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# TESTIMONY

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## Forces Shaping the Future U.S. Workforce and Workplace

### *Implications for 21st Century Work*

LYNN A. KAROLY

CT-273

February 2007

Testimony presented before the House Education and Labor Committee on  
February 7, 2007

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*Forces Shaping the Future U.S. Workforce and Workplace:  
Implications for 21<sup>st</sup> Century Work*<sup>2</sup>

Before the Committee on Education and Labor  
United States House of Representatives

February 7, 2007

**Introduction**

Mr. Chairman: I appreciate the opportunity to be here today to discuss this important topic. The well-being of America's middle class is closely tied to the outcomes of the U.S. labor market. The largest source of income for middle class families is earnings from work, either from current employment or as deferred compensation from prior jobs in the form of pensions or Social Security income. While the consequences of the current state of the economy on the fortunes of middle class families are one area for potential concern, there are a number of longer-term issues that are equally relevant in terms of their potential effects on U.S. workers and employers. Thus, I would like to focus my testimony on the forces that are shaping the world of work and the implications of those trends for the U.S. workforce and workplace. Understanding these forces is critical for shaping policies that can serve to foster a strong and secure middle class well into the 21<sup>st</sup> century.

To set the context, in the next section, I briefly outline three key factors that are expected to have important effects on the workforce and workplace in the next 10 to 15 years: demographic shifts, technological advances, and global competition. I then discuss the most salient implications of these trends for U.S. workers, employers, and other stakeholders such as our education and training institutions. While I do not offer specific policy recommendations, one conclusion that follows is that policymakers at all levels of government need to reexamine—and, where needed, reform—the

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<sup>1</sup> The opinions and conclusions expressed in this testimony are the author's alone and should not be interpreted as representing those of RAND or any of the sponsors of its research. This product is part of the RAND Corporation testimony series. RAND testimonies record testimony presented by RAND associates to federal, state, or local legislative committees; government-appointed commissions and panels; and private review and oversight bodies. The RAND Corporation is a nonprofit research organization providing objective analysis and effective solutions that address the challenges facing the public and private sectors around the world. RAND's publications do not necessarily reflect the opinions of its research clients and sponsors.

<sup>2</sup> In this testimony, I draw on Lynn A. Karoly and Constantijn W.A. Panis, *The 21<sup>st</sup> Century at Work: Forces Shaping the Future Workforce and Workplace in the United States*, MG-164, Santa Monica, California: The RAND Corporation, 2004 available online at: <http://www.rand.org/pubs/monographs/MG164/index.html>.

institutional features of the U.S. labor market, as well as our educational and training system, in light of the changes we anticipate.

### **Forces Shaping the 21<sup>st</sup> Century Workforce and Workplace**

In a recent study we conducted at RAND at the request of the U.S. Department of Labor, we focused on three key factors that we identified as having the most potential to affect workers and employers in the next 10 to 15 years (Karoly and Panis, 2004). Those factors are demographics, technological change, and globalization. The demographic dimension is relevant as the size and composition of the population, combined with patterns of educational attainment and labor force participation, determine the number and makeup of the people who want to work. Demographic trends will also affect the mix of jobs in the economy as a result of differential consumption patterns across different demographic groups. For example, older households demand a different mix of goods and services than younger ones, and the growing participation of women in the labor force has raised the demand for purchased goods and services once produced at home. Immigration patterns play an important role as well, affecting the mix of skilled and unskilled labor.

Considering the recent pace of technological change, it is evident that our economy has been shifting from one based on production to one based on information. In the coming decades, technological advances promise to further shape what goods and services are produced by the economy; how capital, material and labor inputs are combined to produce those goods and services; how work is organized and where it is conducted; and even who is available to work. Finally, the extent of integration between the U.S. economy and the rest of the world in terms of trade, capital flows, labor mobility and knowledge transfers will also influence the U.S. labor market. In the decades ahead, the extent of globalization will affect the size of markets U.S. firms produce for, the mix of products the U.S. population consumes, and the nature of competition in the global marketplace.

