# America In the Global Economy

*A Background Paper for the*
*New Commission on the Skills of the American Workforce*

by

Ray Uhalde and Jeff Strohl
National Center on Education and the Economy and Westat
with
Zamira Simkins, American University

December 2006

© National Center on Education and the Economy 2006

# America In the Global Economy

*A Background Paper for the New Commission on the Skills of the American Workforce*

by

Ray Uhalde and Jeff Strohl

*National Center on Education and the Economy and Westat*

with

Zamira Simkins, American University[1]

December 2006

## I. Introduction

When we survey the performance of America's economy over the last half century or more, at least three factors stand out as key contributors to the nation's comparative advantage: scale, innovation, and educational attainment.

Being big certainly helps. Until the 1980s, the large and relatively wealthy U.S. population had been able to start and grow businesses, achieve economies of scale, accumulate capital and wealth, and enrich living standards in part because very large home markets existed for our goods and services, markets that were very much insulated by geography and other factors from all but a few serious economic competitors from abroad. Nonetheless, many of the benefits of competition were obtained through the active engagement of more than five million domestic business entities operating in a largely free and open market system. One benefit of this market pluralism in a large economy is straightforward: because many private market decisions are wrong and most experiments fail, the process of "experiment, failure, and experiment again" has more chances for success in big markets.[2] Moreover in recent years, the fact that the U.S. is two to four times the size of competitors from other developed economies has let us get away with not being among the best in school.[3]

Americans highly value individualism and hard work, and possess a nearly unbounded optimism in the future. This optimism is rooted in no small part in a deep, affecting appreciation for innovation and discovery.[4] As an indicator of our intensity for exploration and discovery, the United States began

the new century investing 2.7 percent of its gross domestic product (GDP) in research and development (R&D), an impressive figure, but still significantly below the R&D intensity of Japan, Finland and Sweden.[5] Since 1995, growth in R&D expenditures in the U.S. has outpaced growth in Japan, as well as in the European Union.[6] Continuing this momentum is important because, as the long sweep of history shows, the more we learn and discover, the better we get at learning and discovering.[7]

Of course we also learn in formal school settings. The United States has set the world standard for educational attainment throughout the last half century, though we have lost our lead by some measures. Through the 1970s, we far exceeded any other nation in the proportion of working age adults 25-64 who had completed high school. By this indicator, the U.S. now is tied for third, not because we have done worse but because Norway, Russia and the Czech Republic have done dramatically better. Moreover, Canada and Japan lead another group of nations poised to also outdo the US in a few years because they have surpassed us in the proportion of their workforce entrants with a high school diploma.[8] As late as the early 1990s, we ranked first among nations in the proportion of working age adults with university or similar qualifications, but we have since passed the torch to Canada, and others are closing the gap.[9] We are not regressing; rather we are simply not keeping up with the faster pace of other countries.

Historically, these and other factors[10] have propelled economic growth in this country, and they will continue to do so even as the world's economy becomes ever more interconnected and competitive. The challenge that looms before us today – for which China and India are emblematic – is how do we build on our strengths and continue to provide a high standard of living for our citizens? The commission members have focused on what needs to be done to make sure our education and training institutions play their part in meeting the challenge.

This is not the first time we have confronted an economic threat from the other side of the globe. Can we learn from our most recent international economic challenge and the ways in which we responded?

## II. Recent History

In 1990, the United States faced serious international economic challenges from Japan, Germany, and the emerging Asian Tiger economies of Singapore, Hong Kong, South Korea and Taiwan. These nations were experiencing higher rates of productivity growth than the United States, and their living standards and real wages were growing steadily. In contrast, America's two decades of anemic productivity growth had led to falling real wages and declining living standards for the majority of its families. Unlike Japan, Europe, and the Asian Tigers, the U.S. experienced record trade deficits the previous six years. While U.S. productivity, wages and incomes were at high levels in 1990, their growth had slowed significantly in the eighties.

The United States' era of stagnant and then falling real wages and family incomes was reversed after 1995, rising strongly as unemployment declined to full employment levels, productivity growth surged, and skill shortages emerged. Technological innovation exploded in the 1990s causing a productivity surge that was enabled in part by the rising educational attainment of the labor force. Despite the 2001 recession, the U.S. emerged from those challenges with a new and stronger economy, a significantly changed labor market, and a somewhat different cast of international challengers. Today, America's GDP per capita stands at over $41,000 per person – among the world's highest standards of living.[11] What did we do to prosper, and can we realistically continue to do so?

Briefly, a confluence of microprocessor-computer-telecommunications breakthrough technologies supported by increased financial investments, collaborative global business processes, and a large, educated and experienced domestic workforce drove the growth of the last decade. Can we look to similar factors again? Let's briefly examine each.

First, technological innovation: The first transatlantic fiber-optic cable service was initiated in December 1989, and the World Wide Web became accessible to the general public in 1991. The former is the backbone supporting global supply chains for knowledge work. The latter, along with search engines, has democratized information around the world. For example, only a third of

Google's 1 billion searches each day are U.S. based, and less than half are in English.[12] These and numerous other technological breakthroughs powered much of our economic growth in the nineties. Are comparable revolutionary innovations in store in the near future to fuel U.S. growth?

Second, financial investments: Gross private domestic investment rose as a share of GDP by more than two percentage points (increasing over $400 billion annually) between the first half and last half of the 1990s. This investment surge more than accommodated the financing needed for innovations, technologies, business startups and expansions that fueled our growth.[13] The U.S. continues to have the most vibrant and diversified financial system in the world, from its equity markets to venture capital funds, and it remains a singular advantage of our economy.

Third, educational attainment: Expanding educational attainment has traditionally been critical to improving productivity growth and ultimately, the living standards of our citizenry. Historically, new entrants to the U.S. labor force have been better educated -- more high school and college graduates -- than those leaving the work place. In evidence are the 20 years since 1980, when the share of workers with at least some college rose by 20 percentage points, to 58 percent. But future demographic trends suggest a dramatic slowdown. Even though college going rates are at their highest levels,[14] over the next 15 years, the proportion of the workforce with some college or a degree is likely to increase only about four percentage points. This is primarily because the prime-age, native-born workforce in the U.S. will *not grow at all* through 2020.[15] Moreover, the US share of the *global* pool of college students is shrinking and will almost certainly continue to do so, as projected by the OECD.[16]

So if scale, innovation, education and our world class financial systems have been able to power U.S. growth over the past half century, including the most recent economic challenge from Asia, what are our prospects in the new competitive challenge with the so called BRICs – Brazil, Russia, India and China?

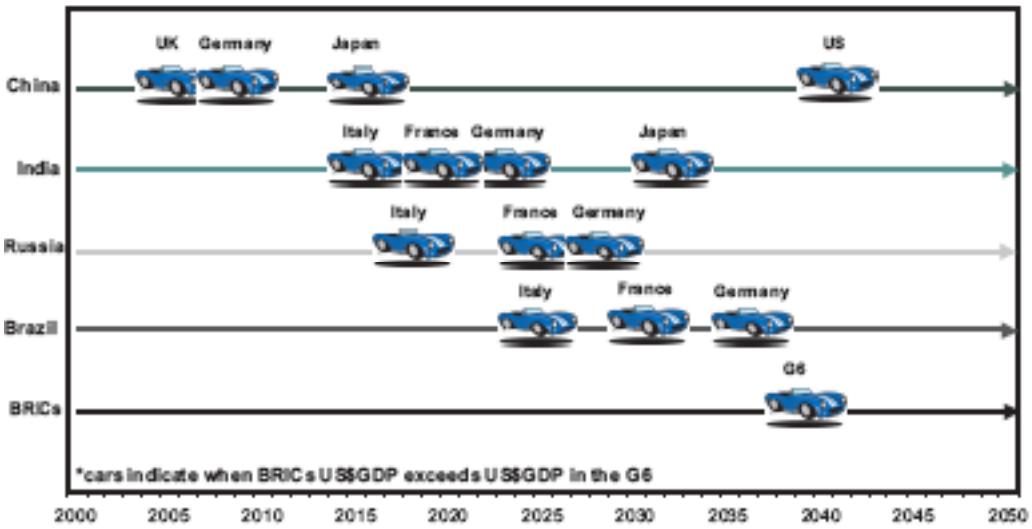
## III. The New Competitive Challenge

*Fast Growing BRICs*

Consider for a moment the following, from a 2003 study by two Goldman Sachs economists.[17] India's economy should grow to be larger than Japan's by about the year 2030, and its population will eclipse China's in 2037.[18] China will likely be the world's largest economy by the year 2040, if not earlier. And the BRIC economies taken together could be larger than the G6 (US, Japan, UK, Germany, France and Italy) by about 2040.

**Figure 1**

**Overtaking the G6: When the BRIC's GDP Would Exceed the G6**




Source: Dominic Wilson and Roopa Purushothaman, "Dreaming With the BRICs: The Path to 2050", October 2003, Global Economics Paper No: 99, page 3, Goldman Sachs Global Economics Website at https://www.gs.com.

These are projections, not facts. But they could turn out to be more or less correct assuming stable politics, sound policies and reasonable luck for the ascending nations. More important, what these projections suggest for the work of the commission is dramatic.

- The *size* advantage maintained for years by the US among its principal competitors is diminished with the emergence of India and China as global market economies. For example, consider the impact of a possible free trade zone between India and China that would constitute, by itself, a

market with nearly 40 percent of the world's consumers. Leadership from the two nations discussed this possibility last year.[19]

- Our children and grandchildren, for the first time since about 1890, will likely not be citizens of the country with the world's largest economy.[20] Indeed, if the 20th Century was America's Century, China plans to seize the mantle for the 21st Century. Or maybe it is more accurate to say "re-seize", for it was from China that we captured the first rank in the late 1800s.[21]

Now we didn't say China would be richer or wealthier than the U.S. Indeed, the same Goldman Sachs study also projects that real U.S. GDP per capita would double between 2000 and 2040 to nearly $70,000 and to over $80,000 in 2050. In contrast, China's real GDP per capita is projected in the study to increase by over 20 times between 2000 and 2040, but only to a level of about $18,000 per person, and to over $30,000 in 2050.[22]

**Table 1**

**GDP Per Capita Projected to 2040 and 2050 for the G6 and BRICs**

(2003 U.S. dollars)

| | **2040** | **2050** |
|---|---|---|
| United States | $69,431 | $83,710 |
| Japan | $56,721 | $66,805 |
| United Kingdom | $49,658 | $59,122 |
| France | $42,601 | $51,594 |
| Russia | $35,314 | $49,646 |
| Germany | $40,966 | $48,952 |
| Italy | $33,583 | $40,901 |
| China | $18,209 | $31,357 |
| Brazil | $16,370 | $26,592 |
| India | $8,124 | $17,366 |

Source: Dominic Wilson and Roopa Purushothaman, "Dreaming With the BRICs: The Path to 2050", October 2003, Global Economics Paper No: 99, page 9, Goldman Sachs Global Economics Website at https://www.gs.com.

Looked at somewhat differently, the average Chinese citizen in 2040 might be about as well off as the average Italian is today. The typical Indian could attain today's Italian living standards about a decade later. And Russians, on average, could achieve a standard of living in 2040 comparable to that of today's Americans.

These projections also imply, though don't assure, a large and growing global middle class, something about which we will have more to say later. For the moment, the central point is that the BRIC economies and others are likely to be important, strong engines for global spending and growth over the next decades, helping bolster the slower economic growth of the US, Europe and Japan.

The important question for the commission to draw from this discussion is what will it take for the U.S. to substantially improve, let alone double our standard of living by 2040 as the Goldman Sachs study projects? Is this a realistic scenario given the intense competition we face as we look to the future, even though we have done it before?[23] We believe two actions necessary to maintaining a high growth, high wage and high employment economy are (1) improving our educational attainment and quality, and (2) nurturing and unleashing our innovation capabilities. Before we take a closer look at the U.S. market for talent however, let's examine the high skills available on the global stage.

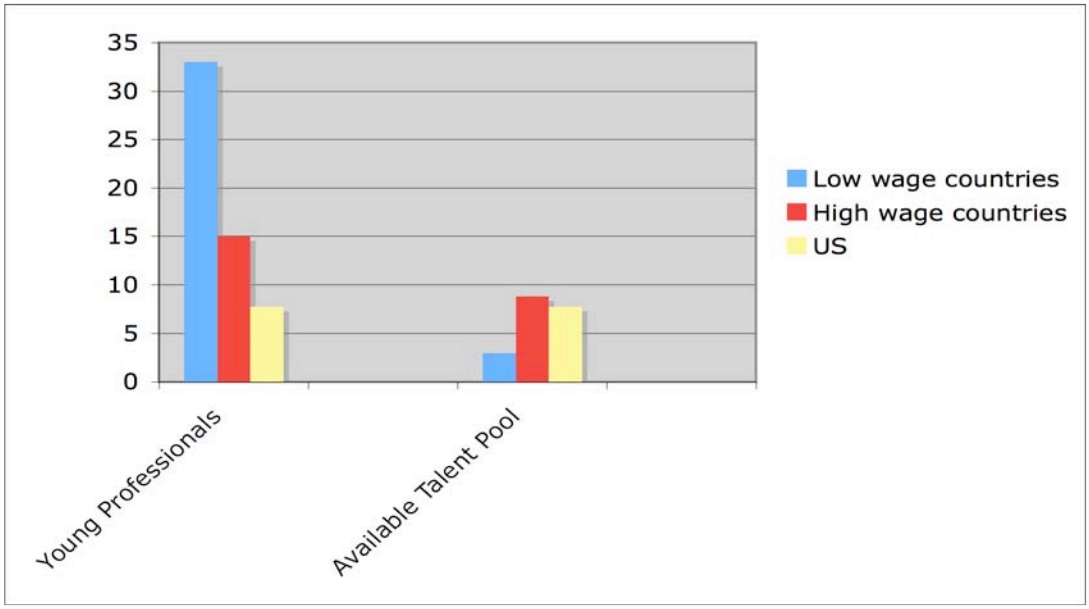
***The Skilled Global Labor Supply***

China, India, and countries from the former Soviet bloc have vaulted into the global supply chain for both manufacturing and services. Companies and individuals in these and other countries are able to compete for global knowledge work as never before. Within the last decade – virtually "overnight" – about 2.7 billion people from just these three nations have joined the global economy, and 1.5 billion of them have been added to the global labor force.[24] Richard Freeman of Harvard refers to this as the "great doubling" of the global labor force. It is the sheer size of this expanding global talent pool that leads

many economists to believe U.S. wage growth could be held down for years to come, or even decline.

But how talented is the global labor market? A recent McKinsey study[25] estimates that there are 33 million new young professionals in a sample of 28 low wage countries, compared with 15 million in high wage countries, and 7.7 million in the United States alone. Of these workers, 4.6 million are considered to be suitable to work for multinational companies today, based on interviews with human resource managers. Young professionals in these emerging markets are defined in the study as engineers, finance analysts and accountants, life science researchers and generalists with university degrees and up to seven years of experience. McKinsey estimates their ranks are growing at 5.5 percent annually, much faster than in the U.S.

**Figure 2**
**The Global Talent Pool, 2005**
(people in millions)




Source: McKinsey, The Emerging Global Market, June 2005 (3 Volumes), http://www.mckinsey.com/mgi/publications/emerginggloballabormarket/index.asp

The pipeline for these young professionals passes through the world's colleges and universities. In 1970, the U.S. predominated in producing college

level talent, enrolling about 30 percent of the college students in the world. Since then, the world has been catching up, with the US enrolling just 14 percent of the globe's college enrollees in 2001.[26] So the U.S. share of a rapidly expanding worldwide pool of college-educated talent is shrinking considerably, even as our college going rates edge up.

And foreign college workers will be a lot cheaper than American workers for decades to come. Although wages have been rising in China and India recently for engineers, managers and other skilled talent, overall wage levels are unlikely to equilibrate with U.S. wages for many years. For example, at a growth rate of seven percent per annum for wages in China, it would take 30 years to reach U.S. levels.[27]

## IV. Taking a Closer Look at the U.S.

### *The Role of Education in a Growth Economy*

*Schooling and Economic Growth::* Most people pursue higher education to increase their earning power, but many do not realize that their individual gains brought on by further education impact the economic growth of the nation. Policy makers and economists strongly agree that a highly educated and skilled workforce is one of the indispensable keys to economic success, particularly in the kind of economic environment the United States will face for the foreseeable future. Studies confirm that education enhances labor productivity and, hence, economic growth through improvements in worker skills and by upgrading the quality of human capital embodied in workers. Another crucial effect of education is that it boosts innovation by developing analytical skills and advancing creativity. As people learn-by-doing and experimenting they contribute to the pool of available knowledge by improving designs, processes, products and technologies. This process places the economy in a virtuous circle with continuously improving technological progress responding to incentives. As the new growth theory asserts, technological change drives economic growth. And education is a platform that supports the engine of growth.[28]

To quantify the contribution of education on the U.S. economy we estimated an economic growth model that reflects this new or endogenous growth theory. The average years of schooling was used as a measure of education, and was separated into two components: postsecondary completion and less-than-postsecondary education completion. These measures were used to model the impact of education on real or inflation-adjusted GDP per worker over the period 1960 to 2000. The following are findings from the model:

- The average years of schooling is estimated to have a positive and significant effect on growth. A one percent increase in the average years of schooling in the U.S., holding everything else constant, raises real GDP per worker by 0.05 percent.
- Post-secondary education completion is estimated to have a positive and significant impact on real GDP per worker. A one percent increase in the

post-secondary completion rate induces a 0.1 percent increase in long-run aggregate output.

- The average years of schooling below the completed post secondary level is also estimated to have a positive and significant impact on real GDP per worker. A one percent increase in average years of schooling for this group results in a 0.06 percent increase in long-run aggregate output.

