THE PRODUCTIVITY AND PROSPERITY PROJECT: AN ANALYSIS OF ECONOMIC COMPETITIVENESS

Definitions and Initial Research Topics

A Report from the Productivity and Prosperity Project (P3), Supported by the Office of the University Economist

October 2005

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INTRODUCTION TO PRODUCTIVITY, PROSPERITY, AND COMPETITIVENESS

As the transition from the industrial age to the information age/knowledge economy continues, economic competitiveness has taken on added importance and new meanings. The concepts of competitiveness, productivity, and prosperity can be applied to individuals, companies, regions (such as metropolitan areas or states), and countries, though the meaning/interpretation of each may vary somewhat by the unit of analysis.

Definition of Terms

Productivity is the easiest of the three terms to define. Economically, productivity is the efficiency with which goods or services are produced by a given set of inputs, such as capital and raw materials. Productivity can be measured at individual, company and geographic levels, commonly as output per unit of labor. (However, a satisfactory measure of productivity is not available at the regional level.) Productivity often is considered to be an intermediate stage between the inputs, such as physical infrastructure, and the outputs of economic performance and prosperity.

Empirical evidence across long time periods and many economies reveals a strong correlation between economic growth/prosperity and the productivity of an economy. Economic success generally is seen as being highly dependent on productivity. According to Krugman:

> Productivity isn't everything, but in the long run it is almost everything. A country's ability to improve its standard of living over time depends almost entirely on its ability to raise its output per worker.

Prosperity most commonly is defined as economic well-being. However, prosperity also can be interpreted more broadly to include all aspects of well-being, including social and environmental considerations, or more generally quality of life. Regional prosperity does not necessarily equate to the prosperity of individuals living within the region if, for example, income inequality is high.

Unlike productivity, which can be explicitly measured, prosperity is harder to gauge, for multiple reasons: (1) qualitative aspects of prosperity are difficult to measure, (2) general agreement does not exist as to precisely what level of economic well-being constitutes prosperity, (3) a consensus does not prevail as to the relative importance of the various aspects of prosperity, even when prosperity is defined more narrowly as economic well-being, and (4) regional prosperity measures are different from those of individual prosperity. Regional economic prosperity might be measured by indicators such as gross product per capita and average income. Measures such as the poverty rate, income inequality, and the unemployment rate provide insight into the prosperity of individuals.

Competitiveness has a dictionary definition of the striving against others to attain a goal, a definition applicable to individuals and companies. Based on their educations and skills, individuals compete with others when they apply for a job. Unless a company is operating under monopolistic conditions, it has direct competitors; a failure to compete results in the closing of a business.

For regions or countries, the concept of competitiveness has gained popularity among economic development advocates who see regions as competing against each other for expanding and relocating businesses. However, some economists object to using the term, arguing that regions and countries do not contend with each other. The zero-sum and sometimes negative-sum game aspect of this competition troubles some economists who champion growth and development strategies derived from Ricardian principles of comparative advantage that predict gains from trade that make all agents/regions better off. The concern is that in overemphasizing competitiveness, policymakers may erect barriers that discourage productive exchange, stifle specialization, or embark on development strategies characterized by tax incentives that are risky and inefficient.

Regional or national competitiveness really consists of the competitiveness of some of the individuals and companies within the area. A distinction needs to be made between "basic" or "export" economic activities in which companies have competitors from outside the region or country, and those economic activities that serve the local population. Companies that serve the local population (such as beauty salons and drug stores) all operate under the same set of regional conditions, making their competitiveness dependent on the characteristics of their company. The success of companies that export (for example, aircraft manufacturers) depends not only on company-specific traits, but also on characteristics of the community in which they are located, such as the quality of the labor force and the tax and regulatory environment.

Regions or nations do not compete against each other for activities that serve the local population (e.g. for the siting of a grocery store), but to a limited extent do compete for export economic activities, such as a new semiconductor manufacturing facility. This competition largely is indirect since most of regional or national competitiveness centers around an area's assets — its labor force, infrastructure, quality of life, and other factors that are evaluated by companies when making business location decisions. The use of incentives to win a particular operation is the primary example of direct regional competition. But such incentives typically act only as tiebreakers between areas whose other characteristics are evaluated equally by companies.

