

Innovation and Economic Growth



The long-term record of success of the US economy is inexorably linked to a growing and well-educated work force, ample research and development expenditures by both public and private sectors, the availability of capital to fund expansion, and access to markets. Developmental economists often reduce this to the shorthand of “the capital/labor ratio” in which capital investments, in combination with a steadily improving workforce, contribute to sustainable growth and rising personal incomes.



Abby Joseph Cohen is senior investment strategist and president of the Global Markets Institute (GMI) of Goldman Sachs. GMI is the public policy research unit of our Global Investment Research Division. Its mission is to provide research and high-level advisory services to policymakers, regulators and investors around the world.

Abby was appointed by the White House to serve on the Innovation Advisory Board which will report to the Congress of the United States in early 2012 on matters related to US innovation and economic competitiveness. As part of their discussions, the advisory board has considered analyses examining factors such as education, worker productivity, investment in research and development, and government policies. The following article synthesizes some of the work prepared by GMI in recent years on these critical topics. It should not be viewed as a summary or preview of the work of the Innovation Advisory Board.

The role of innovation has been critical to economic development as the nation has evolved over the decades. There is a clear statistical link between innovation and gains in the standard of living. Scientific and engineering advances have spurred new products and processes since the founding of our nation. Once a largely agrarian economy, the US advanced from emerging nation status in the mid-19th century to an industrial powerhouse by the First World War. Vast improvements in agricultural productivity released workers for other activities. Massive investment – both public and private – in transportation infrastructure such as seaports, inland canals and rail systems, opened new markets in commerce.

Importantly, conscious government policy helped ease the difficult transition for workers through these dramatic changes. Significant investment in public education led to formation of the world's largest literate workforce by the early 20th century. A comparable shift occurred in the workforce following the Second World War. Public policies, such as the GI Bill of Rights and the expansion of the great state university systems throughout the country, solidified the nation's workers as the best educated. For example, the US had the largest number of college graduates and the highest percentage of adult population with post-secondary education of any nation. This public investment reaped dramatic returns as US workers were consistently the most productive and highly paid.

Current Challenges

The credit crisis, and the severe recession which followed, have revealed many issues of concern. In fact, several of these have been developing for the past decade or longer. There is no doubt that the cyclical stresses have uncovered and exacerbated pre-existing structural questions. For example, median family income adjusted for inflation had

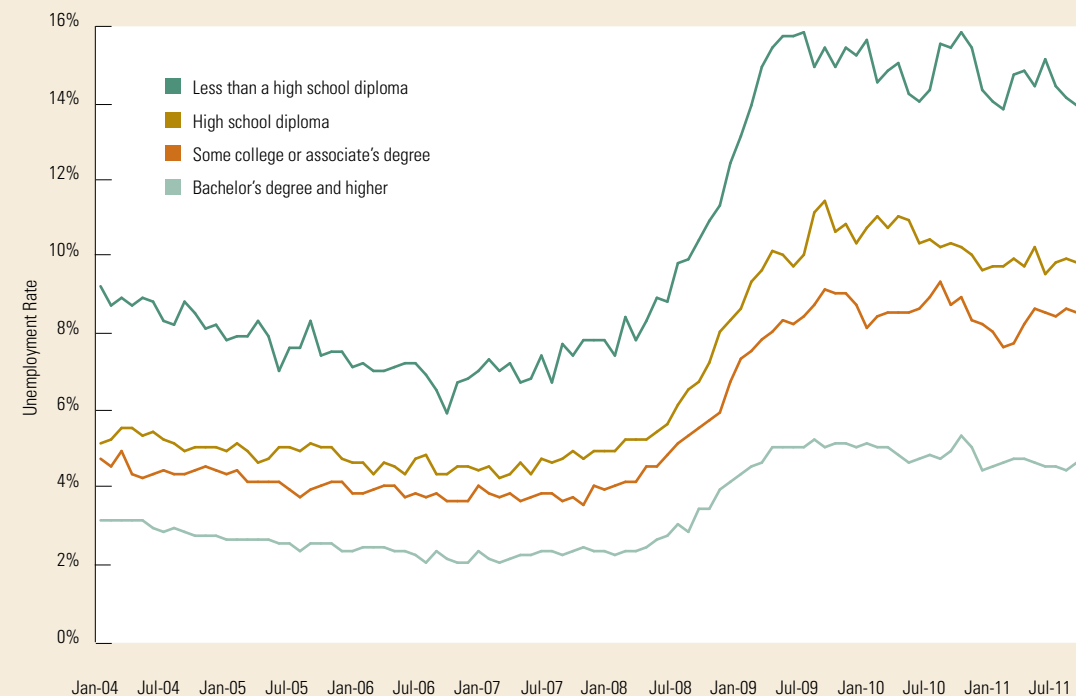
declined about 5% in the US prior to the credit crisis, and this has since worsened since 2007. The gap in income by level of education has widened, as has unemployment. (Exhibit 1)