It is clear that education matters for growth and college matters the most. Over the long run, a one-grade increase in the average years of schooling in the U.S. would result in nearly a one-half percent increase in real GDP per worker. Boosting our college completion rate from 25 percent to 27.5 percent would yield a full one percent increase in real GDP per worker or about $125 billion for the overall economy.

For average Americans, though, these impressive gains from education on an economy-wide level are too abstract. People value education as the primary mechanism available to influence their individual opportunities and future incomes. Since the seventies, a college education has become not only the preferred, but also the most well traveled path to middle class status. Consequently, our country's macroeconomic goals and individual interests can be aligned with education as the linchpin of this win-win situation.

*Education and Earnings:* The earnings trends for, and payoffs to, higher educational attainment are pretty clear. Since the mid-1970s, the average earnings of high school dropouts have declined when adjusted for inflation, while the average earnings of the college educated have increased impressively.

Between 1975 and 2003, real average earnings for adults aged 25-64 increased by a greater percentage at each higher level of educational attainment:

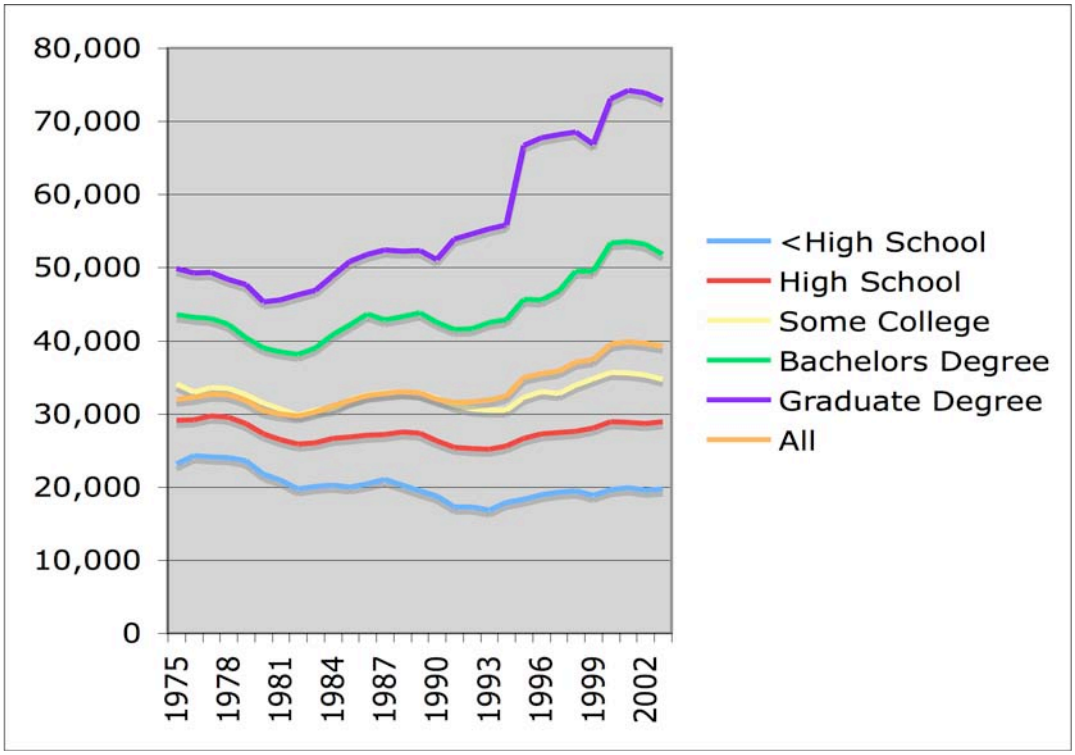
- High school dropouts (-15%),
- High school graduates (-1%),
- Some college (+2%),
- College graduates (+19%), and
- Graduate or professional degrees (+46%).

**Figure 3**

**Average Earnings of Prime Age Adults 25-54 By Education**

**1975-2003**

(2004 dollars)




Source: Tabulations of the Current Population Survey, Annual March Social and Economic Supplements

Bachelor degree and graduate degree earnings declined in 2002 and 2003, but it is too soon to call this a trend. Nor does this signal an end to the college earnings premium.

The recent drop comes after a very long run of consistent increases. The four-year college wage advantage over a high school diploma stands at 80 percent, nearly a million dollars over a 40-year working life, and double the 1979 college premium. And this college wage advantage has grown even as the supply of college-educated workers has increased dramatically. Mandel and others posit that college-educated workers prospered during the last decade because the fast pace of innovation demanded workers who could learn and adapt quickly to new technologies. That drove up pay for educated workers, but also widened the earnings gap between them and their less-educated counterparts.[29]

Since 1983, the average earnings of bachelor degree holders increased by $13,700 adjusted for inflation. Moreover, the difference between BA and high school yearly earnings has increased to nearly $23,000 over the same period. And the difference in earnings between bachelor's and graduate degrees has risen to $21,000 a year, a 40 percent premium. By any of these dimensions, education -- especially higher education -- pays off handsomely.

As we noted, the college earnings premium also is important in helping explain the growth in inequality over the last two decades. The recent decline in college wages and overall wage stagnation raise anew concerns about economic mobility in this country – at the core of the American dream. Is the middle class declining? Can the average Joe or Jane still get ahead?

*Middle Class Mobility:* Yes, the middle class is shrinking.[30] By our definition, half of all U.S. households were middle class in 2003, with incomes between roughly $30,000 and $90,000.[31] Three in 10 families enjoyed incomes in excess of $90,000.

That half of U.S. families are middle class sounds somehow fitting, though middle class status was more inclusive 35 years ago. Then, fully 60 percent of households satisfied this definition of middle class status, while just one in 10 households enjoyed upper class incomes.[32]

What about education's role in determining who is getting ahead and who is falling behind? The American class structure is very dynamic and the determinants of mobility are many fold. Nonetheless, we can say that the middle class is dispersing into two equal and opposing streams of upwardly mobile college-haves and downwardly mobile college-have-nots.

In 1967, nearly half of families headed by high school dropouts and 70 percent headed by high school graduates were in the middle class – that is, the middle five deciles in the household income distribution. By 2003 only a little over a third of dropouts and just over half of high school grads were still in the middle class and nearly all of those who left the middle class had fallen into the lowest two income deciles. As Figure 4 below shows, high school graduates experienced a 17 percentage point decrease in middle class status – 12 points by families falling out of the middle class, and 5 points by families moving up.

While those with high school or less are falling, those with bachelor's or graduate degrees are climbing. Since 1967 families headed by workers with bachelor's and graduate degrees either stayed in the middle class or moved up into the top three income deciles. The share of families with bachelor's degrees in the upper three income deciles increased from 22 percent to 36 percent. Over the same period, the share of families with graduate degrees in the top three income deciles has increased from 32 percent to 57 percent. Figure 4 also shows that, for families headed by college graduates, middle class status decreased by 16 percentage points, this time virtually all as a result of families moving to upper income status.

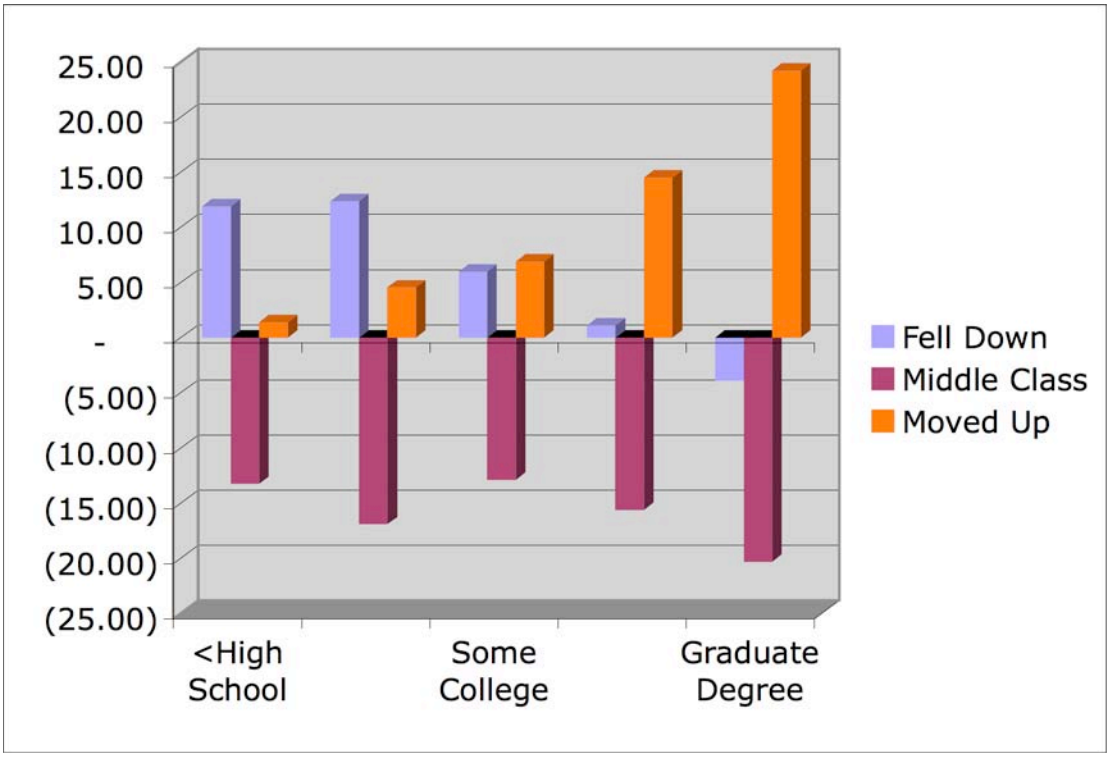
So, while the middle class may be shrinking over time, at least by the measures used here, there is also a strong dynamic underway that is shuffling the pecking order among individuals and families in the US – and education plays a strong role in these movements. Families headed by college and graduate degree holders are much more likely to be moving up the income distribution, while families headed by high school graduates or dropouts are more likely to be moving down the ladder. If college is the ticket to moving up, what can we say about the future? Will the jobs be there if the college going rate continues to advance?

**Figure 4**

**Middle Class Dispersion By Education: Which Way Did They Go?**

**1967-2003**

(percent change in households)



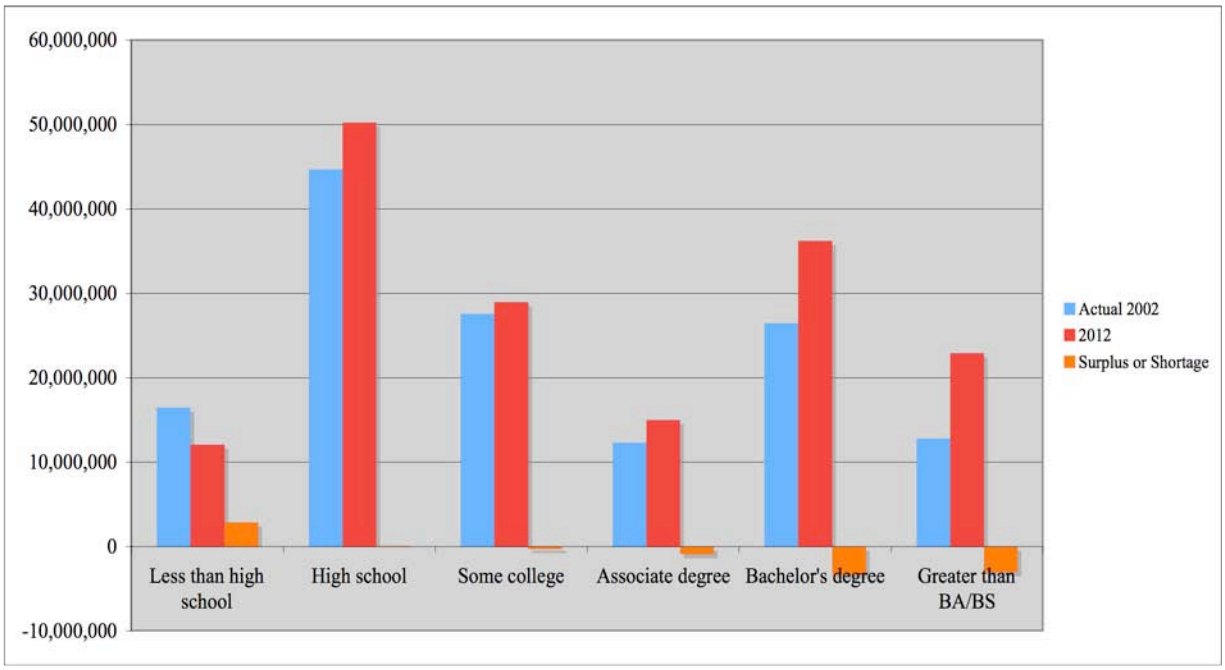

Source: Tabulations of the Current Population Survey, March: 1968, 1970, 1980, 1990, 2000, 2004, CPS Utilities, Unicon Research Corporation, www.unicon.com.

*Education Demand Projections:* If the past is any guide, the future promises a rising demand for educated and skilled workers, though this is not universally acknowledged. Many analysts point out that the Bureau of Labor Statistics (BLS) projects only a one percent increase in college jobs by 2012. Anthony Carnevale argues that these projections are misleading.[33]

Projections by BLS consistently understate economic demand for education and skill, in part, because they assume that educational attainment remains unchanged within occupational categories over the duration of the projections. As result, for example, BLS' projections to 2012 suggest only a small surplus of people with "at least some college" and a shortage of over 4,000,000 workers with high school or less. This is a most unlikely outcome for the U.S. economy, or else we are in bigger trouble than most imagine.

Using conservative adjustments for prior trends in education demand, Figure 5 below illustrates quite a different picture. Demand for workers with bachelor's degrees is projected to increase by almost 10,000,000 jobs beyond current levels, with similar increases for jobs that require graduate level education. Using these adjusted demand data, and a supply model derived from Census projections and Current Population Survey data, produces the opposite result – a "shortage" of more than 7,000,000 workers with an associate degree or higher and a "surplus" of 3,000,000 workers with the least schooling.[34]

**Figure 5**
**Education Projections:**
**Actual Supply in 2002, Projected Demand and Projected Surplus or Shortage of Workers in 2012 By Education**
(People in millions)




Source: Estimates by Carnevale and Strohl based on Census projections and CPS data. See endnote #34.

Most economists, of course, do not believe that labor shortages or surpluses persist for any length of time. Other labor sources would be tapped, for example through stepped-up immigration and offshoring, production processes would be

revamped, and wages would adjust to relieve pressures and clear most markets. The important points these projections hold for commission members are two-fold. First, the projections reinforce that we must find ways to reduce the number of high school dropouts in the adult workforce by several million. If for no other reason, we need to do so because their expected numbers based on historical trends far exceed the requirements of the economy. And, of course, there are substantial social costs associated with many persons who lack a high school diploma. They are substantially over-represented among: those with out of wedlock births, absent fathers, the poor, welfare recipients, and the incarcerated. Second, they suggest that the U.S. market for college-educated workers should be tight for several years to come, auguring well for the fortunes of such workers. But what if demand for highly educated and skilled workers doesn't materialize on this scale? And what if the global talent pool identified above is tapped to fill all or part of the college gap? Mandel makes the point that if the pace of innovation and technology-based growth slows considerably, there will be much less need for college-educated workers, and salaries especially for new graduates would suffer most.[35]

Baby boom retirements should create a steady stream of replacement openings for college-educated workers. By 2020 there will be more than 40 million baby boomers with at least some college between the ages of 55 and seventy-five years old. And we aren't producing college-educated workers fast enough to replace the baby boomer retirees. Between 1980 and 2000 we increased the share of U.S. workers with college by a hefty 20 percentage points. At current rates of college going the share of workers with at least some college will only increase by 3 percent between 2000 and 2020.[36]

### *Credentials and Competencies*

While these projections give us a sense of what employer demand for high school and college graduates might be in the future, they tell little about what new workforce entrants should know and be able to do in order to satisfy workplace requirements. Employers use diplomas of recent graduates as a signaling devise – a sign of potential -- even though we know that career success

and productivity on the job are driven by a complex set of competencies and skills.

Even when employers know the courses graduates have taken, these academic credentials often only serve as artificial screens. For example, few people go to a good college or get a good job unless they complete Algebra II in high school, but most college majors and the vast majority of good jobs require only a small share of the content taught in Algebra II.[37]

In order to better prepare our students for tomorrow's world of work, we need to better understand how employers use educational credentials as measures of potential and as simple proxies for a much broader set of occupational competencies – knowledge, skills, and abilities. It is these competencies that employers value. But which are valued most highly valued now and in the future?

The Occupational Information Network (O*Net)[38] database enables us to get behind the titles of jobs and the academic credentials of jobholders to observe what jobs require people to do and the knowledge, skills, abilities and interests of job incumbents. O*Net is a comprehensive database of worker attributes and job characteristics, used frequently by human resource professionals and school counselors. Each of approximately 1000 occupations, with some exceptions, is described by over 275 descriptors. The data are obtained through structured interviews of job incumbents and augmented by observations of industrial psychologists. The information is clustered into broad categories for each occupation according to worker characteristics, worker requirements, experience requirements, occupational characteristics, occupational requirements, and occupational-specific information.[39]

Each information category contains subcategories that further define the job or worker. For example, the worker characteristics category includes abilities such as cognitive attributes, interests such as enterprising or investigative, and work styles such as conscientiousness.

Finally, each descriptor of the job or worker is rated for "importance" and "level". Job incumbents were asked to rate the importance of an attribute in the performance of their job and to rate the level of skill required to do their job.

Using this information for each occupation, matched with earnings and educational attainment data from the Current Population Survey for workers employed in each occupation, we are able to analyze the distribution of various knowledge, skills and ability attributes among jobs in the economy, and to measure the occupational earnings that correspond to various levels of competency for each attribute. This allows us to make a first approximation of the value employers assign to the occupational knowledge, skills, abilities, interests, and work styles people bring to jobs beyond their academic credentials.