Further, most economists argue that the use of incentives by regions generally is counterproductive. Malecki characterizes the use of incentives as "low road" development strategies. In contrast, "high road" strategies lead to 21st-century knowledge economies and involve research and development, strong but flexible institutions, a culture of trust and networking, and broad capabilities to capture and absorb external knowledge.

Kitson, Martin and Tyler conclude:

> ... if the notion of regional competitiveness has meaning and value, it is as a much more complex and richer concept; and one, moreover, that focuses more on the determinants and dynamics of a region's (or city's) long-run prosperity than on more restrictive notions of competing over shares of markets and resources. It is one that recognizes that ultimately competitive regions and cities are places where both companies and people want to locate and invest in.

To the extent that regions and countries do compete with others, the number of competitors typically is small. Any particular region or country competes primarily for only a small number of economic activities for which they have some comparative advantage. Few other regions have the same set of target activities. For example, over the last half century, Arizona primarily has competed for just a few economic activities, especially electronics, aerospace, and related instruments. Only a few other states specialize in these particular activities.

For the most part, then, the competitiveness of regions or countries consists of the quality of the area's economic foundations, such as its human resources and infrastructure. These foundations are the inputs to economic production: the stronger the foundations, the stronger is the productivity of the economy, and in turn, the greater is prosperity. According to the National Competitiveness Council of Ireland:

> Competitiveness is the ability to achieve success in markets leading to better standards of living for all. It stems from a number of factors, notably firm level competitiveness and a supportive business environment that encourages innovation and investment, which combined lead to strong productivity growth, real income gains and sustainable development ... in the long run, competitiveness is about growth in productivity … In the short run national developments in prices, wages and exchange rates can have significant impacts on the competitive performance of a nation's firms – even those firms with high rates of productivity growth.

The measurement of competitiveness, then, largely consists of the measurement of the various inputs to the productive process. While some of the foundations can be quantifiably measured, data on others are unavailable. General agreement does not exist on the relative importance of the various foundations.

Models of the Relationship Between Competitiveness, Productivity, and Prosperity

The simplest model of regional or national economic production consists only of inputs and outputs. The inputs mostly consist of the economic foundations, which also are referred to as the building blocks, pillars, or development capacity of the economy. These inputs can be categorized into such groupings as human resources and infrastructure resources. No generally accepted categorization system exists. Similarly, no standard terminology is used. A few of the categorizations are included in Table 1.

Traditionally, the outputs typically consisted of economic performance and prosperity measures, such as gross product per capita and the unemployment rate. Currently, quality-of-life measures frequently are included among the outputs.

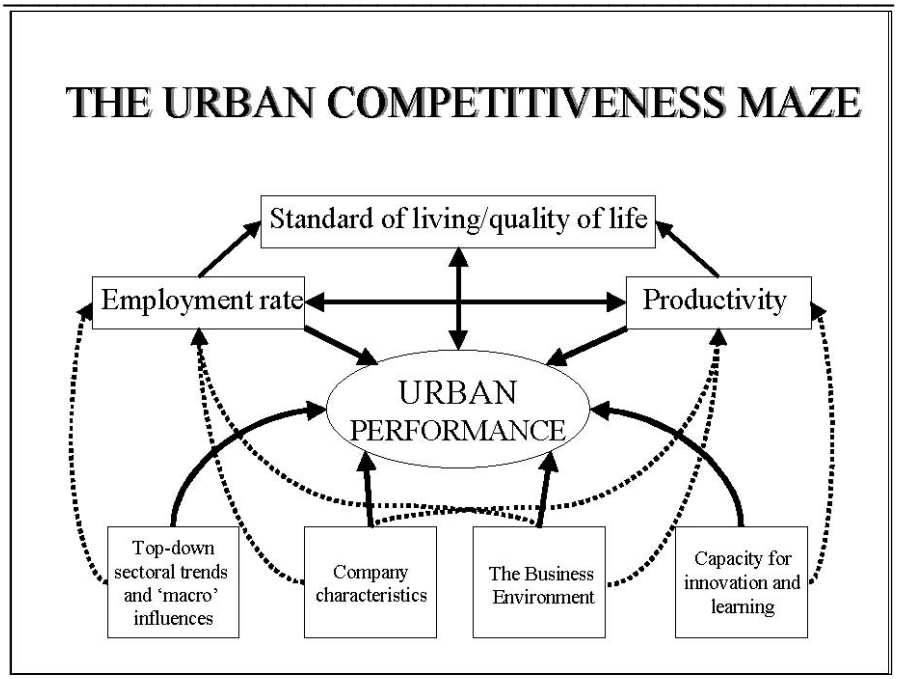
More sophisticated models insert one or two stages between inputs and outputs. Begg's model in Figure 1 places the inputs at the bottom. Productivity and employment rate are seen as intermediates determined from the inputs. The intermediates and the inputs together determine "urban performance." The intermediates and performance affect the "standard of living/quality of life."