The average unemployment rate in the US currently stands at an uncomfortably high 8.6%.¹ There is a striking divergence based on education. The unemployment rate for those with college degrees is about 4%; at the same time, the rate is 13% for those who are poorly educated. This reported unemployment rate understates the severity of the problem, especially for people who have been out of work for lengthy periods and are so discouraged that they are not actively

The US had the highest percentage of adult population with post-secondary education of any nation until recently.

¹ Bureau of Labor Statistics, December 2, 2011.

Exhibit 1: Employment Gap by Education

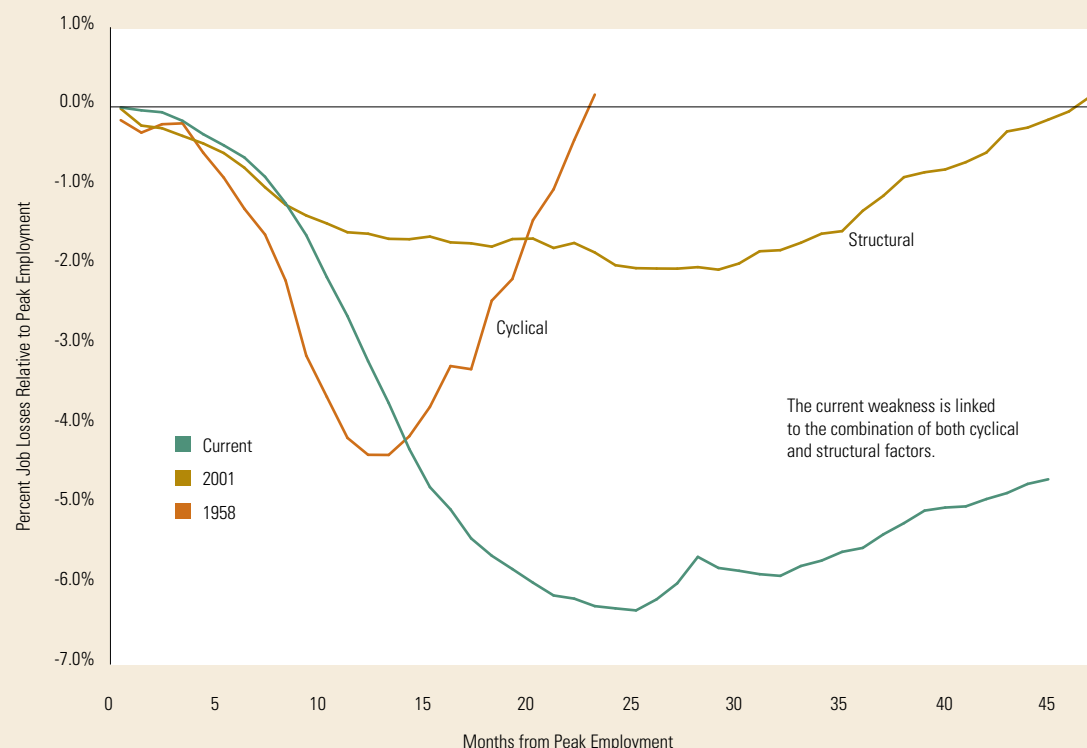


Source: Bureau of Labor Statistics.



The severity of the job losses since 2007 can be tied to both structural and cyclical factors.

Exhibit 2: Employment Changes During Selected Recessions and Recoveries



Source: Brookings Institution, Bureau of Labor Statistics, Goldman Sachs Global Markets Institute.

seeking employment. These individuals are technically no longer part of the labor force and do not count as unemployed. The average duration of unemployment, at 40 weeks, is about double the duration during prior recessions. (For those readers with interest, please refer to the work published by the Bureau of Labor Statistics on the varying measures of unemployment. The more comprehensive gauge is referred to as U-6 and it includes, for example, discouraged workers and those working part-time involuntarily.)