We selected a set of attributes we call *New Economy Foundation Competencies* to examine more closely:

**Academic Competencies**

- **Basic Skills –** fundamental academic skills needed to work with or acquire more specific skills. These include reading comprehension, active listening, writing, speaking, mathematics, and science.
- **English Language -** Knowledge of the structure and content of the English language including the meaning and spelling of words, rules of composition, and grammar.
- **Mathematics –** Knowledge of arithmetic, algebra, geometry, calculus, statistics, and their applications.
- **Arts and Humanities –** Knowledge of facts and principles related to learning concerned with human thought, language, and the arts.

**Thinking and Reasoning Competencies**

- **Critical Thinking –** Using logic and reasoning to identify the strengths and weaknesses of alternative solutions, conclusions or approaches to problems.
- **Originality -** The ability to come up with unusual or clever ideas about a given topic or situation, or to develop creative ways to solve a problem.
- **Innovation -** Creativity and alternative thinking to develop new ideas for and answers to work-related problems.
- **Deductive Reasoning -** The ability to apply general rules to specific problems to produce answers that make sense.

- **Inductive Reasoning** - The ability to combine pieces of information to form general rules or conclusions (includes finding a relationship among seemingly unrelated events).
- **Mathematical Reasoning –** The ability to choose the right mathematical methods or formulas to solve a problem.

**Workplace Competencies**

- **Social Skills -** Developed capacities used to work with people to achieve goals.
- **Complex Problem Solving -** Identifying complex problems, reviewing related information to develop or evaluate options; to implement solutions.
- **Thinking Creatively –** Developing, designing, or creating new ideas, applications, relationships, systems, or products including artistic contributions.
- **Engineering and Technology –** Knowledge of the practical application of engineering science and technology including applications to the design and production of various goods and services.
- **Enterprising Interests –** These work environments involve starting up and carrying out projects, often leading people and making decisions.

For each of the New Economy Foundation Competencies, we have examined two types of information: (1) the distribution by educational attainment of workers in occupations sorted by quintiles of competency level required of or held by incumbents, and (2) the average earnings for workers in occupations by educational attainment and sorted by quintiles of competency level required of or held by incumbents.

Educational attainment is shown for a sample of our selected competencies in Tables 2, 3 and 4 below wherein we ask the question: Who works in high skill jobs? Generally and not surprisingly, the data show that the greater the level of competency that occupations require, the higher the proportion of more highly educated workers are employed in those occupations. For example, thirty percent of high school graduates are employed in occupations that demand the least amount of basic skills, while only 6 percent of college graduates hold these

jobs. On the other hand, over one-third of college grads work in jobs that demand the highest level of basic skills, while just 8 percent of high school graduates hold such jobs. Less educated workers are not shut out of all high skill jobs, but they are much less likely to hold them.

**Table 2**

**Who Works In High Skill Jobs? -- Basic Skills**

(Percent of Workers by Education and Competency Levels Occupations Require)

| Quintiles of Competency Required | <High School | High School | Some College | Bachelor's Degree | Graduate Degree |
|---|---|---|---|---|---|
| q1(low) | 47.4 | 30.4 | 16.3 | 6.1 | 2.2 |
| q2 | 26.6 | 22.0 | 19.8 | 10.1 | 4.4 |
| q3 | 15.7 | 23.0 | 25.2 | 20.3 | 10.3 |
| q4 | 7.2 | 17.0 | 23.4 | 26.3 | 18.2 |
| q5(high) | 3.1 | 7.7 | 15.4 | 37.3 | 64.9 |
| | 100 | 100 | 100 | 100 | 100 |

Source: Tabulations from merged O*Net and Current Population Surveys, pooled March 2003-2004 Supplements

**Table 3**

**Who Works In High Skill Jobs? -- Mathematical Reasoning**

(Percent of Workers by Education and Competency Levels Occupations Require)

| Quintiles of Competency Required | <High School | High School | Some College | Bachelor's Degree | Graduate Degree |
|---|---|---|---|---|---|
| q1(low) | 37.1 | 24.4 | 19.4 | 14.8 | 12.7 |
| q2 | 25.5 | 20.8 | 17.9 | 9.5 | 11.5 |
| q3 | 19.1 | 22.2 | 21.4 | 16.5 | 19.3 |
| q4 | 14.2 | 19.6 | 22.5 | 25.1 | 29.8 |
| q5(high) | 4.2 | 13.0 | 18.9 | 34.1 | 26.6 |
| | 100 | 100 | 100 | 100 | 100 |

Source: Tabulations from merged O*Net and Current Population Surveys, pooled March 2003-2004 Supplements

**Table 4**

**Who Works In High Skill Jobs? -- Enterprising Interests**

(Percent of Workers by Education and Competency Levels Occupations Require)

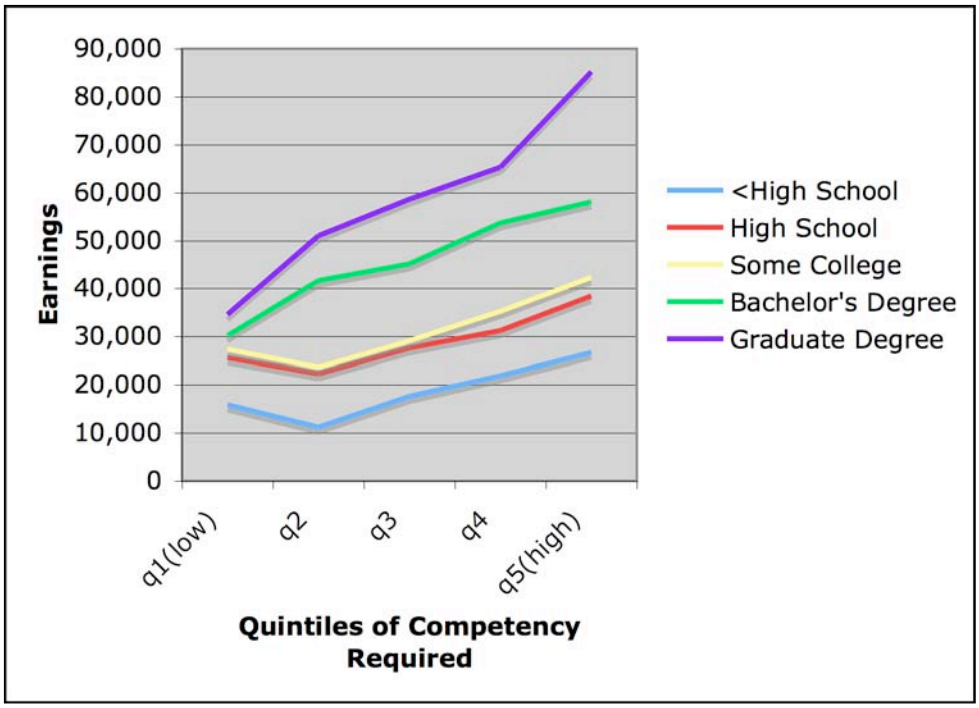
| Quintiles of Competency Required | <High School | High School | Some College | Bachelor's Degree | Graduate Degree |
|---|---|---|---|---|---|
| q1(low) | 42.1 | 30.3 | 19.3 | 9.8 | 8.0 |
| q2 | 17.0 | 16.4 | 19.4 | 25.7 | 30.7 |
| q3 | 22.1 | 17.6 | 15.8 | 11.2 | 19.4 |
| q4 | 10.0 | 17.4 | 23.6 | 26.1 | 18.2 |
| q5(high) | 8.9 | 18.2 | 21.9 | 27.1 | 23.7 |
| | 100 | 100 | 100 | 100 | 100 |

Source: Tabulations from merged O*Net and Current Population Surveys, pooled March 2003-2004 Supplements

As we have shown previously, the earnings returns to more education have been impressive over several decades. But we also want to know which competencies and skills -- that underlie these academic credentials -- are valued by employers? What should new workforce entrants know and be able to do in order to satisfy the requirements of the workplace? To illustrate this point, Figure 6 below displays the average earnings by education of workers according to the basic skill level required of occupations in which they are employed. Basic skills is one of our Academic Competencies. As one would expect, occupations requiring more skill tend to pay more, even with the same level of educational attainment. For high school graduates, for example, occupations requiring the highest degree of basic skills competency pay on average 50 percent more than those requiring the least basic skills competency. And for college graduates, high basic skill occupations pay nearly twice as much as jobs demanding the least basic skills competency. Similar earnings illustrations for each of the New Economy Foundational Competencies are presented in the appendix.

**Figure 6**
**Do Skills Pay?**
**Average Earnings by Education of Workers and the Competency Level Occupations Require:**

**Basic Skills**

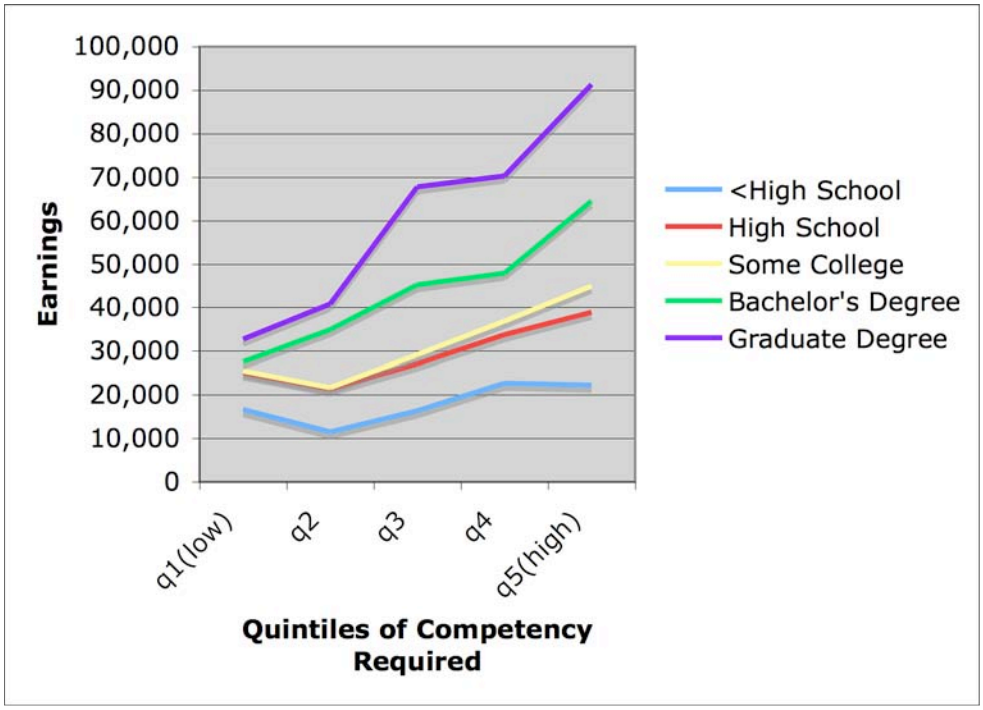



Source: Tabulations from merged O*Net and Current Population Surveys, pooled March 2003-2004 Supplements

Figure 7 illustrates the earnings returns to innovation, one of our Thinking and Reasoning Competencies. For this competency, employers pay, on average, over 50 percent more to high school grads in jobs demanding the highest degree of innovative thinking in contrast to those jobs requiring the least innovation. And for bachelor degree holders the premium paid to the highest quintile exceeds 135 percent of the lowest quintile of jobs!

**Figure 7**
**Do Skills Pay?**
**Average Earnings by Education of Workers and the Competency Level Occupations Require:**

**Innovation**

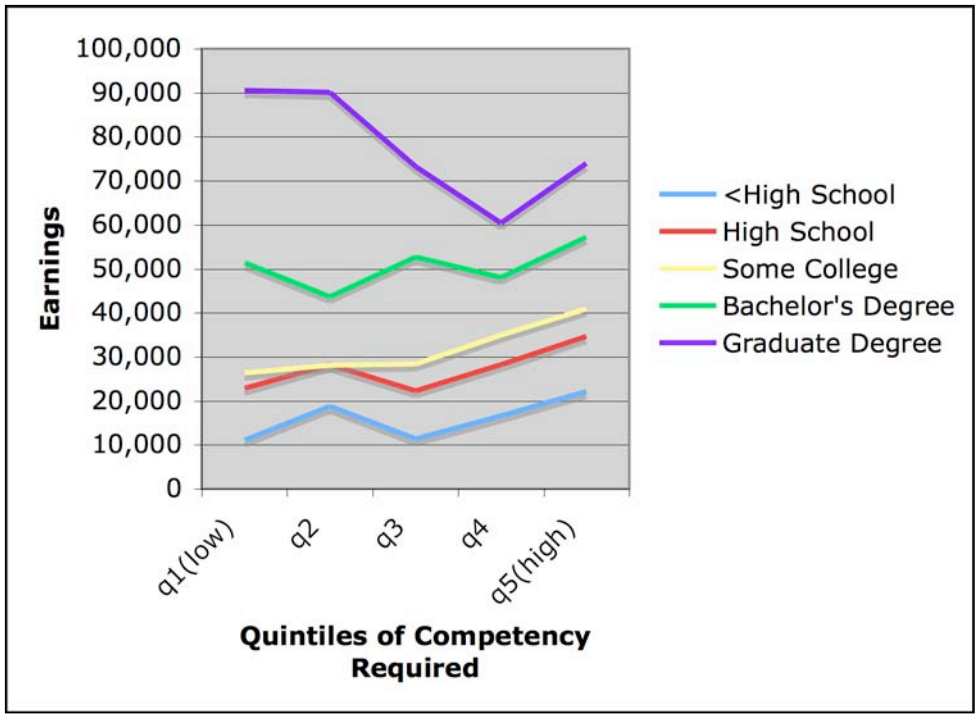



Source: Tabulations from merged O*Net and Current Population Surveys, pooled March 2003-2004 Supplements

Lastly, we examine one of our Workplace Competencies, knowledge of engineering and technology in Figure 8 below. Unlike nearly all the rest of our New Economy Foundation Competencies, knowledge of the practical application of engineering science and technology appears to evidence very uneven pay treatment. While high school graduates experience a 50 percent earnings reward for working in those occupations that demand the most of this kind of knowledge, relative to the lowest quintile, the comparable premium for college grads is a modest 10 percent. And graduate degree holders appear to be penalized financially for working in occupations with high skill demands. We have briefly examined these outcomes and suspect it is driven by occupational choices based on non-monetary characteristics of the occupations in the highest quintiles of competency (such as government science and technology jobs and university teaching posts). This clearly deserves further review and analysis.

**Figure 8**
**Do Skills Pay?**
**Average Earnings by Education of Workers and the Competency Level Occupations Require:**

**Engineering and Technology**




Source: Tabulations from merged O*Net and Current Population Surveys, pooled March 2003-2004 Supplements

In summary, the information shown above and in the appendix demonstrates a generally consistent pattern and tells an intuitively appealing story. First, the greater the level of skill required of occupations, the higher the education levels of job incumbents. Second, for each competency and education level, the greater the level of skill required of occupations, the greater the average earnings for workers in those occupations. Thus, the signaling and sorting devices currently used within the labor market tend to deploy our most educated workers to jobs requiring more skill and to reward higher skill occupations with higher pay. Moreover, the New Economy Foundation Competencies we have selected (somewhat arbitrarily) tend to demonstrate their market value.

Consequently, not only is there a clear payoff to education, there also is a payoff to skills.

This original analysis is very preliminary, however, and considerable more analytical work remains to be done. There likely is a high degree of correlation among these competency measures, for example, and there are many more competencies to choose from. One statistical approach that can be used to measure the interrelations among variables and to reduce the large number of O*Net variables to a smaller number of descriptors is factor analysis. We have experimented with this approach. Applying factor analysis to the 35 skill variables in the O*Net data file, we were able to reduce them to four factors or clusters: (1) basic academic, process and social skills, (2) maintenance and repair skills, (3) analysis, problem solving and management skills, and (4) math skills. This analysis could be extended to incorporate the variables in the ability, knowledge, work interests, and work styles domains as well. The clusters of the most significant related variables thus produced by factor analysis might then replace the more judgmental categories (and associated competencies) we introduced earlier -- Academic Competencies, Thinking and Reasoning Competencies, and Workplace Competencies. Indices for these factor groups could also be used in subsequent analysis to help explain the variation in occupational earnings. These further analyses have not been carried out in this study.

While our figures above and in the appendix attempt to control for educational attainment, a more sophisticated multivariate analysis would more rigorously isolate the incremental contribution to earnings of each competency from the effects of other factors. We carried out some preliminary work for two of our competencies -- complex problem solving and critical thinking -- using multivariate analysis to explain the variation in earnings among 467 occupations for which complete matched CPS and O*Net data were available. More specifically, separate regression equations for each competency measure were estimated to measure the relationship between the log of earnings as the dependent variable, and four educational attainment categories and four quintiles of competency as the dependent variables. (One category of educational attainment and one quintile of competency were omitted.) The

results confirm that the quintiles of each competency are significantly and positively related to occupational earnings. The higher the level of skill for these competencies that occupations require, the higher the average earnings paid to workers independent of their level of education. Nonetheless, these equations only explained about half the variation in earnings among occupations. Further research clearly is warranted in this promising area.

This first stage analysis is instructive and suggests several useful applications to explore. As one example, using earnings to inform the selection of which competencies to include in an industry competency model could augment what experts and employer groups "say" are important skills with evidence of what employers actually "pay" for certain skills.[40]

We, of course, know that education and training do not create their own demand. While high skills through higher quality education and training are clearly a necessary part of any national strategy, they are not sufficient for America to maintain a high and growing standard of living for all its citizenry. Just as scissors are only effective with two blades, we need education and training policies and practices on the supply side of the labor market that are driven by growth policies and practices on the demand side that encourage more and better use of educated and skilled labor. It is this subject to which we now turn.