TABLE 1
EXAMPLES OF THE CLASSIFICATION OF INPUTS

Arizona Strategic Planning for Economic Development	National Competitiveness Council of Ireland	World Bank (Specific to Knowledge Economy)
Human Resources	Education & Skills	Education & Human Resources
Technology	Innovation & Creativity	Innovation System
Capital	Entrepreneurship & Enterprise Development	
Physical Infrastructure	Economic and Technology Infrastructure	Information Infrastructure
Quality of Life		
Tax and Regulatory Environment	Business & Work Environment	Economic Incentive & Institutional Regime

Sources: Arizona Strategic Planning for Economic Development, "Creating a 21st Century Economy;" National Competitiveness Council of Ireland; and World Bank.

FIGURE 1



Source: Iain Begg, "Cities and Competitiveness" in *Urban Studies*, May 1999.

Though the terminology is considerably different, the model used by the National Competitiveness Council (NCC) of Ireland (see Figure 2) is similar to that of Begg. The NCC identifies the inputs as the "foundation stones" of the economy and indicates that they are the primary drivers of competitiveness. The inputs are labeled as "policy inputs" because policymakers can have an impact on competitiveness and ultimately prosperity by actions taken to strengthen the foundations. The intermediates are considered to be neither completely inputs nor outputs. Building competitiveness is seen as resulting in strong economic stability, with both productivity and increases in real wages maximized. The outputs, or performance indicators, are not directly under the control of policymakers. Performance results from the quality of the inputs and the ability to build competitiveness.

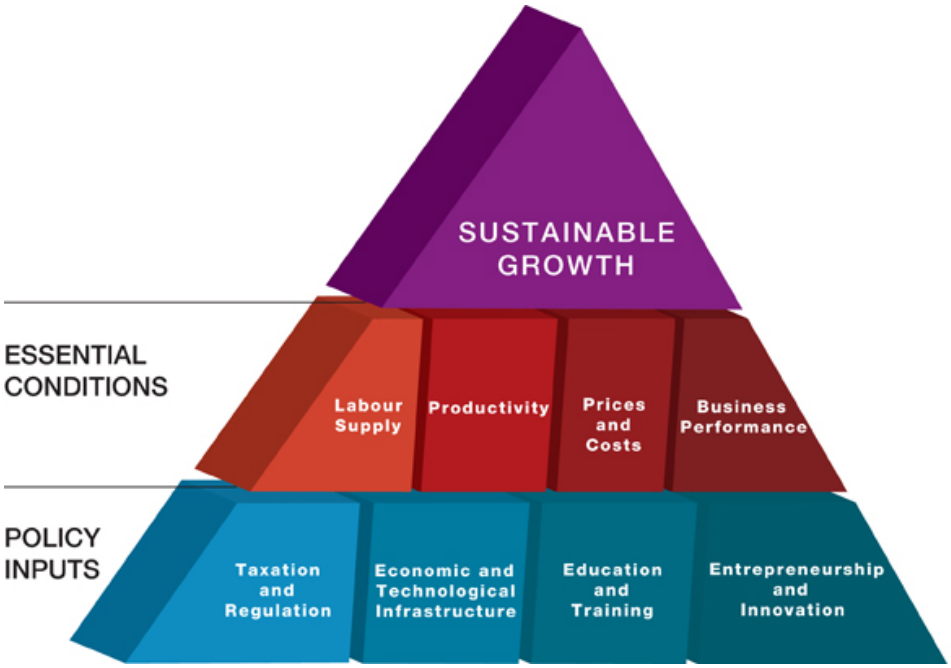
As implied by the NCC's use of the term "policy inputs," public policy has a role in enhancing a region's competitiveness and ultimately prosperity. The public agenda must recognize that natural market adjustments need to occur in a business climate unfettered by overly burdensome regulation and taxes, and that public support (e.g. for education) must be in place for individuals and businesses to reach maximum potential. The role of policy through an active development agenda in concert with the economic foundations is illustrated in Figure 3.