The gap in employment and family circumstances highlights the long-term importance of stresses on public schools throughout the country. Most education funding comes from state and local governments. The current budget pressures in many communities have led to cutbacks in the K through 12 programming but also in the essential vocational training offered by many high schools and community colleges. About half of all post-secondary school students in the US attend public colleges and universities.

The severity of the job losses since 2007 can be tied to both structural and cyclical factors. It is instructive to view the current employment cycle in the context of previous periods. From peak to trough, the US lost almost 6% of its jobs. Approximately 8.8 millions jobs were lost, and by mid-2011 2.3 million were added back. This pace of recovery is extremely slow by historical standards, and the trough from which we are emerging was unusually deep. (Exhibit 2)

The line marked “cyclical” shows the classic textbook recession in the United States. Based on the experience of the late 1950s, the nation lost about 4% of its jobs, but these were largely restored within two years. Many of the workers had been furloughed from their positions in the nation’s factories, including auto manufacturing and steel plants, and were called back to their jobs when demand recovered.

The line marked “structural” shows a different pattern and is based on the experience of the last decade. The moderate recession of 2001 led to a job loss of about 2% of the nation’s jobs from peak to trough. Although this decline was not as severe as the cyclical example, it took dramatically longer – almost four years – for the same number of jobs to be returned to the economy. Importantly, many of the new jobs were not equivalent to those that had been lost. In different industries, such as information technology and high-level services, there was often a mismatch between the skills required in the newer jobs and many of the unemployed workers. However, by mid-decade, jobs were being added to construction, lower-level services and other categories requiring less education.

The current cycle combines the worst of both cyclical and structural experiences. The sharp decline in jobs, followed by a sluggish recovery, has meant a dramatically slower return to the prior peak in employment. There is clear anecdotal data of skills mismatches. For example, recent college graduates entering the workforce with so-called STEM training (science, technology, engineering and math) have experienced greater success in finding positions and at above-average compensation. On the less encouraging side, most of the jobs lost from construction have not been restored.

A gender effect is also seen in the data. The unemployment rate for men at 11% was almost three percentage points higher for men than for women during the worst part of the recession in the first half of 2009. Much can be attributed to the industries most afflicted by the decline in demand, including the male-dominated construction and, to a lesser extent, manufacturing sectors. Education may also play a role. Over the last decade, the likelihood of a young adult earning a college degree has stagnated in the United States, for the first time. During this period, young women have become more likely to attend college, and men have become less likely. About 54% of the students on the nation's campuses are women. (Exhibit 3)

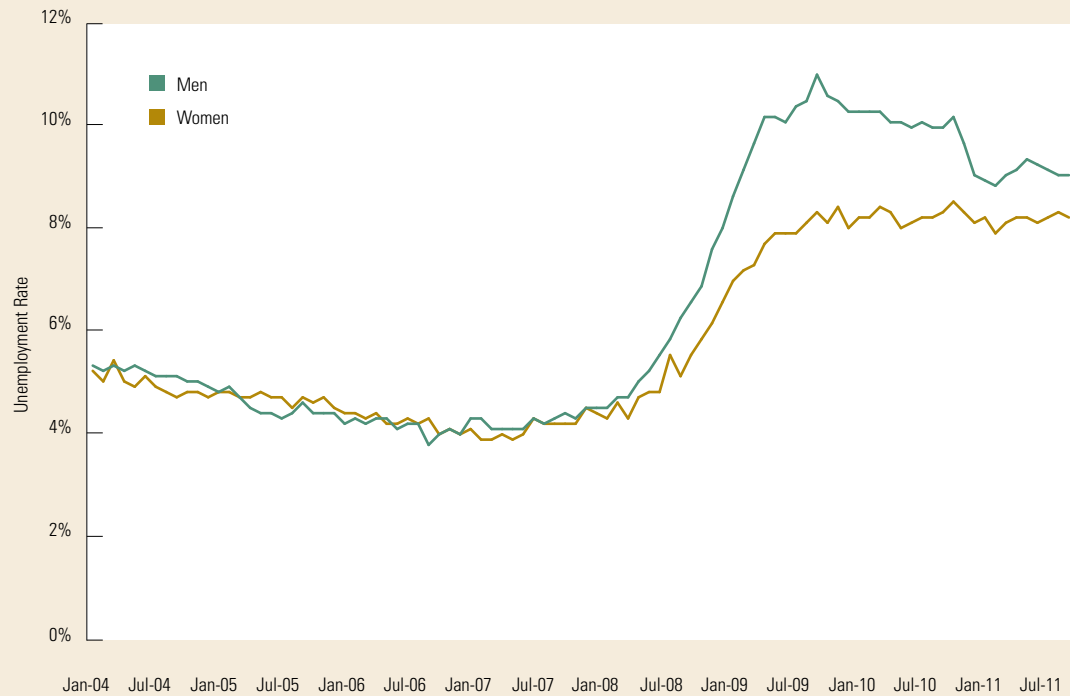
In addition to the divergences in employment by level of education and gender, there is also a notable divide between younger and older workers. The reported rate of unemployment for adults, ages 20 to 24 years, is about 15%. This is roughly double the rate for individuals 35 years and older. (Exhibit 4)