## V. The Jobs and Growth Future

In addition to improving our education quality, it is necessary to nurture and unleash our innovation and technology prowess. As mentioned earlier, this is a second condition if we are to maintain a high growth, high wage and high employment economy. By innovation and technological change, we are not just talking about paradigm shifting scientific discoveries. Economic growth that springs from innovation does not rely exclusively on technology. Rather, it encompasses a much broader notion of innovation, one that joins ideas and inventions with the insight and applications that add important new value.[41] Knowledge in all its forms matters to spur innovation-based growth, including better ideas for business processes and work organization practices, new products, and new markets.[42] Moreover:

- *Institutions* such as universities, R&D laboratories, government policies and regulations, and patent laws matter for new knowledge development because they shape the environment for producing and applying new knowledge.
- *Financial markets* are crucial for taking new knowledge and ideas to scale commercially.
- *Location* matters because new knowledge can spill across economic actors in an industrial sector within a geographic area, creating competitive advantage for areas – so increasingly, regions are important. Tacit knowledge, embedded in the minds of individuals and the practices of organizations, contributes to a region's competitive advantage. Moreover, attractive communities and societies with an accommodating culture can lure quality labor, entrepreneurs, and capital investment.[43]
- *Societies and cultures* that generate and tolerate new ideas, encourage risk taking and entrepreneurship, embrace diversity, and adapt to changes in economic and technological conditions also are necessary for innovation-based growth.

This type of strategy underscores the importance of public and private investing in those factors that spur new knowledge creation, along with human and physical capital investments, to support and promote economic growth. An innovation-based growth policy does not rely on the notion that there are only so many good jobs to go around in this world. It depends on; indeed it requires a global expansion of jobs and purchasing power. Knowledge development through the process of R&D, discovery, innovation, and problem solving, along with the art of product design, development, and marketing present endless possibilities for satisfying the needs of people throughout the world. More good jobs should follow more good ideas for improving the human condition.

This rosy scenario, while plausible for the long term, is fraught with a number of uncertainties. Will domestic and global demand materialize on a scale sufficient for U.S. businesses to employ the millions of two and four year college graduates we project for 2012? Will the number of U.S. college graduates alone satisfy this demand? And will the substantial historical wage premium for higher education continue as the domestic and global pools of college talent expand? Businesses could pursue strategies that would counterbalance the "more good U.S. jobs" scenario, such as:

- Substituting technology for skilled labor;
- Increasing reliance on skill-based immigration;
- Keeping baby boom retirees in the workforce longer; or
- Expanding outsourcing of labor offshore well beyond anything we have experienced to date.

We are not prepared to deal in depth with each of these uncertainties in this paper. Regarding baby boom retirees, we commend the thoughtful paper by Alicia Munnell who concludes "keeping older workers in the labor force may well be good for both workers and employers, but it is not obvious that it will happen."[44]

Technology substitution or automation, immigration and offshoring are each alternative strategies that employers can continue to pursue to alleviate wage pressures and respond to tight labor markets. As a result, millions of worker dislocations will likely occur each year from these and cyclical causes, even as

employment expands in the aggregate. We are prepared only to address in this paper the offshoring U.S. jobs.

*Offshoring:* Globalization is altering political and economic landscapes around the world and, as a result, U.S. economic dominance of the global economy has lessened by some important measures. Between 1960 and 2003, the U.S. share of global GDP slipped from 35 percent to 31 percent. At the same time, China's share of world output rose from less than one percent to over four percent.[45] But this is not our main concern. In fact, we will argue later that the U.S. can benefit from a rising income level in other countries because growing foreign demand for U.S. goods and services holds the potential for boosting our growth as well. Indeed, this is precisely the point made earlier by the authors of the Goldman-Sachs projections for the BRIC nations – these nations likely will be strong engines for global spending and thereby bolster the economic growth of the U.S., Europe, and Japan.

The main concern we face is that our workforce is becoming less competitive in a global labor market. One way this is signaled by the global economy is by the trends in offshoring American jobs to foreign countries. This is the canary in the coalmine. First manufacturing in the 1980's, then services in the 1990's, and now innovation and R&D jobs are moving to Canada, China, India, the Philippines, and other developing economies. Twenty years ago, no serious observer of the world economy imagined that any nation would be able to offer to multinational companies large numbers of highly educated and skilled people willing to do quality work at wages far below U.S. and European levels. That, of course, is exactly what China, India, the Philippines and others have been able to do.

What are the trends? If we are willing to make the reasonable assumption that outsourcing U.S. service jobs to overseas production locations is closely related to the import of services, then we can use trade data from the U.S. Commerce Department's Bureau of Economic Analysis (BEA) to gauge the trend in outsourcing since the early 1990's. By strictly defining offshoring in the services sector as being proxied by intra-firm purchases of private services by multinational companies (affiliated firms), and offshore outsourcing as US

import transactions with non-affiliated firms, we see the trend displayed in Figure 9 below.[46]

The data show imports of services into the U.S. since 1992 increasing from about $100 billion to over $280 billion in 2005. The share attributable to our strict definition of offshoring has grown from 13 percent of services imports to 22 percent during this same period. Affiliated imports of private services by multinationals have increased by double digits each of the past two years, rising to $60 billion in 2005. During the same period, offshore outsourcing or imports from unaffiliated firms dominated the imports of services. The dollar value of imports from unaffiliated firms has increased from $90 billion in 1992 to $219.5 billion in 2005. This suggests that US companies prefer to outsource certain services rather than establish their own operations units overseas. As a result, regulating or limiting such outsourcing practices would be difficult. In fact, the under-estimation of services imports is becoming increasingly obvious with some foreign countries reporting exports of services to the US several times greater than what BEA estimates. Altogether, these data indicate that there is a growing trend in outsourcing U.S. service jobs.

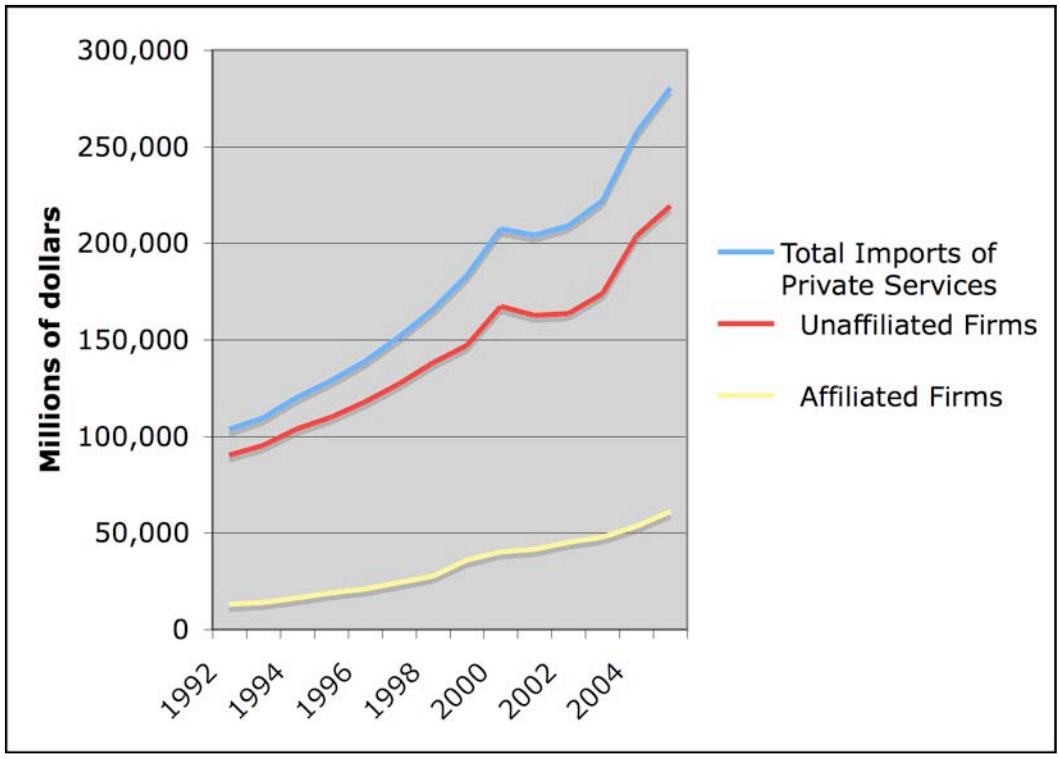
**Figure 9**

**Is Outsourcing of U.S. Service Jobs Increasing?**

**U.S. Imports of Services by Affiliation With U.S. Firms**

**1992-2005**

(Millions of dollars)




Source: US Department of Commerce, Bureau of Economic Analysis. US International Services: Cross-Border Trade and Sales Through Affiliates. http://www.bea.gov/bea/di/intlserv.htm

Note: Offshoring is strictly defined as related to imports of private services from affiliated firms. Offshore outsourcing is defined as imports of private services from unaffiliated firms.

So far, job loss caused by offshoring has been rather modest. We estimate the overall loss of jobs to offshoring between 1970-2002 at about 2.9 million, of which about 2.4 million were in manufacturing and over 400,000 in services.[47] This amounts to about 100,000 jobs per year, on average. That is relatively small in an economy that includes almost 150 million jobs and creates and destroys tens of million of jobs every year. Much attention was given to Forrester Research's 2002 estimate that the U.S. will lose 3.4 million white-collar jobs

overseas by 2015. This estimate pales in comparison to an estimate by U.C. Berkeley researchers Ashok Bardhan and Cynthia Kroll[48] of the number of jobs *at risk* of either being offshored or, eventually, automated through technology -- estimated at perhaps 14 million jobs. Bardhan and Kroll examined the "occupational outsourceability attributes" of occupations and developed, in their terminology, a "heuristic sense" of the potential jobs at risk over time.

We have developed improved estimates of the number of jobs most vulnerable to offshoring using the O*Net data described previously. These data allowed us to build and improve on the extant research because the O*Net data describe in considerable detail the skills and tasks that jobs require. The procedure we used to predict offshoring risk is a two-step procedure. The first step was to estimate a model using a set of occupations with a known outcome, in this case occupations that have been offshored or not. The set of occupations offshored with certainty were defined based upon existing research by Kroll and the Bureau of Labor Statistics. We also hand coded a set of jobs assumed by us to be impervious to outsourcing. The O*NET data were the source for the model's explanatory variables, and included a measure of the level or importance for the following:

- Administration and management
- English language
- Independence
- Physical strength
- Repetitive tasks
- Automation
- Originality
- Programming
- Repetitive motion
- Contact with others
- Decision making and problem solving
- Recognition
- Orientation to service
- Customer and personal service
- Thinking creatively

A stepwise logistic regression using SAS was used to estimate the model. Overall, the model provided a very good fit.[49] Below are the parameter estimates that were statistically significant in explaining offshoring:

**Table 5**
**Job Attributes that Explain the Probability of Offshoring Occupations**
(Logit estimates statistically significant at the 90 percent confidence level)

| Job Attribute | Parameter Estimate |
|---|---|
| Administration and Management | 1.35 |
| Physical Strength | -2.43 |
| Interaction with Computers | 3.67 |
| Decision Making/Problem Solving | -2.26 |
| Customer and Personal Service | -1.52 |
| Thinking Creatively | -1.24 |

Source: Logit estimates from merged O*Net and Current Population Surveys, pooled March 2003-2004 Supplements.

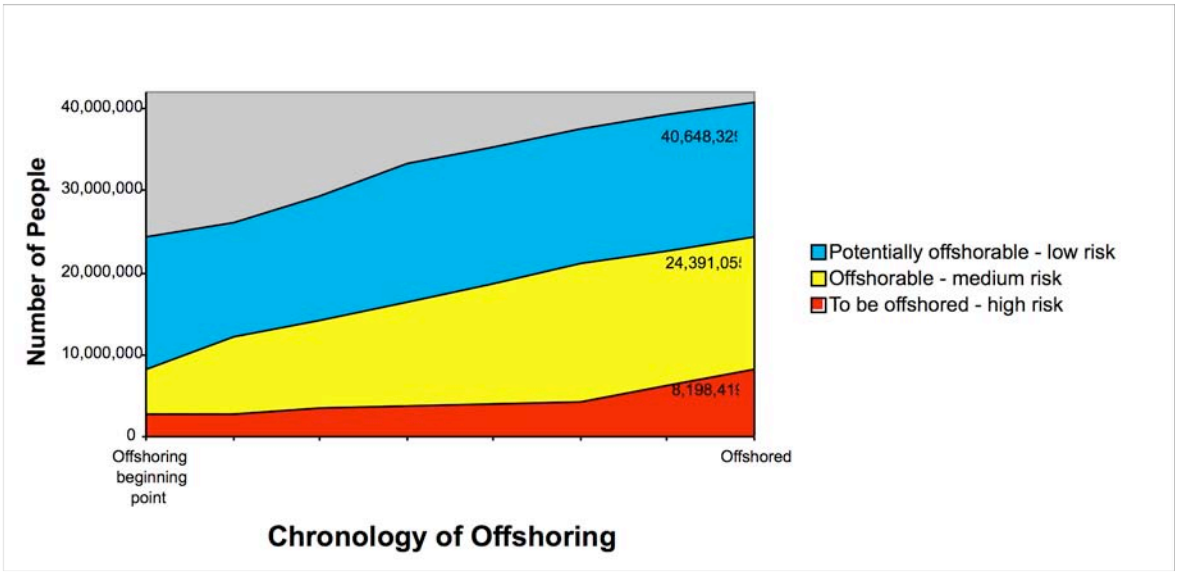
These coefficients can be interpreted as weighting the contribution that each statistically significant explanatory variable has on the risk (probability) associated with an occupation being offshored. The estimates suggest that jobs requiring a high degree of knowledge about administration and management principles, and jobs requiring considerable interaction with computers are more likely to be offshored overseas. In contrast, we find that jobs that demand physical strength ability have a lower probability, as do jobs that place high importance on thinking creatively and solving problems. Not surprisingly, occupations that require a high degree of customer and personal service also tend not to be as much at risk of being offshored.

In the second step, the parameter estimates were used to predict the probability of offshoring for the balance of the O*Net sample of occupations -- predicting out of sample. For each occupation we estimated a risk probability, and then an estimate of jobs at risk by multiplying each probability by employment in that occupation.

Using this technique, we estimate approximately eight million jobs to be the most vulnerable to offshoring due to the nature of the work performed. Another 16 million jobs, illustrated in Figure 10 below, exhibit a medium risk of being offshored based on the nature of the work performed. Overall, we estimate as many as 40 million American jobs, or 27 percent of the U.S. labor force, are theoretically vulnerable to offshoring.

**Figure 10**

**Estimated Number of Jobs Vulnerable to Offshoring Over Time**




Source: Estimates based on logit parameter estimates applied to merged O*Net and Current Population Surveys, pooled March 2003-2004 Supplements

Within the United States, vulnerability to outsourcing offshore appears not to be evenly distributed among states. Overall, we estimate that 16 percent of the nation's labor force is at moderate risk or greater of job loss due to outsourcing offshore. This estimate ranges from a low of 12 percent in Mississippi and Montana to 20 percent in New Jersey and 22 percent in Washington, D.C., as shown in Table 6. Recall that these estimate are based on the characteristics of occupations and the skills and tasks required of the incumbents. Thus, states with a higher than average proportion of jobs characterized by a high degree of interaction with computers, or high administrative content, for example, are predicted to experience a greater vulnerability to outsourcing offshore. Maybe this is why it is not surprising that Washington, D.C jobs rank at the top of the vulnerability list, even though we excluded government jobs from our estimates because of political difficulties associated with offshoring these positions.

**Table 6**

**States Ranked by Estimated Share of Jobs At Risk of Offshoring**

(Jobs at moderate risk or greater as percent of labor force)

| | | | |
|---|---|---|---|
| **National** | 16 | Nebraska | 15 |
| Washington D.C. | 22 | Idaho | 15 |
| New Jersey | 20 | Alabama | 15 |
| Maryland | 19 | Alaska | 15 |
| Connecticut | 19 | Kansas | 15 |
| Massachusetts | 18 | Iowa | 15 |
| New Hampshire | 18 | North Carolina | 15 |
| Virginia | 18 | North Dakota | 15 |
| Minnesota | 18 | Arizona | 15 |
| California | 18 | South Carolina | 15 |
| Delaware | 18 | Maine | 14 |
| Utah | 17 | Wisconsin | 14 |
| Colorado | 17 | New Mexico | 14 |
| Georgia | 17 | Oregon | 14 |
| Pennsylvania | 17 | Louisiana | 14 |
| Texas | 16 | Indiana | 14 |
| Michigan | 16 | Wyoming | 14 |
| Missouri | 16 | Oklahoma | 14 |
| Illinois | 16 | West Virginia | 14 |
| New York | 16 | Tennessee | 14 |
| Washington | 16 | Kentucky | 14 |
| Florida | 16 | South Dakota | 13 |
| Hawaii | 16 | Nevada | 13 |
| Rhode island | 16 | Arkansas | 13 |
| Ohio | 15 | Montana | 12 |
| Vermont | 15 | Mississippi | 12 |

Source: Estimates based on merged O*Net and Current Population Surveys, pooled March 2003-2004 Supplements.

As we said above, the number of jobs offshored to this point have been rather modest. But these have been good jobs; more than 70 percent of jobs offshored since the 1990s have required at least some college based on our analysis. A sampling of jobs by vulnerability is shown below.

**Vulnerability of Selected Jobs to Offshoring**

**High Risk**

- Computer programmers
- Software Engineers
- Accountants and auditors
- Financial credit analysts

**Medium Risk**

- Management analysts
- Tax preparers
- Architects
- Civil Engineers

**Low Risk**

- Physicians, surgeons, and other healthcare support
- Marketing and sales managers
- Real estate brokers and agents

A loss of college jobs and wages is critically important because it threatens access to and growth of the American middle class. Nowadays, good middle class jobs are typically jobs that require at least some college, not just in service industries but also in advanced manufacturing. As previously shown, college jobs are key to mobility into and beyond the U.S. middle class.