An optimal competitiveness strategy recognizes that activist policy initiatives can play a role when outcomes are incomplete. The free market does not always generate optimal outcomes. In the case of public goods, the free market underproduces. Research and development is an example. External spillovers to those who did not conduct the research can make the private return lower than the public return. Similarly, education is underproduced and poorly allocated by the private market since a lien cannot be attached to human capital.

The public role in economic development is summarized by Begg:

> … the role of government is undoubtedly shifting from direct provision to an enabling one. Where public intervention is most successful, this tends to be attributable to effective infrastructure, policies which enhance the quality of labour, and the promotion of appropriate specialisation and economic linkages … Following the logic of figure 1, the main scope for action by urban policy-makers is in enhancing the business environment, fostering innovation and learning and assuring social cohesion.

FIGURE 2
NATIONAL COMPETITIVENESS COUNCIL OF IRELAND
INDICATORS OF PROGRESS



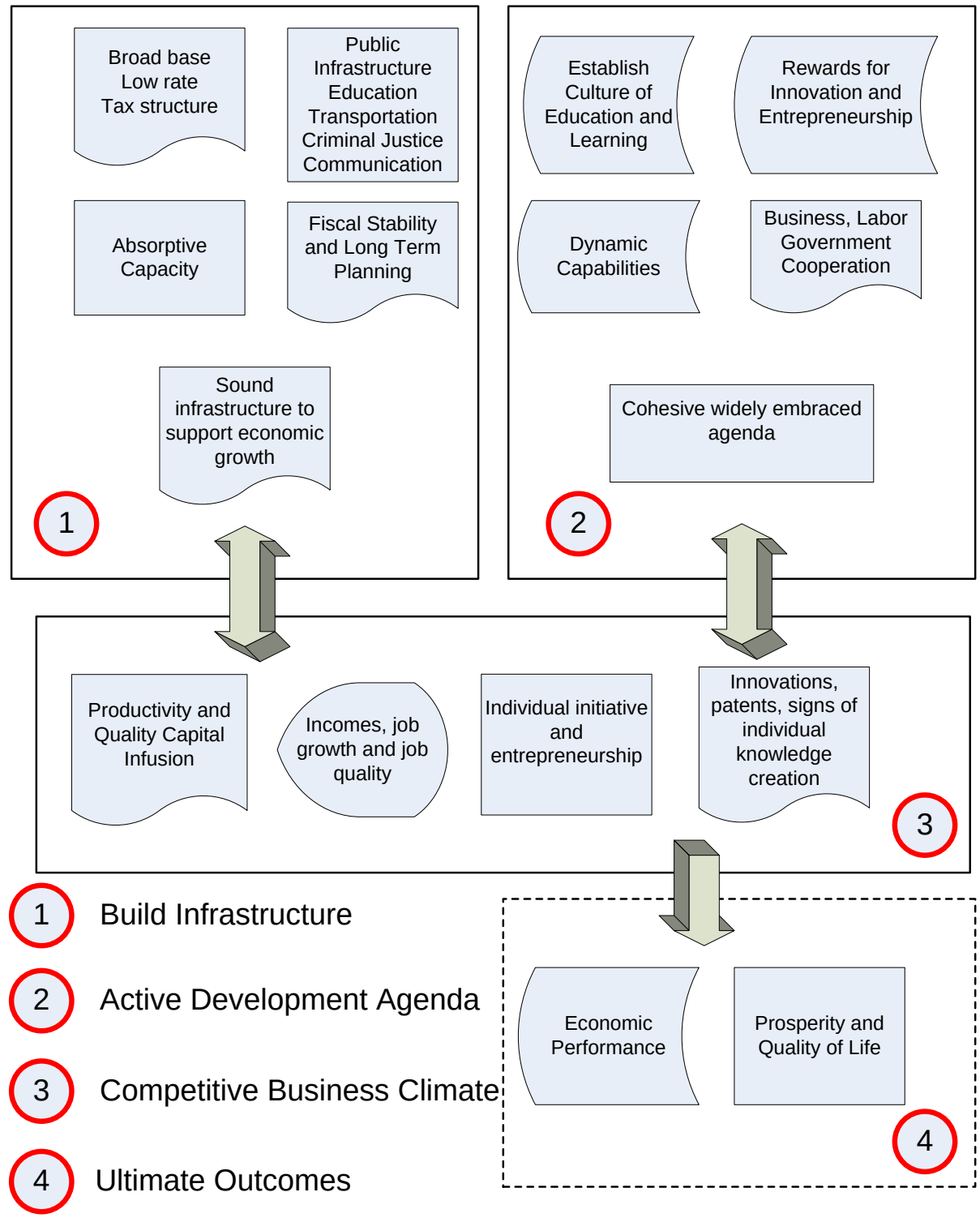
Inputs

- **Taxation and Regulation**
  - Taxation Rates and Overall Burden
  - Regulation and Reliance on Competition
  - Labor Market Regulations
- **Economic and Technological Infrastructure**
  - Total Investment in Infrastructure
  - Transport and Energy Infrastructure
  - Information and Communications Technology (ICT) Infrastructure
  - Housing
- **Education and Training**
  - Total Investment in Education
  - Pre-Primary Education
  - Primary Education
  - Secondary Education
  - Tertiary Education
  - Life-Long Learning
- **Entrepreneurship and Innovation**
  - Business Formation and Management
  - Investment in Research and Development
  - Innovation
  - Clusters and Networks