Sociologists and economists point to several demographic factors for the disparity, noting that there are usually two, often intersecting, paths to career development: (1) education and (2) work experience, including on-the-job training and retraining. Both of these paths seem less certain for today's younger workers. We've already noted the lack of progress in nationwide educational attainment in recent years. This is occurring

against a backdrop in which the skill set required for many available jobs is increasing in complexity. This is especially worrisome in some communities that are already below-average in their educational achievement. The decline in the percentage of young males moving on to post-secondary school education is hurting them. And, in the absence of a job, they are not receiving the training and retraining often provided by employers. Other critical elements include the shift in the US economy away from jobs in manufacturing and other categories that previously offered good paying entry-level positions and patterns of rising compensation.

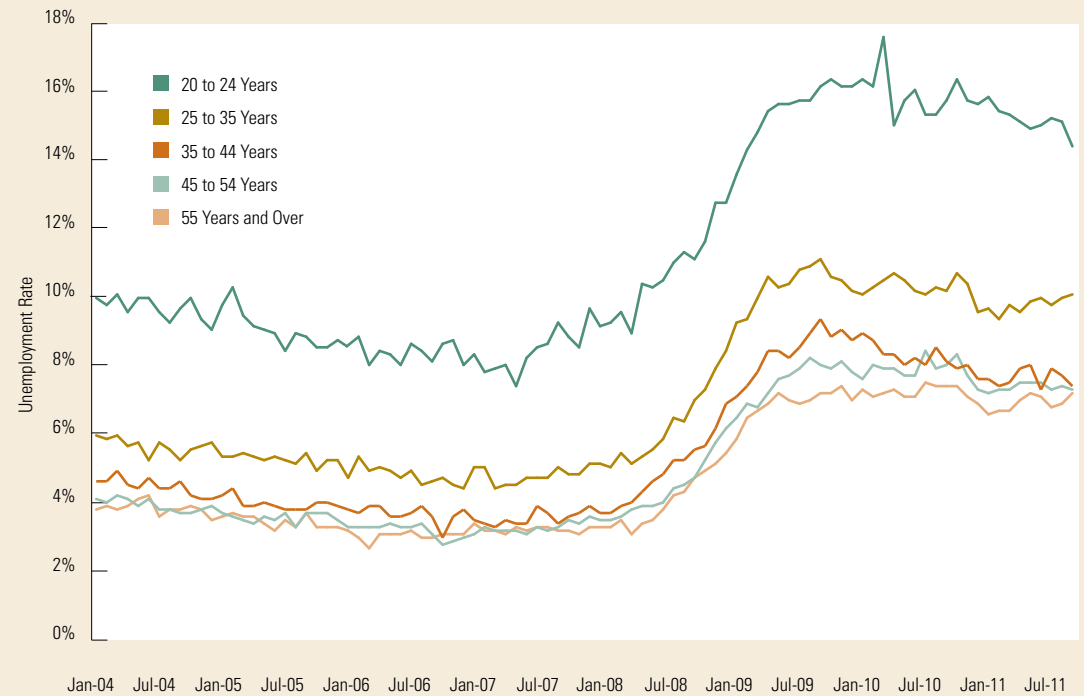
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Exhibit 3: Employment Gap by Gender



Source: Bureau of Labor Statistics.