## VI. The Global Middle Class

Faced with the threat of large numbers of good knowledge jobs moving overseas and an expanding pool of global talent to do the work, U.S. employment and wage growth could be held down for years to come. How might we maintain a high employment, high wage economy with a vibrant and growing middle class in the face of large potential job losses and downward wage pressures? Fortunately, the very threat itself might be part of the answer. Strongly rising foreign economies can benefit the U.S. economy if they raise a middle class that consumes increasing quantities of imported goods and services, including those produced in the U.S.[50]

Several sources suggest that the global middle class will grow. The Goldman Sachs projections estimate that the emerging economies of Brazil, Russia, India and China will experience a rapid growth of their global middle class and correspondingly significant reductions in poverty. The World Bank report confirms that the number of Chinese living in extreme poverty has declined by over 150 million since 1990, and will decline another 200 million by 2015.[51] But escaping "extreme poverty" of a dollar a day is not evidence of a growing middle class when measured as the ability to buy imported goods and services from the United States.

Thankfully, the data suggest that the number of middle class consumers in China and India – the world's largest developing economies – is growing and is likely to become an increasingly important consumptive sector. China's Academy of Social Sciences estimates that 250 million Chinese are part of their middle class, with household assets between $18,000 and $36,000. This reflects an increase from 15 percent of the population in 1999 to 19 percent in 2003.[52]

The National Council of Applied Economic Research in New Delhi measures India's middle class at 300 million people with resources sufficient to purchase a house, car, and to invest in education and retirement.[53] Other estimates for India are significantly lower. Regardless of the precision of these estimates, Indian survey data suggest that rising incomes, new attitudes, and changes in the availability of goods and credit are altering Indian consumption patterns. Data from surveys of 10,000 four-member urban families conducted by

an Indian management consultancy firm suggest that middle class Indians are shifting expenditures to personal care and convenience, entertainment, and other more discretionary purchases, and away from spending on groceries, for example. This is just what one would expect with growing affluence and an evolving middle class.[54]

How big is the emerging middle class outside of China and India? Senauer and Goetz provide thoughtful estimates of the size of the global middle class.[55] Using year 2000 Peruvian survey data on living standards, the authors calculated annual per capita total expenditure levels that would place an individual into a middle class stratum. This expenditure level then was matched to gross national income (GNI) per capita calculated by the World Bank, which provided an income level of $6,000 GNI per capita. Using the $6,000 level, the World Bank's GNI data for emerging countries, and income distribution data for selected countries, the authors estimated the proportion of the population and number of people in these countries that belong to the global middle class. We present their estimates, totaling 665 million people, in Table 8 below.

Since these nations account for about 60 percent of the world's population, a simple extrapolation would suggest maybe 1.1 billion people make up the global middle class, about 17 percent of the earth's population. A comparable estimate was obtained in another World Bank paper, by Branko Milanovic & Shlomo Yitzhaki, in which the authors estimated the global middle class – defined as individuals with income between the per capita incomes of Brazil ($3,500) and Italy ($8,000) -- at around 11percent of the world's population or about 733 million people.[56] We might conclude from this brief review that the global middle class numbers between 700 million and 1.1 billion people.

**Table 8**

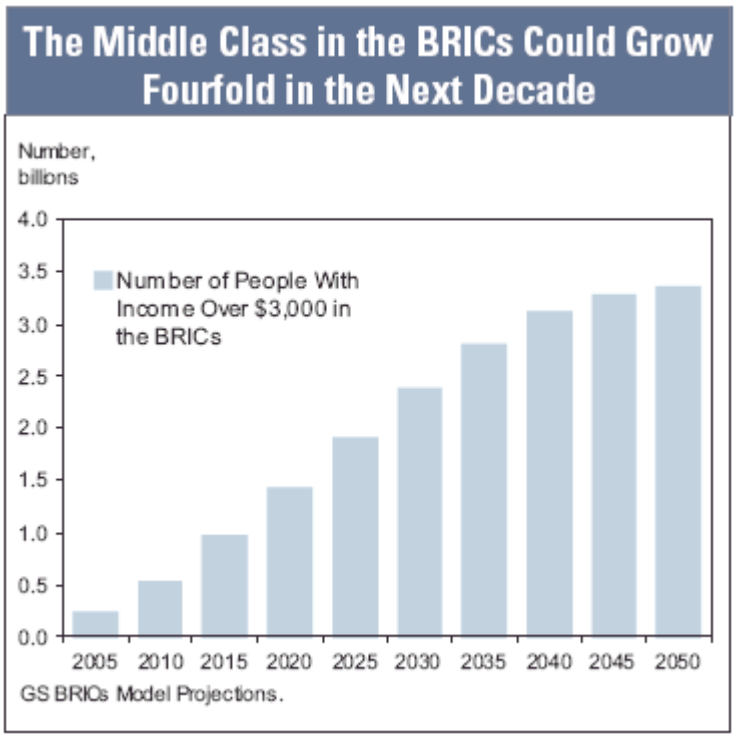
**Size of the Emerging Middle Class in Selected Countries, 2000**

| | Percent of the Population | Number of People (millions) |
|---|---|---|
| Brazil | 35 | 57.9 |
| China | 23 | 290.4 |
| India | 9 | 91.4 |
| Indonesia | 10 | 21.0 |
| Korea | 93 | 44.0 |
| Malaysia | 46 | 10.7 |
| Mexico | 46 | 45.1 |
| Nigeria | <5 | <6.3 |
| Pakistan | <5 | <6.9 |
| Peru | 27 | 6.9 |
| Philippines | 25 | 18.9 |
| Russia | 45 | 65.5 |
| Total | | 665 |

Source: Calculations by Senauer and Goetz, 2000 Population: World Bank, World Development Indicators, 2002, Washington, D.C., April 2002.

Our purpose is not to settle on an exact estimate of the size of the global middle class, but rather to suggest an order of magnitude and to emphasize the dynamics for growth of the global middle class, especially among the BRICs. According to another recent Goldman Sachs study, the number of people in the BRICs with income above $3,000 per year – their entry point into the middle class – could increase by 800 million in the next decade. By their definition of the middle class, middle income persons in Brazil and Russia are projected to more than double in the next decade, increase by 10 times in China, and by nearly 14 times in India!

**Figure 11**




Source: Goldman Sachs, (October 2004). *The BRICS and Global Markets: Crude, Cars, and Capital.* CEO Confidential, Global Economics.

And it is precisely this type of large and growing global middle class that could give Americans hope for their economic future in the face of a turbulent global economy. A growing global middle class that is willing and able to purchase US goods and services on a scale that enables America to maintain a high wage, high employment growth economy is a win-win scenario. It would be in our economic and geo-political interests for developing nations of the world to grow richer and prosper through both trade and aid. If they don't, we likely won't.

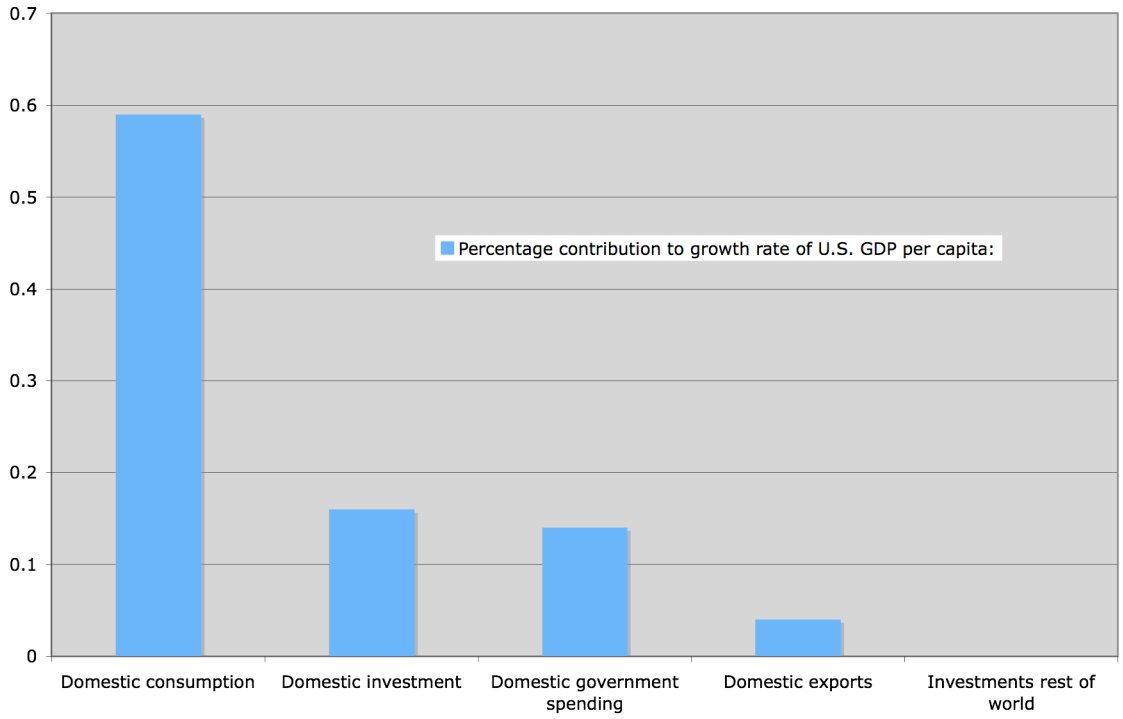
This conclusion is supported in the empirical work by Catherine Mann of the Institute for International Economics, who concludes that promoting robust growth in markets abroad is more essential for exports and sales of U.S. services than it was for U.S. manufactured goods. And since the American economy is predominantly service oriented, the export of U.S. services to a growing global middle class is likely to be a key component of future U.S. job growth.[57]

What is the evidence that a growing global middle class would be willing and able to buy high-end US goods and services, and thereby fuel U.S. growth and living standards? Absent a consistent and accepted measure over time of the global middle class, we asked ourselves how much of the growth in the U.S. standard of living can be accounted for by the consumption of U.S. exports by the rest of the world? For the period 1962 through 2000, we disaggregated the U.S. GDP per capita growth rate into its component parts: domestic consumption, domestic investment, and government spending, domestically produced exports, and investment in the rest of the world. The results are displayed below.

**Figure 12**

**Components of the Growth Rate in U.S. Standard of Living**

(Percent change in U.S. GDP per capita for each percentage point increase in growth component)




Source: See Simkins, op cit, pp. 27-28 for the model, data sources, and regression results.

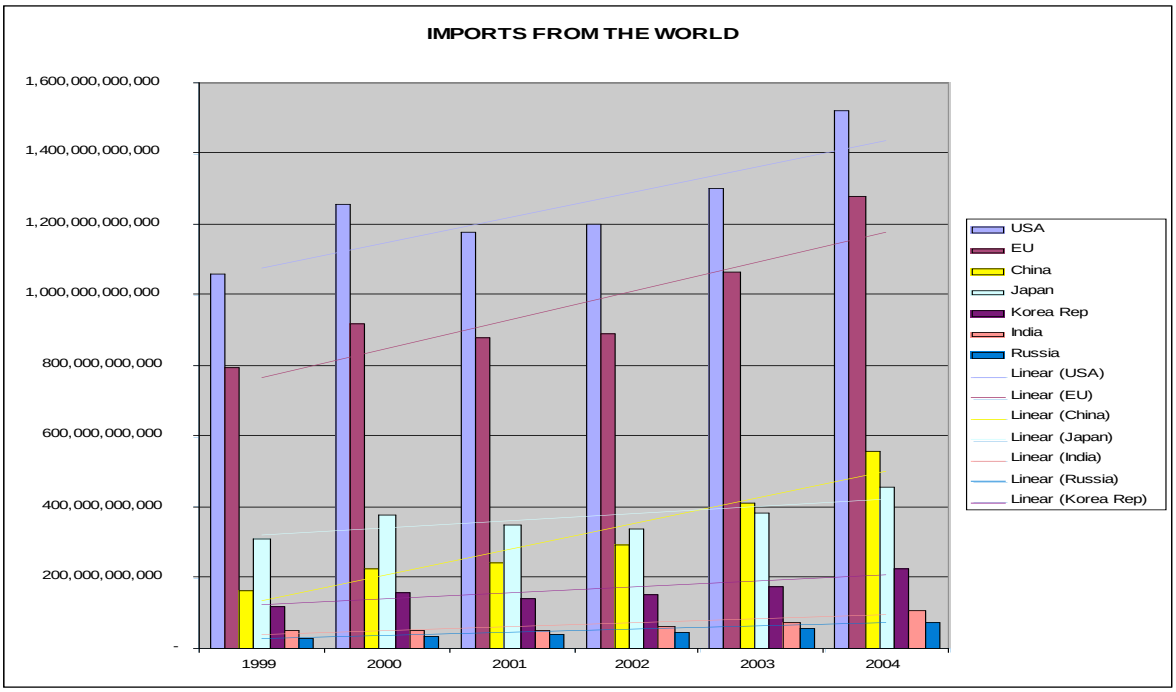
The most influential factor for U.S. income growth per capita is growth in

domestic consumption. Nearly 60 percent of U.S. GDP per capita growth is attributable to its own per capita consumption growth. The next largest contributing components are growth in U.S. investment (+0.16 percent) and growth in government expenditures (+0.14%). About 4 percent of U.S. GDP per capita growth is accounted for by U.S. export growth per capita. So consumption of U.S. goods by the rest of the world, while important, currently is only about one-fifteenth as important to the growth of our standard of living as is domestic consumption. The U.S. cannot rely primarily on the rest of the world for its own growth.

This is true despite the fact that, in absolute dollar terms, we are the world's second leading merchandise exporter, behind only Germany. Moreover, the U.S is far and away the leading exporter in the fast growing commercial services sector, with 15 percent of the world's action. Nonetheless, relative to the size of our large home market, trade as a share of our overall economy is modest. We rank 60$^{th}$ in the world in terms of total trade's share of our GDP. In other words, while the world depends heavily on the U.S. for growth, the U.S. relies importantly but modestly on the rest of the world for its own growth. While it is an essential part of an overall good jobs strategy, export-led growth is not likely to be sufficient by itself to maintain U.S. living standards – at least based on historical trends. But this could change over time as global trade in services – a U.S. strength -- increases in importance, and as the BRICs and others grow, prosper, and demand more services.

One implication of our research is that, for the United States to maintain and improve its living standards, it should target its exports of goods and services to countries that exhibit a dynamic, growing middle class. Using data on total imports by country, the following graph suggests that China and the European Union could be two of these preferred target destinations, as their consumption of foreign made commodities grows rapidly and their middle class is expanding.

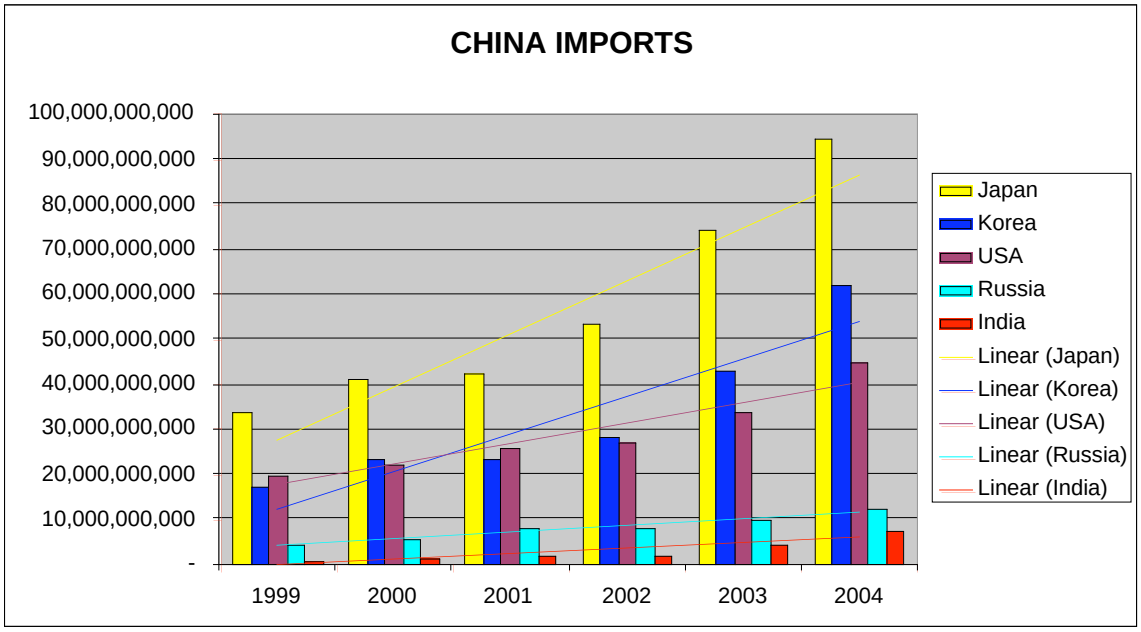
**Figure 13**




Source: UN, Comtrade.

China obviously enjoys a large trade surplus with the U.S., but China also is buying more and more goods and services from the U.S. As the following graph suggests, China's imports from the U.S. on average grew at 25 percent annually.

**Figure 14**




Source: UN, Comtrade.

To penetrate the consumer markets of China and other developing economies on a scale that provides ever increasing numbers of high wage jobs to U.S. workers will require that American companies figure out how to produce those products and services that best fit the changing needs of this dynamic global consumer market. And it is incumbent that America's workforce adapts, skills up, and competes vigorously in the expanding global market for talent.

## VII. Summing Up

Education and innovation historically have propelled economic growth in this country, and they will continue to do so even as the world's economy becomes ever more interconnected and competitive. The rise of the Chinese and Indian economies is emblematic of the challenge we face – how do we build on our comparative strengths and shore up our relative weaknesses in order to continue providing a high standard of living for our citizens? The members of the *New* Commission on the Skills of the American Workforce have been asked to focus on what needs to be done to make sure our education and training institutions play their part in meeting this challenge.

In this paper, we ask what it would take for the U.S. to maintain and even substantially improve its standard of living in the decades ahead? Is this a realistic scenario given the intense competition we face as we look to the future, even though we have done it before? We organized our response to this question around the two actions we believe are necessary to maintaining a high growth, high wage and high employment economy, that is: (1) improving our educational attainment and quality, and (2) nurturing and unleashing our innovation capabilities.