Source: National Competitiveness Council of Ireland.

FIGURE 3

Competitiveness Roadmap



Source: The Productivity and Prosperity Project: An Analysis of Economic Competitiveness.

THE PRODUCTIVITY AND PROSPERITY PROJECT

The Productivity and Prosperity Project: An Analysis of Economic Competitiveness (P3) is a new initiative led by existing faculty and research staff of the L. William Seidman Research Institute in the W. P. Carey School of Business at Arizona State University. Research affiliates from throughout the school and university may participate on a broad set of projects.

The work conducted as part of P3 will be based on economic and econometric analyses, summaries of existing empirical evidence, and broad surveys of relevant literature in related disciplines to ensure well-rounded, multidimensional analyses. The research results will be shared with the community through reports and other devices. Members of the research team will work to organize conferences and to be visible at national and international meetings on regional economics.

Enhancing productivity is the primary means of raising prosperity. In turn, gains in productivity are dependent on competitiveness. An overarching objective of P3 is to examine the notion of competitiveness from the perspective of an individual, a business, a region, and a country. The roles of individual initiative, business strategy, and economic development policies in maximizing productivity and ultimately prosperity will be examined. A particular focus will be the state of Arizona, with comparisons made to other states. Metropolitan areas and other subdivisions of Arizona also will be examined.

The P3 research agenda will examine all aspects of the competitiveness model: inputs, intermediates, and outputs. As each dimension of competitiveness is explored, key determinants and empirical metrics will be established.