Exhibit 4: Employment Gap by Age



Source: Bureau of Labor Statistics.

The Longer View

There is currently active debate throughout the country on several critical economic issues. In addition to the stubbornly high unemployment and income disparities discussed earlier, attention has focused on budget deficits, trade initiatives, and many others. The focus of this article is on innovation which is so integral to sustainable long-term economic progress.

As previously noted, the two broad categories affecting innovation, productivity and long-term economic competitiveness are labor and capital. On the first: Nations have their greatest success when workers are skilled, given incentives to be productive, are healthy and feel safe in the workplace. On the second: Investment capital needs to be available, allocated appropriately and be able to generate adequate returns.

The United States has an enviable record in scientific and industrial innovation. The nation has the world's most productive workers (measured in output per person-hour), the strongest university system, significant spending on research (more than double the second-largest spender), and prolific patent generation. The US has produced more Nobel Prize winners than any other country. However, data in more recent years suggest a less intense focus on bolstering innovation, which is in turn

a contributing factor to slower-than-potential economic growth. This slippage can be seen in several ways including:

- The US no longer leads in the percentage of adults with college degrees. Depending upon the source, we have slipped several slots to about tenth in the world. In part, this reflects the efforts made by other nations to bolster their average education attainment. More disturbing is that the US has not made any progress relative to its own prior history.
- The percentage of the federal budget allocated to research and development has declined to 2.8%, about half the levels in the decades immediately following the Second World War. The federal government has played a critical role in financing the basic research underlying earlier innovations such as computing equipment, the internet, GPS, and so-called “space age” materials. Much of this has occurred through direct research at government agencies such as NASA and through funding provided to the nation's universities.
- The private sector has further shied away from funding basic research which is critical to true breakthroughs in products and processes. Less than 5% of the R&D performed by companies is in basic research. The declines have been notable in industries such as healthcare which are less able to protect their intellectual property rights in global markets.
- The time for patent approvals has risen to about three years, compared to 18 months in 1990. About half of the patents issued in the US are now given to non-US entities, such as major Korean and Japanese corporations.

Reinvigorating the National Innovative Spunk

There is much work underway – in universities, think tanks, corporations, and governmental agencies – seeking to enhance the economic impact of our innovative efforts. These forensic analyses include detailed comparisons of prior economic cycles as guides to recommendations for the future. Not surprisingly, many of these recommendations include the following ingredients:

- Encouraging quality education for all, and supporting the STEM (science, technology, engineering and math) studies that will be essential to innovative thinking. There has been a notable decline in the percentage of US students taking degrees in these areas and is currently only 15% of the total, less than half in Korea and Germany.
- Funding basic research in several areas, including health, climate-friendly technologies, and water.
- Supporting the needed infrastructure for economic growth. During Martin Van Buren's administration in the early 19th century, this meant the Erie Canal. During the current administration this means high-speed broadband access. Public/private partnerships could bring the needed capital to new projects and to finance previously deferred maintenance on roads, bridges and other elements of our transportation system.
- Acknowledging that many other nations pursue specific industrial policies, and aiming to ensure that US companies and workers are not disadvantaged.
- Benefitting from the scale and synergies found in geographic and industrial clusters. For example, New York City is in the early stages of a project that will build critical mass in technology innovation in the form of a new campus on city-owned property.

Mayor Bloomberg has asked leading universities to develop proposals which will bring together world-class faculty, high-caliber graduate students and state of the art facilities, all in close proximity to a well-trained work force. Access to financial and media services are additional attractions.

A Final Observation

Our greatest challenge with regard to fostering innovation cannot be simplistically measured in terms of university degrees granted or patents rewarded. Rather, the national goal should be to use the extraordinary basic research and creativity and to “translate” them through appropriate development and commercialization. A joke in Silicon Valley goes something like this: The creative process is born in the US; development takes place in Korea; and volume production occurs in China.

At a recent forum hosted by the Brookings Institution, industry leaders including Andrew Grove, former Chairman of Intel, and Eric Schmidt, Executive Chairman of Google, encouraged the need for “translational innovation.” It is this type of approach that will enhance returns to investment, boost economic growth and help create productive, well-paying jobs. ■

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