We organized the paper in this manner because we know that education and job training do not create their own demand. While high skills through higher quality education and training are clearly a necessary part of a national strategy, they are not sufficient for America to maintain a high and growing standard of living for all its citizenry. Just as scissors are most effective with two blades, we need education and training policies and practices on the supply side of the labor market that are driven by growth policies and practices on the demand side that encourage more and better use of educated and skilled labor, especially college educated workers.

In looking at demand side strategies, we examined the opportunities presented by future growth of the global middle class. We tentatively concluded that while export-led growth is an essential part of an overall good jobs strategy for the U.S., it is not likely to be enough by itself to maintain our living standards – at least based on historical trends. But this could change over time as global

trade in services -- a U.S. strength -- increases in importance, and as China, India and other economies grow, prosper, and demand more services.

Earlier in this paper we identified the size of America's home market as a crucial component of our historical comparative advantage. We showed that over the last four decades nearly 60 percent of per capita U.S. growth has been dependent upon growth in our domestic consumption. Thus, a comprehensive demand side strategy also must target the domestic consumers U.S. businesses know best. The energy industry, for example, is an obvious sector around which to build an intentional, innovation-based growth strategy at both national and regional levels. A full blown, technology driven initiative that emphasizes alternative energy sources, energy conservation, environmental interests, and higher technology energy exploration has the potential both to reduce U. S. dependence on foreign oil and to generate new and different jobs at good wages in the energy and conservation arenas. And while sound national macroeconomic policies are essential for overall growth and prosperity, complementary regional strategies also are critical. Regions are where supply chains, complementary industries, networks of investors, university-based and other research efforts, and skilled workers join forces to achieve the critical mass necessary to stimulate economic activity and innovation. So while global supply chains and international competition present a national challenge, it is at the regional level where an important part of future U.S. competitive success will be determined.

On the supply side, we asked ourselves what education and skills matter for individual and national economic success in the global economy? Our research demonstrated that education matters for growth and college matters the most. Boosting college completion rates by just 10 percent would inject $125 billion into the economy over the long run. For individuals we found that, since the mid-1970s, only college graduates have enjoyed significant gains in inflation-adjusted earnings. Moreover, while the middle class may be shrinking over time, families headed by college and graduate degree holders are much more likely to be moving up the income distribution. Families headed by high school graduates or dropouts, on the other hand, are more likely to be moving down the ladder.

If college is the ticket for moving up, what can we say about the future? We projected demand for workers with bachelor and graduate degrees to increase in 2012 by almost 20,000,000 jobs beyond current levels. At the other end of the education spectrum, our projections reinforce that we must redouble efforts to reduce the number of high school dropouts in the adult workforce by several million. If for no other reason, we need to do so because their expected numbers based on historical trends far exceed the expected requirements of the economy. And, of course, there are substantial social costs associated with many persons who lack a high school diploma.

Education credentials often serve as a signaling devise that employers use to gauge what potential hires might know and be able to do on the job. Employers are really interested in the knowledge, skills and abilities people bring to the workplace, not just their education credentials. We examined a new data set to test this hypothesis and found preliminary evidence to support it. We showed that the greater the level of skill required of occupations, the higher the education levels of job incumbents. Secondly, we found that the greater the level of skill required of occupations, the greater the average earnings for workers in those occupations, after holding constant the level of education. Consequently, not only is there a clear payoff to education, there also is an independent payoff to higher skills. And that appears true not only for competencies like innovation, critical thinking, and complex problem solving, but also for basic skills and social skills that are important in interacting with colleagues and customers.

We also found that these competencies were useful in estimating which jobs are most vulnerable to being offshored overseas. Jobs that place high importance on thinking creatively, solving problems, and providing personal service to customers are less at risk of being offshored. Rule-bound administrative jobs and those requiring a high degree of interaction with computers are more at risk. Overall, we estimated as many as 40 million jobs are theoretically vulnerable to offshoring based on the nature of the work. We estimate about eight million jobs are most at risk. Another 16 million jobs exhibit a moderate risk to offshoring. So by this analysis, 16 percent of U.S. workers are currently at least moderately vulnerable to losing their jobs through offshoring, ranging from 12 percent in

Mississippi and Montana to 20 percent or more in New Jersey and Washington, D.C.

And these vulnerable jobs are good jobs; unlike the 1970s and 1980s many are white-collar positions. About 70 percent of jobs offshored since the 1990s have required some college. This loss of college jobs and wages is critically important because, as we have shown, it threatens access to and growth of the American middle class.

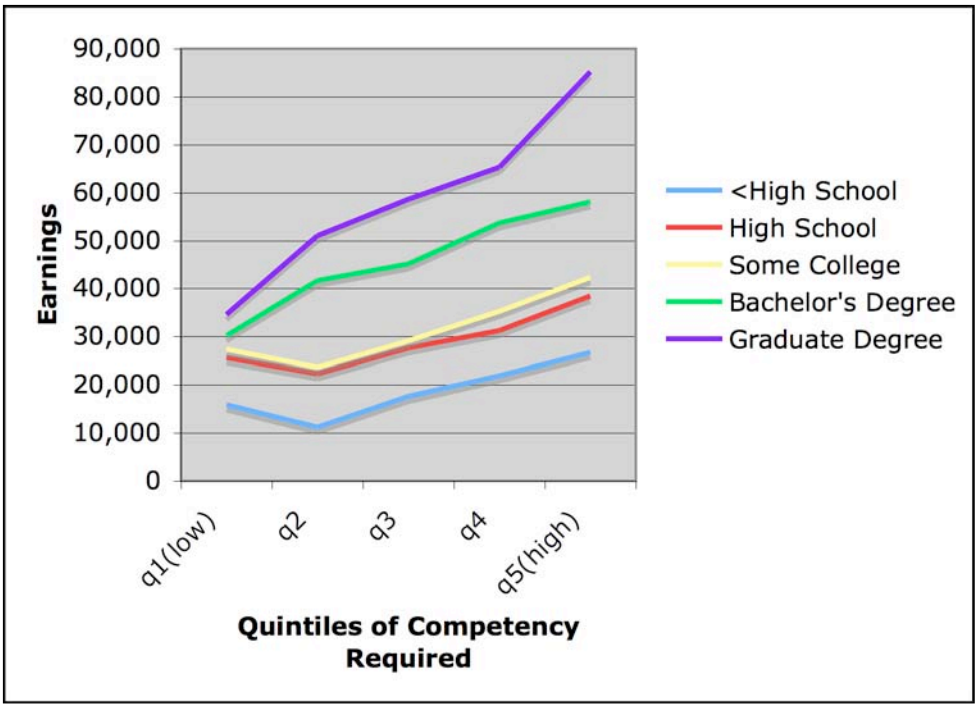
Education in general, and college jobs in particular, therefore turns out to be key to both opportunity and risk in the labor market of the future. First, college jobs are central to innovation and economic growth, personal earnings growth, and family mobility into and beyond the U.S. middle class. Second, many college jobs as they currently function are also highly vulnerable to offshoring overseas to a growing pool of global talent. We need to focus more attention on the competencies and skills that underlie education credentials, to identify and teach those competencies that are highly valued in the marketplace by employers such as problem solving, critical thinking, and innovation. Our work here is, in part, a step forward in identifying what new workforce entrants should know and be able to do in order to satisfy the requirements of the 21st Century workplace.

In conclusion, we recognize that globalization is neither automatically beneficial nor universally destructive. Neither our analysis nor history offer assurances, though our work does suggest some ways forward. Therefore, we should identify strategies that will enable America to seize opportunities presented by globalization while minimizing its negative effects on our communities, workers, and their families.

