virtually all levels. We need to look
at immigration laws, and look at developing new
incentives to attract people from other nations,
especially highly skilled people. Indeed, we would
do well to look at how some other nations—such as
Canada—have been successful in importing high-
quality human capital.

4. Create an environment designed to utilize and
retain high-quality human capital

Communities and regions must think systemati-
cally and strategically about their opportunities in
the new century. Bringing together the physical,
social, and financial capital as well as the amenities
needed to attract and retain high human capital
opportunities is no small task. Most rural areas do
not have the capacity to pursue several different
options, so tough choices must be made. This
requires unusual leadership, with the ability to see a
new, more strategically focused vision, and then the
capacity to implement a plan to realize the vision.

At Iowa State, we have found community and
regional visioning, enhanced by modern comput-
ing technology, to be a technique that can be quite
helpful, and community and regional leaders must,
themselves, begin to understand this new thinking, and these new tools.

This is an area where there is assistance, such as through land-grant universities and their extension arms, as well as state departments of economic development. They can facilitate broader strategic planning, visioning, and partnering.

**TAKING ADVANTAGE OF ENHANCED HUMAN CAPITAL**

What are some of the characteristics of an environment that attracts and retains high human capital? Again, there are many, but let me offer three.

First, it will have a 21st century infrastructure, including, a transportation system and services that give it easy access to urban markets; easy access to information—electronic connectivity, or “closing the digital divide,” if you will; and quality educational systems and health care services. It must be an infrastructure that will enable people in rural areas to ride the wave of the new economy rather than pick up the tailings of the old. To use a metaphor, communities on the concrete highways of the 20th century must move to make sure they are on the electronic highways of the new century, or they will surely be bypassed.

Second, a characteristic of such environments will be that they are built on focused strategies that have a clear vision for the future, including the kind of human resources needed for success and a strategy that focuses on amassing the other resources and amenities needed to attract and retain high human capital people.

Third, it will be an environment of partnering, or to use a word that I'm particularly fond of because I believe it is more direct in its approach, an environment of engagement.

You can't go it alone—as a person, as a business, as a community. Our human and financial resources in rural America are limited, so we must work together—pool our resources; work with others to build capacity—so that we can move faster and access more expertise.

We can build our capacity by partnering, with other communities, with the private sector, and with other resources, such as land-grant universities and community colleges and their innovation centers. These partnerships give rural areas access to knowledge, and a considerable research capacity that they wouldn't otherwise have.

Distributing the benefits of university-based research parks is an example of an item on our agenda at Iowa State. Also, because of our expertise in a particular area, Iowa State University was able to help an Iowa community save a major employer—and a $10 million annual payroll—all because we had the expertise to show that a company's economic analysis was, in fact, wrong, and closing this particular plant—a cat food plant—would actually produce the opposite effect the company wanted.

**CONCLUSIONS**

I'd like to close by posing this question: It's an age-old question. The question is this: Is the glass half empty—or half full?

The population shifts of the past half century have left much of middle America with a glass that is filled only halfway. Granted, it never was filled all the way, but the level has been dropping.

Rural population—as a percentage of the U.S. population—has declined in every U.S. census—save one. In 1820, it went up one-tenth of a percent from the 1810 census. It dipped under 25 percent
in 1990, and I have seen no indication of a reverse in this trend for the 2000 census.

In my state of Iowa, the population of 44 of our 99 counties peaked in 1900 or earlier. While populations in some of these counties have started to grow again, none have returned to the heights reported 100 or more years ago. And some rural counties separated from metropolitan areas by at least one county have continued to decline in every census since 1900.

However, I would like to argue that neither answer to the question—half full or half empty—is appropriate for our discussion of the future of rural America. Instead of looking at the glass as being half full or half empty, I prefer to look at the glass as having a lot more room—room for people, and room for opportunity.

Boosting human capital in rural America and creating an environment that can utilize that human talent—that human capacity—could result in a renaissance for rural America. And in doing so, we will not only boost the prospects for the nearly 60 million people who inhabit the 80 percent of our land that we call rural America, but also ensure the continued capacity of America to feed itself, and many others. That surely is a worthy goal.

Margaret Mead wrote, "If we are to achieve a richer culture, rich in contrasting values, we must recognize the whole gamut of human potentialities, and so weave a less arbitrary social fabric, one in which each diverse human gift will find a fitting place."

Thank you.