Initially, P3 will (1) produce an overview of business climate and business relocation decisions, (2) focus on the education/human resources input, particularly on the role of higher education, (3) examine labor market outputs, including job quality and other components of wages, and (4) assess the role of the knowledge economy in achieving productivity and prosperity.

Business Climate and Business Location Decisions

The term “business climate” largely is synonymous with “competitiveness.” Thus, this research effort will produce an overview of competitiveness and the role of public sector development strategy:

- The business climate attributes most important to attracting quality capital investments (business location decisions).
- Arizona’s tax and public expenditure systems and regulatory environment.
- The role of development strategy, particularly the public sector role, including an examination of the experiences in other states and countries.

Education and Human Resources Inputs

Regions competitive in the 21st-century economy are comprised of competitive companies, which in turn consist of competitive individuals. The more highly skilled a worker, the higher is the worker’s productivity. The educational attainment and skills of workers are more important than at any time in the past. Thus, a region’s educational infrastructure and the educational achievement of its residents are key components of regional competitiveness.

The time and money invested by individuals in furthering their educations yields significant returns that can be measured in lifetime earnings and other measures (Wolfe and Haveman). Moreover, educated individuals create "spillovers" that benefit entire economies (Moretti).

Initial P3 research will address the following topics:

- Educational attainment of Arizona residents relative to residents of other states by age, workforce status, place of birth, recent migration status, and race/ethnicity.
- Individual access to educational institutions and to financing.
- The return to individuals from investment in education.
- The return to society from investment in education.
- The pricing of tuition.
- The relationship between investment in higher education, particularly at research universities, and business location decisions and the overall business climate of a region.

Labor Market Outputs

Employment is one aspect of the labor market. Underlying the research on labor market performance is the understanding that quality job growth can be sustained only with the continuing infusion of productive capital and employment opportunity. Wages are another aspect of the labor market. Wages reflect several factors: job quality (industrial mix and occupational mix), worker productivity, local cost of living, local amenities, and labor supply and demand.

Initial P3 research will investigate the following topics:

- The effect on wages of each of its components. (Reports on job quality already have been released, available online at www.wpcarey.asu.edu/seid/Reports.cfm)
- The relationship between job growth and gains in productivity and prosperity.
- The reasons for Arizona's relatively low labor force participation rate.

Knowledge Economy

One definition of the knowledge economy is that "the generation and exploitation of knowledge play the predominant part in the creation of wealth" (United Kingdom Department of Trade and Industry). Features of the knowledge economy include (1) knowledge becoming more important as an input, (2) knowledge becoming more important as a product, (3) codified knowledge becoming more significant as a component of economic relations, and (4) changes in information and communication technologies.

Many economists now view knowledge to be a primary factor of production. Neoclassical economic theory considered labor and capital to be the only factors of production in the industrial age; in the preceding agricultural age, labor and land were viewed as the factors of production. Unlike other factors of production, knowledge is a public good that is not limited.

Knowledge economy competitiveness implies having command over the production of ideas, processing of and measurement of knowledge, and maximizing the discovery of new processes, products and service delivery systems. It requires dynamic skill sets, absorptive capacity, an educated workforce, and a broad base of general skills.

Business leaders believe that strength in the knowledge economy is important for competitiveness, productivity, and prosperity. The Business Roundtable, comprised of 15 diverse business organizations, has issued a call for action, specifically targeting the current and impending deficiency of science and engineering graduates. Their report, *Tapping America's Potential: the Education for Innovation Initiative*, calls upon business, community and government leaders to set aggressive goals for increasing the number of college science and engineering graduates by 2015. It is not clear that this and similar agendas are broad enough to span the needs of a fully functioning knowledge-based economy.

P3 research will address several issues:

- A description of the knowledge economy and its historical evolution and possible future direction.
- Whether knowledge is a fundamental resource as important as capital and labor in neoclassical growth theory or even more important as suggested by Romer.
- Whether the knowledge economy is limited to science and technology investments or whether elements of the knowledge economy are present in virtually any 21st century business enterprise.
- The long-run economic returns to investments in knowledge economy pursuits.

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