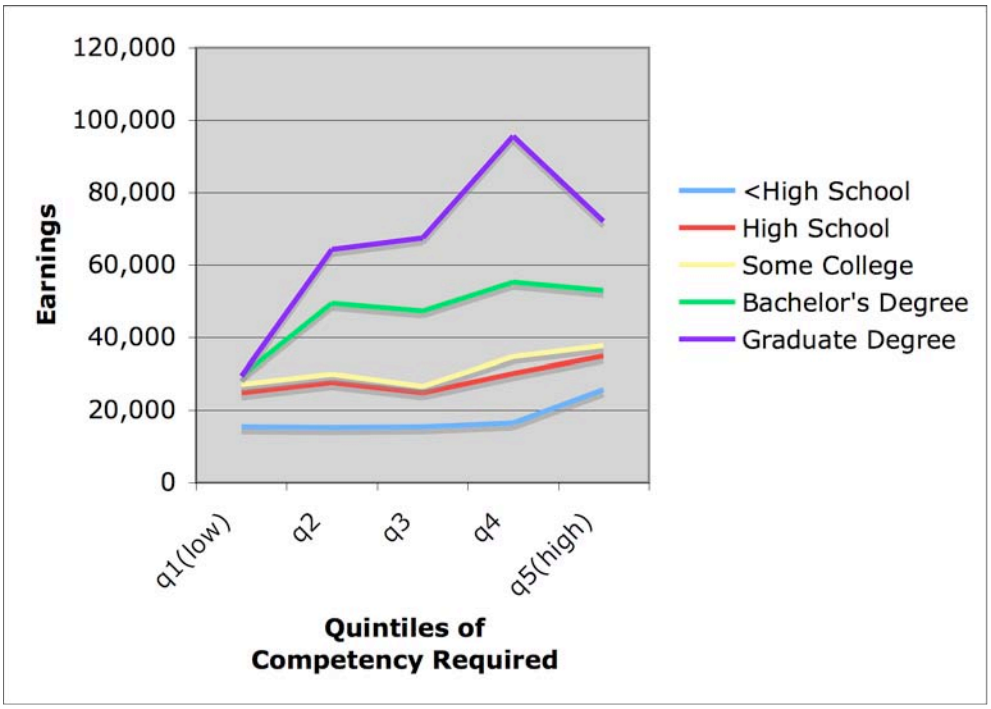
# Appendix

## Average Earnings by Education of Workers and the Competency Level Occupations Require: *

### Basic Skills

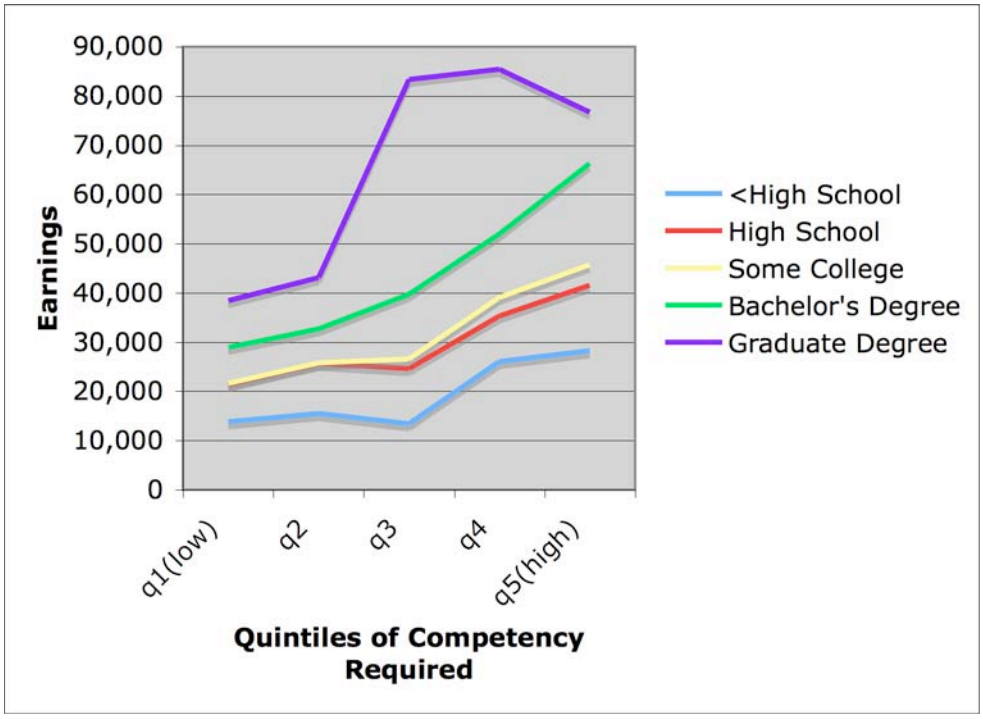



### English Language

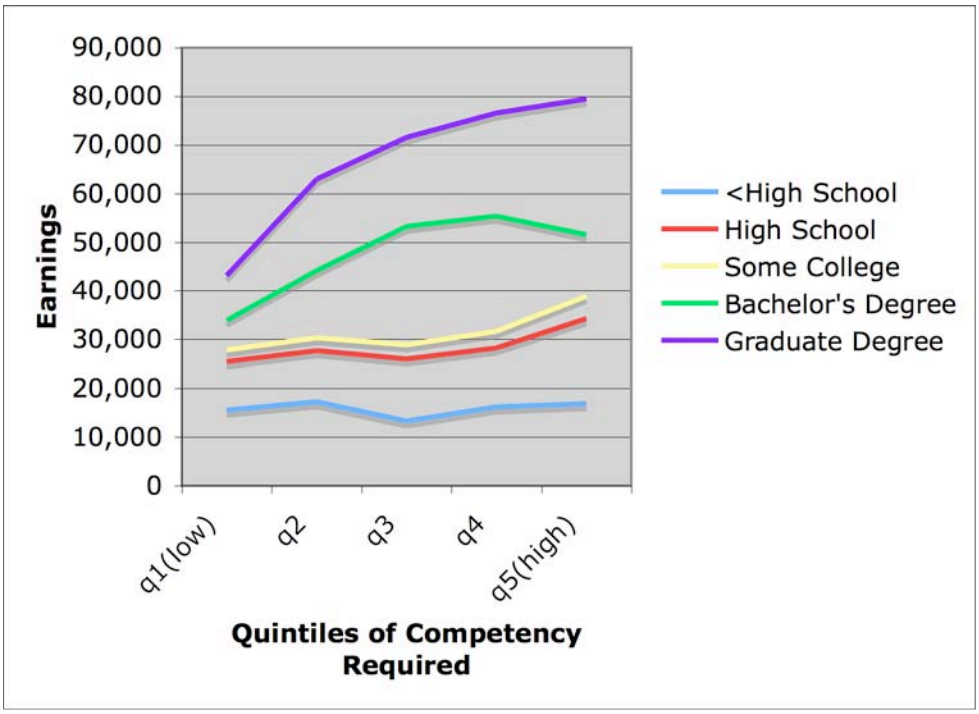


## Average Earnings by Education of Workers and the Competency Level Occupations Require (continued):

### Mathematics

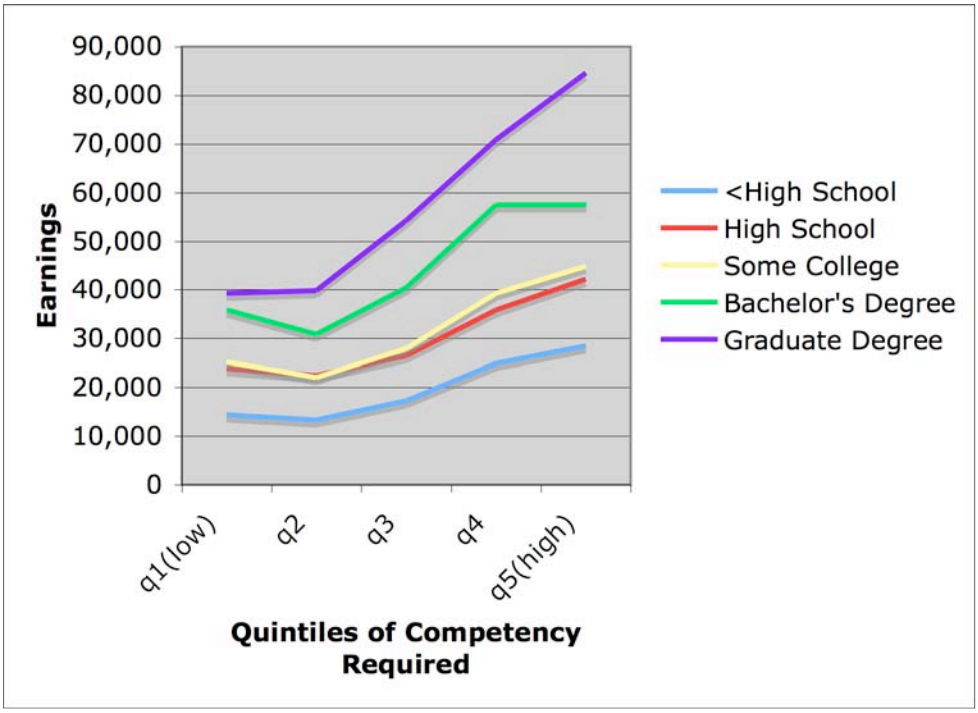



### Arts and Humanities

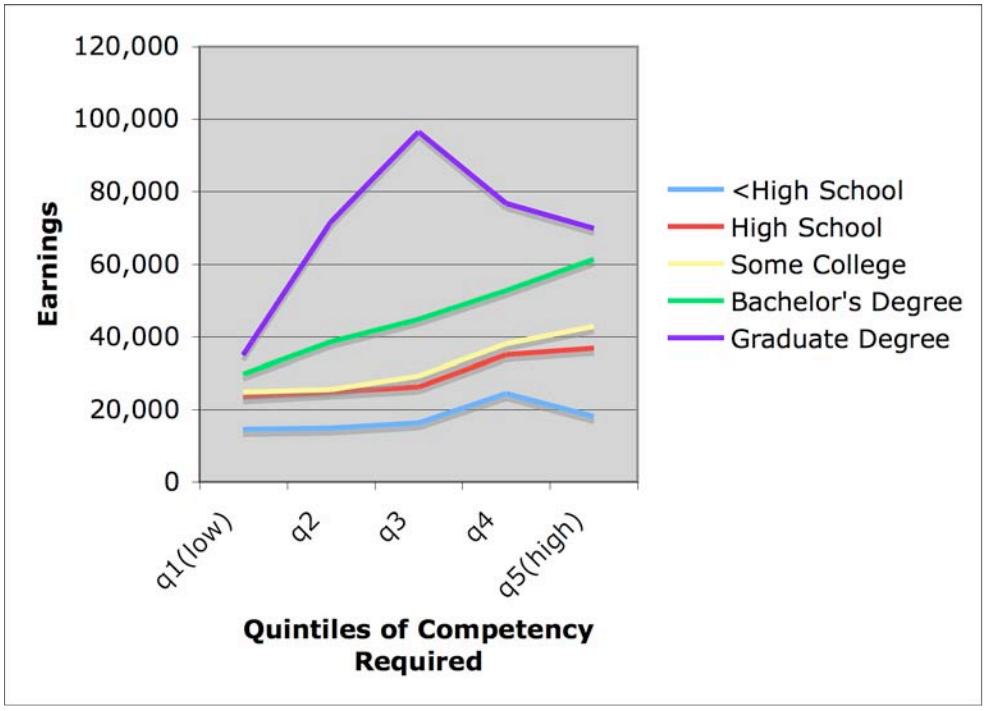


## Average Earnings by Education of Workers and the Competency Level Occupations Require (continued):

### Critical Thinking

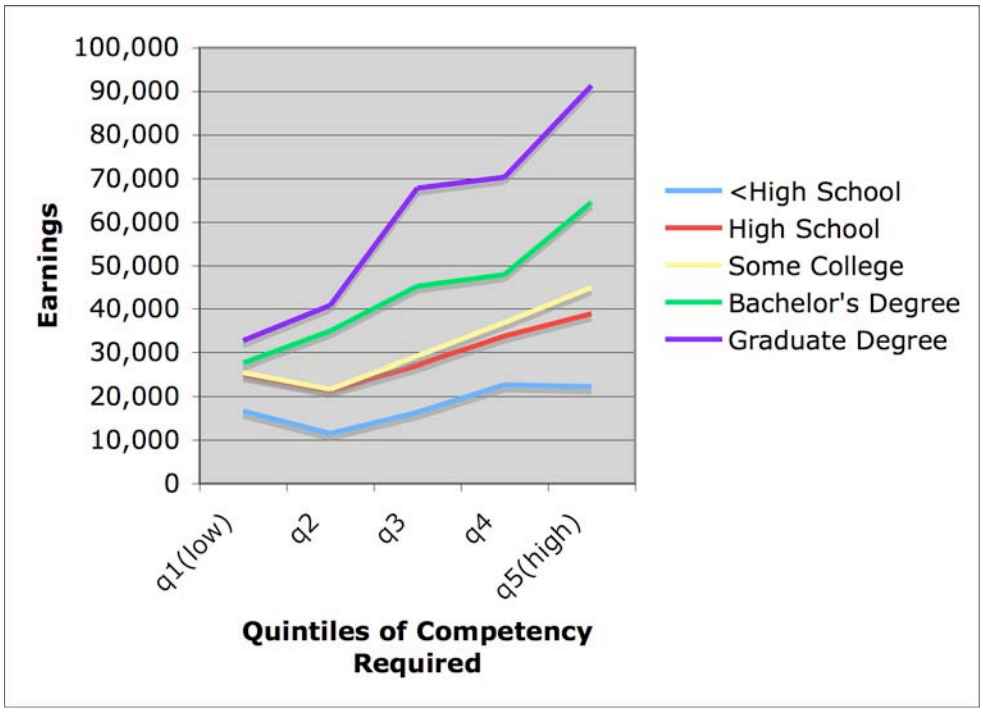



### Originality

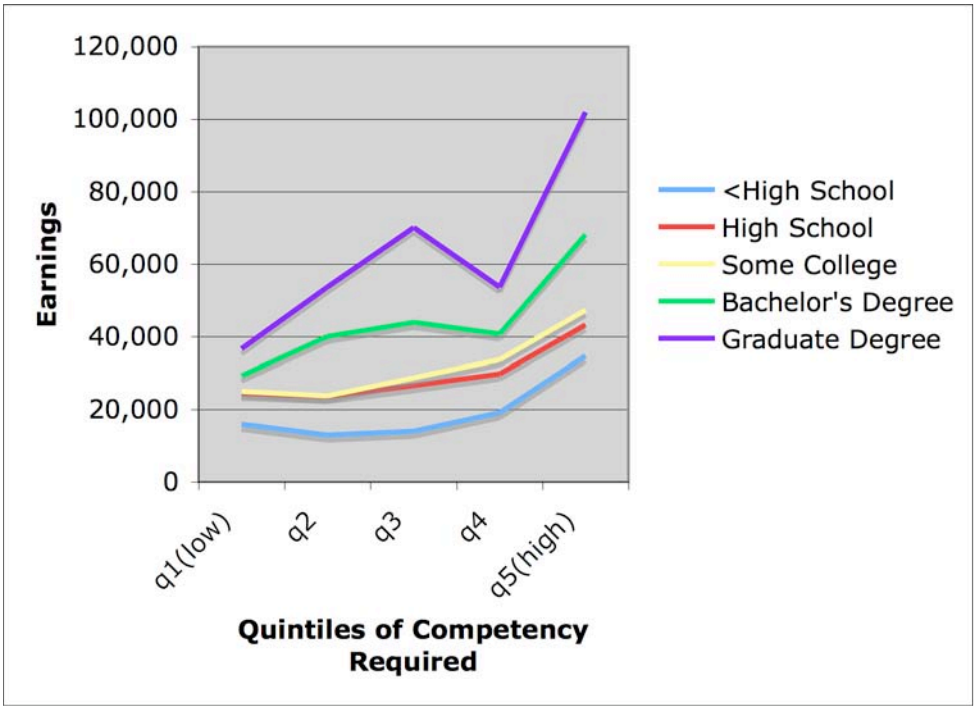


## Average Earnings by Education of Workers and the Competency Level Occupations Require (continued):

### Innovation

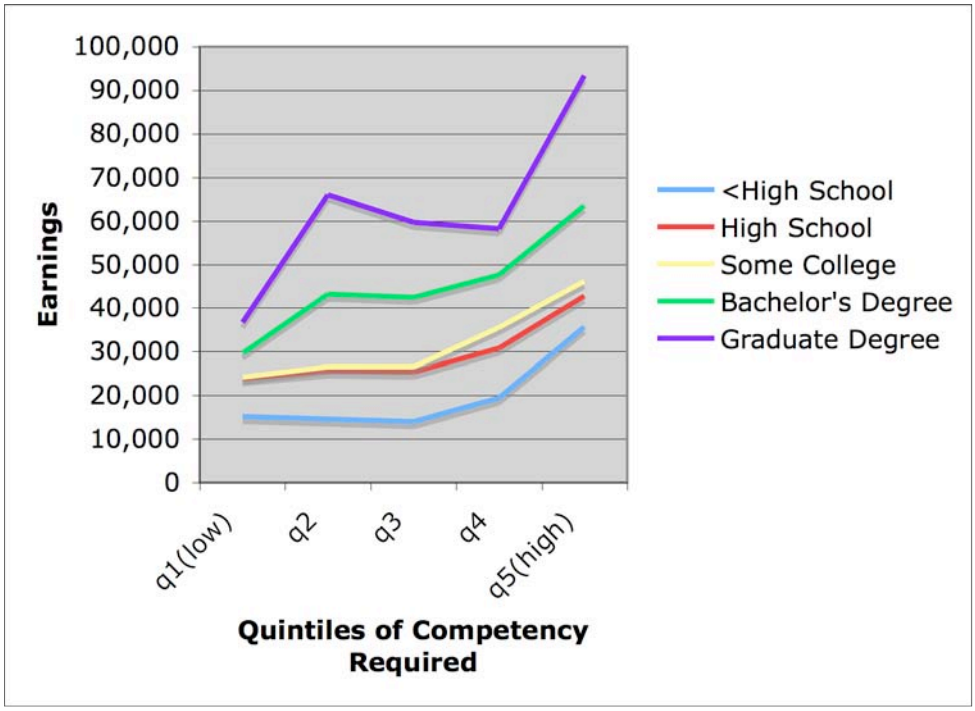



### Deductive Reasoning

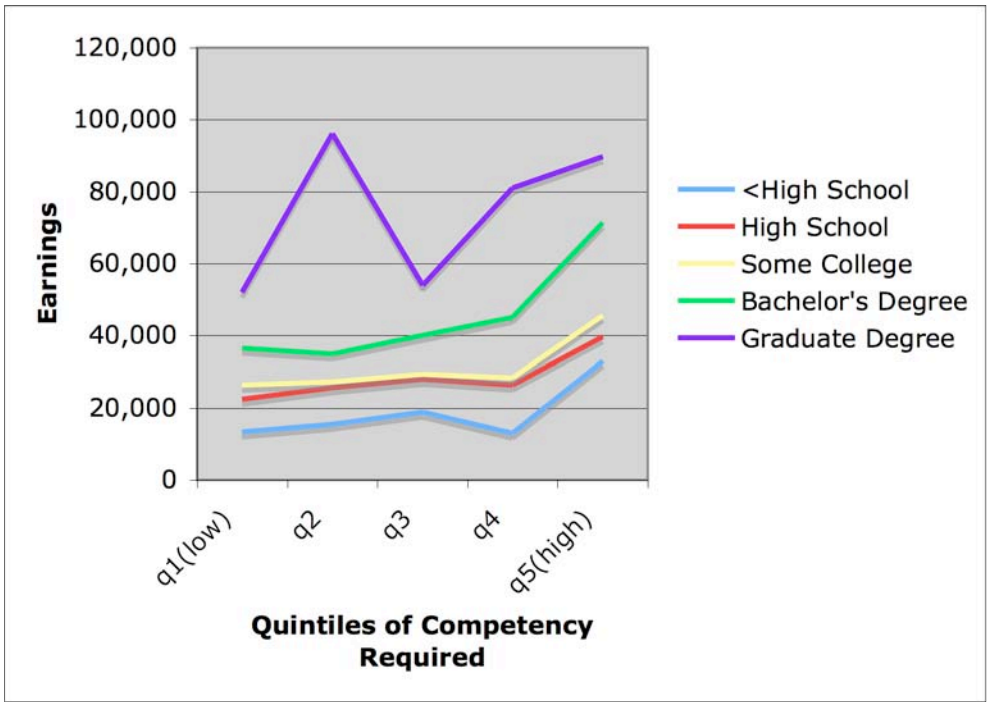


## Average Earnings by Education of Workers and the Competency Level Occupations Require (continued):

### Inductive Reasoning

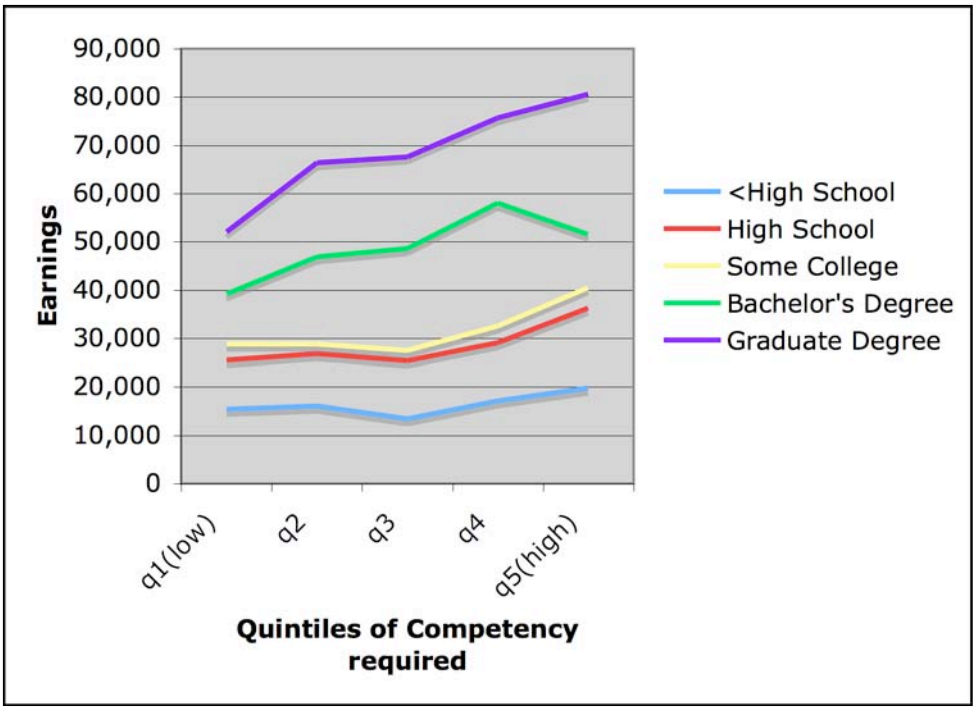



### Mathematical Reasoning

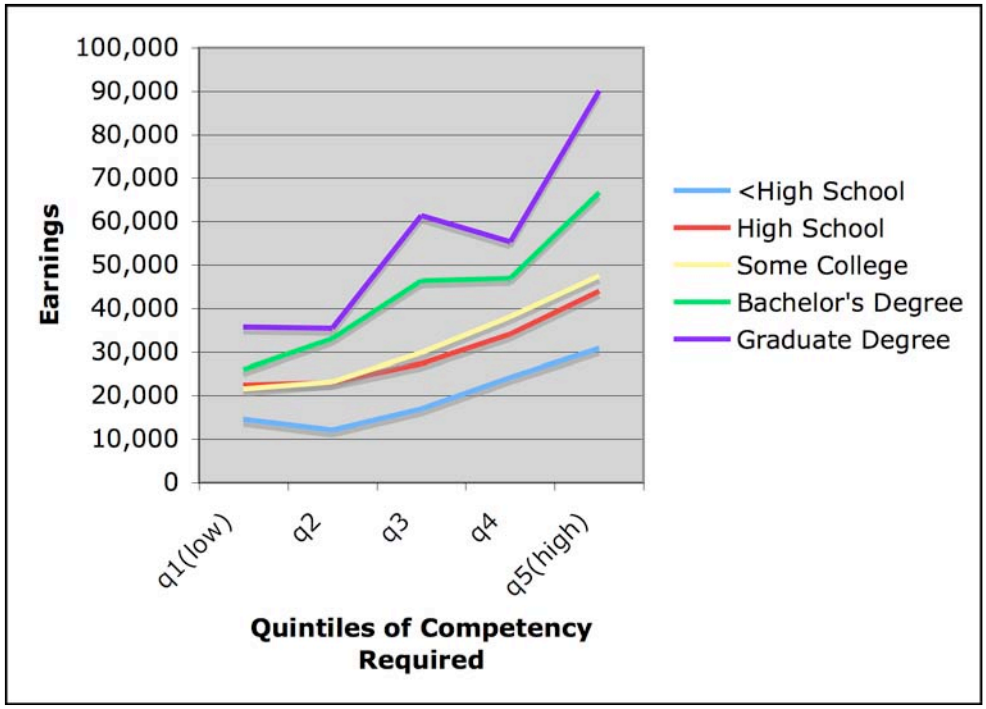


## Average Earnings by Education of Workers and the Competency Level Occupations Require (continued):

### Social Skills

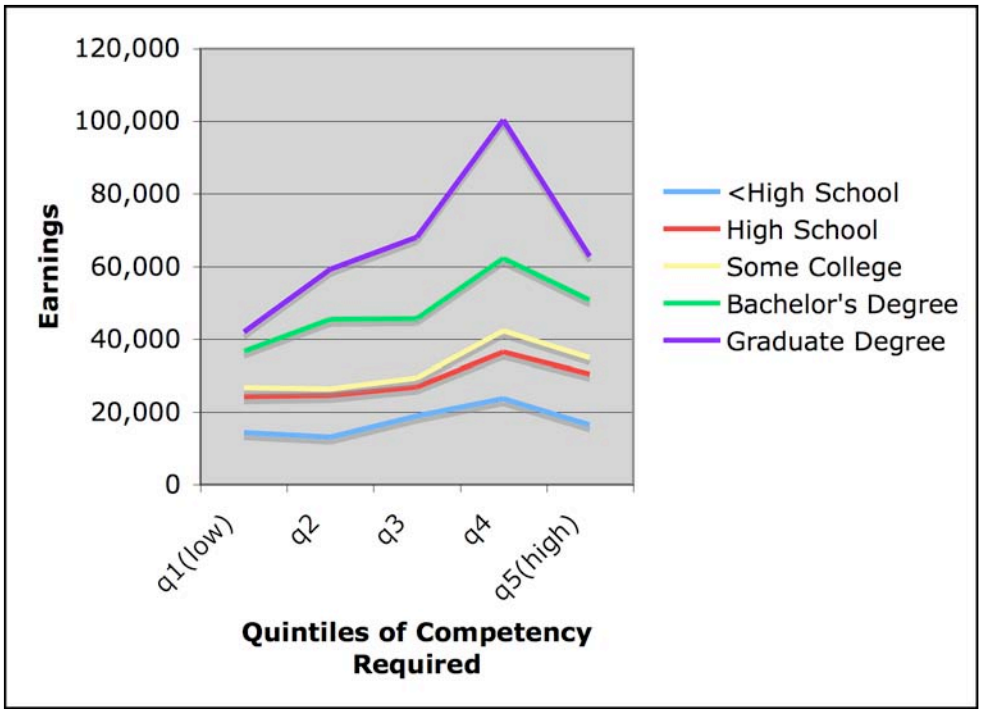



### Complex Problem Solving

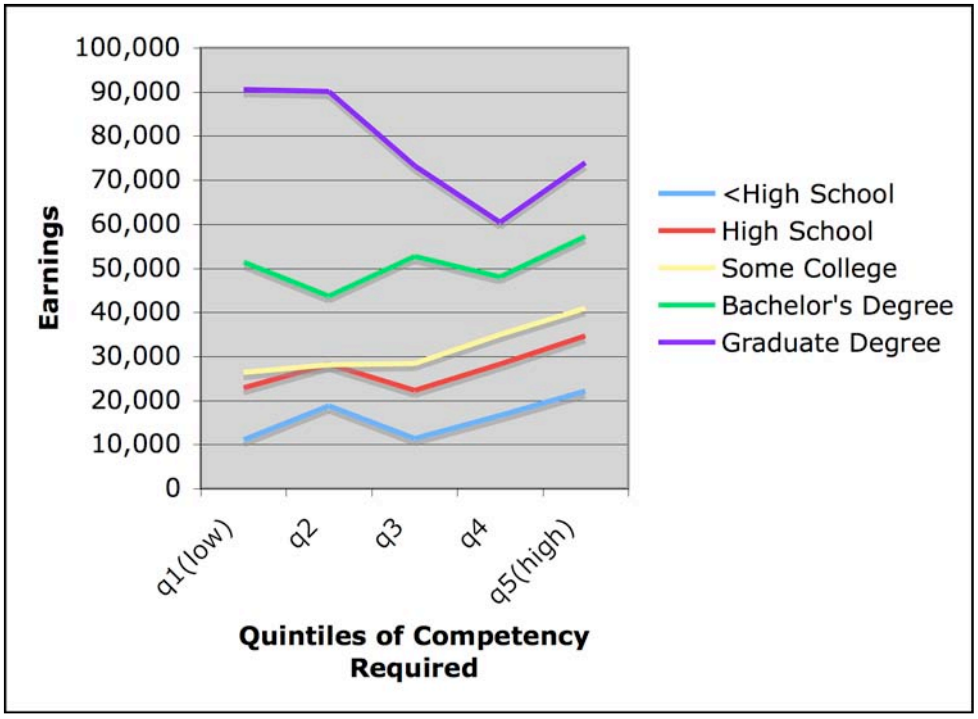


## Average Earnings by Education of Workers and the Competency Level Occupations Require (continued):

### Thinking Creatively

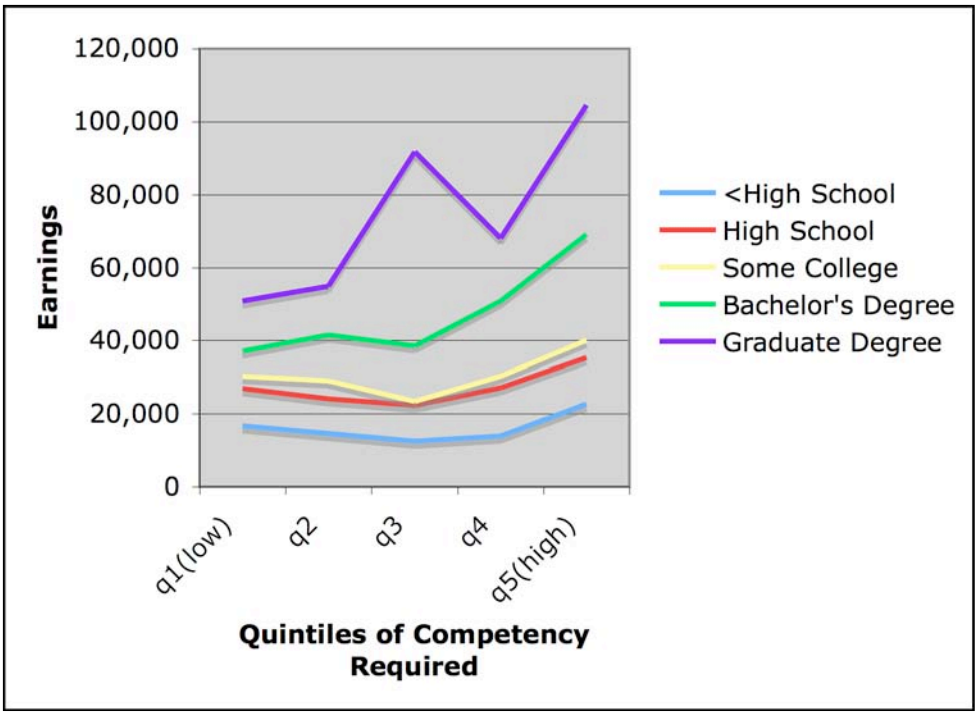



### Engineering and Technology



## Average Earnings by Education of Workers and the Competency Level Occupations Require (continued):

### Enterprising Interests




* Source: Tabulations from merged O*Net and Current Population Surveys, pooled March 2003-2004 Supplements.

[1] This background paper summarizes a set of quantitative analytical studies carried out in support of the *New* Commission on the Skills of the American Workforce under the direction of Anthony Carnevale who oversaw the labor market and economic analyses for NCEE and the Commission. The studies were intended to provide data to inform the deliberations of the Commission members and their final report. Presented here are results, sometimes preliminary, of original analyses as well as selected data from a review of relevant economic studies and periodicals. While the authors wrote this background paper, they benefited from extensive consultations and collaboration with, and the analysis of, Carnevale during his tenure with NCEE. Gerri Fiala provided valuable comments.

The research team also included Wissam Harake, Sarah Hogarth, Katherine Jessup, Gbemisola Oseni, Nam Pham, and Maria Rafaj.

This work was supported in part by grants from the Annie E. Casey Foundation, the Bill and Melinda Gates Foundation, the William and Flora Hewlett Foundation, and the Lumina Foundation for Education.

[2] John Kay, Culture and Prosperity, 2004, New York, NY, Harpers Business, pp. 120-124.
[3] Anthony P. Carnevale and Donna M. Desrochers, "If America's So Dumb, Why are We So Rich?", Community College Journal, June/July 2003, pp. 10-15.
[4] Council on Competitiveness, Innovate America, National Innovation Initiative Summit and Report, 2005, Washington, D.C., p. 8.
[5] Organization for Economic Cooperation and Development (OECD), "Knowledge: Worth the Investment?", OECD in Washington, January 2003, Washington, D.C., p.1.
[6] OECD, "Towards a Knowledge-Based Economy", OECD Science, Technology and Industry Scoreboard 2003;; http://www1.oecd.org/publications/e-book/92-2003-04-1-7294/A.2.htm
[7] Paul Romer, "In the Beginning Was the Transistor", http://www.forbes.com/asap/120296/html/paul_romer.htm
[8] OECD, Annex 3, Table A1.2a, http://www.oecd.org/edu/eag2006.
[9] OECD, Table A3.4A, http://www.oecd.org/edu/eag2004.
[10] Financial systems are another key factor contributing to America's comparative advantage. By almost any measure, it is clear that the U.S. continues to have the most vibrant and diversified financial system in the world.
[11] Among the world's 50 largest economies, the U.S. ranked just below Norway and above Ireland in 2005 purchasing power parity; http://www.cia.gov/cia/publications/factbook/rankorder/2004rank.html
[12] Thomas L. Friedman, The World Is Flat, 2005, New York, NY, Farrar, Straus and Giroux, pp. 153-154.
[13] Authors' calculations based on Bureau of Economic Analysis, U.S. Department of Commerce, National Income and Product Accounts Table, Table 1.1.10 http://www.bea.gov/bea/dn/nipaweb/TableView.asp#Mid

[14] In October 2005, 68.6 percent of the high school graduating class of 2005 enrolled in colleges or universities, a historical high.
http://www.bls.gov/opub/ted/2006/mar/wk4/art01.htm
[15] This discussion on demographic trends draws from The Aspen Institute, Domestic Strategy Group, Grow Faster Together. Or Grow Slowly Apart, 2002, pp. 30-32.
[16] OECD, Annex 3, Table A1.4, www.oecd.org/edu/eag2006.
[17] Dominic Wilson and Roopa Purushothaman, "Dreaming With the BRICs: The Path to 2050", October 2003, Global Economics Paper No: 99, Goldman Sachs Global Economics Website at https://www.gs.com. These projections are in U.S. dollar terms.
[18] U.S. Census Bureau, Global Population Profile: 2002, p. 12.
[19] "China, India Draw Closer", The Express , a publication of the Washington Post, Monday, April 11, 2005, p. 7.
[20] Angus Maddison, "The World Economy: Historical Statistics", Table 2 – GDP, http://www.ggdc.net/maddison/.
[21] Ibid. In 1890, U.S. GDP was estimated to be $215 billion (in 1990 dollar terms). China's GDP was estimated at $205 billion. India was third at an estimated $163 billion, followed by the United Kingdom with GDP estimated at $150 billion, then Germany and France.
[22] Wilson and Purushothaman, op cit, p. 20.
[23] Real US GDP per capita doubled from $18,491 to $37,232 in the 35 years from 1970 to 2005;
http://eh.net/hmit/gdp/gdp_answer.php?CHKrealGDP_percap=on&year1=1970&year2=2005

We were able to replicate the BRICs projections 20 years into the future within reasonable tolerances even though we used a different data set, growth model, and methodology. Sami Harake, "Schooling and the New Economy: An Empirical Study for the U.S.", April 19, 2006, PowerPoint presentation, slides #45, 46, 79.
[24] Richard B. Freeman, "Doubling the Global Workforce: The Challenge of Integrating China, India and the Former Soviet Bloc Into the World Economy" November 8, 2005, presentation at the Urban Institute, Washington, D.C.
[25] McKinsey, The Emerging Global Market, June 2005 (3 Volumes),
http://www.mckinsey.com/mgi/publications/emerginggloballabormarket/index.asp
[26] Richard B. Freeman, "Does Globalization of the Scientific/Engineering Workforce Threaten U.S. Economic Leadership?" NBER Working Paper No. 11457, June 2005, p. 4.
[27] Freeman, November 8, 2005, op cit.
[28] See, for example, OECD, The Sources of Economic Growth in OECD Countries, 2003, p. 60, and Paul M. Romer, "Endogenous Technological Change." Journal of Political Economy 98(5), 1990.

This section on growth models relies on a study by Sami Harake, "Schooling and the New Economy: An Empirical Study for the U.S.", September 9, 2006, National Center on Education and the Economy, Washington, D.C.

[29] Michael J. Mandel, Rational Exuberance, 2004, Harper Business, New York, NY, p. 10.

[30] By middle class we mean the share of households with income in the middle deciles of the household income distribution, defined in constant 2004 dollars. Income deciles were created using real household income defined in 2004 dollars. Household income was measured by the variable _hhinc on the CPS Utilities data file. This variable combines the Current Population Survey (CPS) variables HTOTVAL (1988-2004) with HHINCTOT (1968-1987).

The middle class was defined to afford wide inclusion and contains households whose income falls within the 3rd through 7th deciles. We then analyzed movement into- and out-of the low, middle, and upper class by holding these current income deciles constant and investigating change at several points in time (CPS years 1968,1970,1980,1990, 2000, 2004). The middle years were chosen to capture business cycle effects. The end points were chosen to extend the series as far through time as the data allows.

Educational attainment and employment were defined by the maximum of 'Head of Household" or "Spouse".

Trends in share of the middle class captured by each education group were then evaluated against the income deciles as defined above.

The data used were from the tabulations of the Current Population Survey, March: 1968, 1970, 1980, 1990, 2000, 2004, CPS Utilities, Unicon Research Corporation, www.unicon.com.

[31] More precisely, the deciles 3-7 span the household income range of $33,368 to $91,206 for CPS year 2004.

[32] Based on tabulations of "employment" by either the head of household or spouse from the 1968 and 2004 CPS, March Supplements.

[33] This section on the role of education relies heavily on unpublished work by Anthony P. Carnevale, "Connecting the Dots Between High School, College and Careers", p. 17, and is described in narrative form in "Discounting Education's Value", September 22, 2006, The Chronicle of Higher Education, http://chronicle.com/chronicle/v53/5305guide.htm.

[34] The Census population projections estimate 208,050,741 persons between 16 and 65 in 2012. The supply of education has been obtained using this projection adjusted by the trend-adjusted distribution of education among the population, 1992-2004 (CPS), and the historic labor force participation rate (LFPR) of people in each education category. The projection is based on the average LFPR (1992-2004).

We used a regression model based on changing proportions of education, 1992-2004, to project trends in education requirements or demand to 2012. We regressed the proportion of education in each major occupation group, using a simple OLS regression method, on time and time squared. This enabled us to: (1) capture the trends in demand, and (2) the time squared term controls for the rate of increase.

[35] Mandel, op cit, pp. 175-177.

[36] The Aspen Institute, op cit, pp. 30-32.

[37] The Occupational Information Network (O*Net), described below, documents the amount of education needed in 15 subject areas, from high school through undergraduate studies, to perform in a job.

The presentation in this section on O*Net relies on the computer support and analysis of Gbemisola Oseni, a graduate student at American University.

[38] O*Net is a data system developed and maintained by the U.S. Department of Labor. It replaced the more familiar Dictionary of Occupational Titles in the late 1990s.

[39] These descriptions of O*Net, the content model and various definitions are taken from http://www.onetcenter.org/content.html and Data Dictionary: O*NET 9.0 Database, December 2005, National Center for O*NET Development, Employment Security Department, Raleigh, NC. The categories are defined as follows:

- Worker Characteristics — enduring characteristics such as *abilities*, *interests*, and *work styles*, that may influence both performance and the capacity to acquire knowledge and skills required for effective work performance.
- Worker Requirements — work-related attributes acquired or developed through experience and education. *Knowledge* represents the acquisition of facts and principles pertinent to a job. *Experience* lays the foundation for establishing procedures to work with given knowledge. This set of procedures is more commonly known as *skills*. *Skills* may be further divided into basic skills (such as reading, that facilitate the acquisition of new knowledge) and cross-functional skills (such as problem solving, that extend across several domains of activities).
- Experience Requirements — qualities related to previous activities and specific types of work activities. This category includes information about the typical experiential backgrounds of workers in an occupation or group of occupations, as well as certification, licensure, and training.
- Occupational Characteristics — variables that define and describe the general characteristics of occupations that may influence occupational requirements.
- Occupational Requirements — generalized *work activities* that summarize the kinds of *tasks* that may be performed within multiple occupations. Occupation-Specific Information — descriptors that apply to a single occupation or a narrowly defined job family. This information includes requirements such as *knowledge*, *skills*, *tasks*, and machines, tools, and equipment.

[40] The US Department of Labor has recently developed a useful competency model for advanced manufacturing based in large part on expert input from employers and industry representatives about which skills matter to them. For more information on this approach to building and using competency models see http://www.workforce3one.org/members/getfileinfo.cfm?id=655.

[41] It is important to recognize that invention and innovation are separate processes that are necessarily intertwined in the delivery of new products to market. Invention often occurs in the proverbial garage – hence the need for good open-minded education – but it is R&D or innovation that takes a product from the inventor's mind to the store shelf. A favorite example in industrial organization is that of the Xerox machine. The process was thought through by a single individual, but it took 20 years and the creation of a research company to innovate the process to a workable market product.

[42] An excellent overview of this new growth theory is contained in Joseph Cortright, "New Growth Theory, Technology and Learning", 2001, Impresa, Inc., Portland, OR.
[43] The importance of location and regions in economic growth and development has been chronicled recently in the popular business press; see "The Competition Issue: Places to Beat", Business Week, August 21/28, 2006, pp. 106-119.
[44] Alicia H. Munnell, "Policies to Promote Labor Force Participation of Older People", paper prepared for and Urban Institute conference, November 11, 2005, Washington, D.C., p. 2.
[45] This discussion of offshoring draws on a working paper by Zamira Simkins, "Globalization and the U.S.: A Comprehensive Report on the Global Middle Class, Offshore Outsourcing, and Their Effects on the U.S. Economy", November 2006, National Center on Education and the Economy, Washington, D.C.
[46] Simkins, ibid, p.12. Regression analysis explaining U.S. employment levels also confirms this assumption. The analysis finds US imports of services partially replace US workers employed in service sectors; ibid, p. 19.
[47] Ibid, p.19.
[48] John C. McCarthy, "3.3 Million US Service Jobs to Go Offshore", Brief, November 11, 2002, Forrester Research, Inc.; and Ashok Deo Bardhan and Cynthia Kroll, "The New Wave of Outsourcing" (November 2, 2003). Fisher Center for Real Estate & Urban Economics. Fisher Center Research Reports: Report #1103.
http://repositories.cdlib.org/iber/fcreue/reports/1103
[49] The logit model obtained a very good fit based on three criterion: Homer-Lemshow statistics; pseudo R-squared; and % concordant/discordant
[50] This discussion of the global middle class draws on the working paper by Simkins, op cit, pp. 20-34.
[51] World Bank, World Development Indicators, 2005, Table 2.5.
[52] Cited by BBC News, online
http://news.bbc.co.uk/2/hi/business/3582015.stm. A summary is also available though Deloitte Global Financial Services Industry Outlook, online http://www.deloitte.com/dtt/cda/doc/content/dtt_gfsi_Global%20FSI%20Outlook_2006-04-21.pdf.
[53] Rao S. and I.Natarajan (1996). *Indian Market Demographics – The Consumer Classes.* National Council for Applied Economic Research, New Delhi.
[54] KSA Technopak household survey, reported in Nirvikar Singh, "The Idea of South Asia and the Role of the Middle Class", April 29, 2005, University of California, Santa Cruz.
[55] Senauer, B. and Linda Goetz (2003). "The Growing Middle Class in Developing Countries and the Market for High-Value Food Products." Department of Applied Economics, University of Minnesota. Economic Research Service, USDA. Washington, DC.
[56] Branko Milanovic and Shlomo Yitzhaki, "Decomposing World Income Distribution: Does the World Have a Middle Class?, March 2001, The World Bank, Washington, D.C., p. 34.
[57] Catherine L. Mann, "Offshore Outsourcing and the Globalization of US Services: Why Now, How Important, and What Policy Implications, in The

United States and the World Economy, C. Fred Bergstrom editor, 2005, Institute for International Economics, Washington, D.C., p. 282.