In assessing the *demographic trends*, the most striking shift is that the workforce is projected to grow more slowly in the future. The annual growth rate of the nation's workforce is expected to slow to 0.6 percent in the 2010s and 0.4 percent in the 2020s (Toosi, 2002, 2006). That is a sharp decline from the 1.3 percent average annual increases seen in the 1990s and the 2.6 percent average annual increases experienced during the 1970s. The slowdown in labor force growth is the result of the retirement of the baby boom cohort and the end of the rise in women's employment rates. The influx of immigrants counteracts those trends to some extent but not enough to allow labor force growth rates to keep pace with recent decades. As a result of immigration patterns and differential fertility rates for minority groups, the trend toward a more ethnically and racially diverse workforce can also be expected to continue.

In terms of *technological advances*, it hardly seems controversial to say that technology will continue to shape the economy in even greater ways over time, while the pace of those impacts can be expected to accelerate. One expected consequence of the technological advances is a continued growth in the demand for a high-skilled workforce capable of undertaking the basic R&D to develop new technologies, developing the applications and production processes that exploit the technological advances, and bringing the resulting products to the commercial marketplace. Beyond the high-technology sectors themselves, changes in technology in recent decades have been identified as an important source of rising demand for skilled workers in a wide range of industries and occupations (Karoly and Panis, 2004). New technologies favor non-routine skills such as flexibility, creativity, problem-solving, and complex communications. Computers and other new technologies complement workers with these skills. In contrast, information technologies tend to substitute for routine skills that can be translated into programmable steps for computers to execute. Complementary changes in workplace practices—such as more decentralized forms of business organizations and other aspects of “high performance” work systems that give workers more authority, flexibility, and opportunities to work in teams—further increase the demand for workers with high-levels of skills (Bresnahan, Brynjolfsson, and Hitt, 2002). All indications are that such technological advances in the future will continue to place a premium on higher-skilled “knowledge” workers who are responsible for analyzing, problem-solving, and communicating information needed for decisionmaking.

The third factor, *globalization*, can be expected to have equally important effects. While the pace and extent of the integration of the U.S. economy and other world economies depends in part on the outcome of future trade policies adopted by the United States and other countries, we can anticipate that globalization will affect industries and segments of the workforce that in the past were relatively isolated from outside competition, boosting trade, affecting capital flows, encouraging mobile populations, and causing rapid transfer of knowledge and technologies. The evidence to date of the effects of globalization on the economy suggests a future course that will comprise both aggregate effects and distributional consequences. For the economy and the labor market as a whole, trade has generally produced favorable outcomes: continued employment growth because of expanded markets, high rates of innovation and productivity gains as a result of more competitive markets, and rising standards of living due to lower prices and greater consumer choice (Burtless et al., 1998). At the same time, the distributional consequences are equally salient. For U.S. workers, that means job declines in some sectors of the economy, counterbalanced by job creation in others. Ultimately, globalization and technological change have similar consequences: gains in the economy as a whole from innovation and expanded markets but distributional consequences as new technologies and overseas competition displace workers or alter the skill-content of jobs.

## **Implications for Workers, Employers, and Other Stakeholders**

By understanding the forces that are shaping the world of work and how those forces are likely to evolve over time, we can draw out the implications of those trends for the various stakeholders in the labor market – workers, employers, education and training institutions, and policymakers. In doing so, much of the exercise involves informed speculation. In the absence of a crystal ball, we are not in the business of making definitive predictions. However, we do believe that certain trends are more likely to occur than not. I'd like to highlight four key messages that come out of our work.

**First, we foresee a redefinition of employer-employee relationships and work arrangements, toward greater specialization and more worker-entrepreneurs.** The combination of technological change and globalization are propelling firms toward a model of greater specialization than in the past. The adoption of new technologies have shifted the ways firms are organized and conduct their businesses—both in “old economy” goods-producing sectors such as steel and machine tools industries, as well as services-producing sectors such as retailing, trucking and banking. This includes a trend toward the “vertical disintegration of the firm”: in other words, companies shedding non-core functions through outsourcing in order to focus on specialized products and services that define their core competencies.

Decentralized business forms also go hand-in-hand with decentralized decisionmaking within organizations, and attaching a premium on knowledge-generation as a way of achieving competitive advantage. Shifts toward more participatory “high performance” work systems that give workers more authority, flexibility, and opportunities to work in teams as well as performance-based pay are also attributable to the power of information technologies and their associated networks to coordinate and control across and within organizations in a more decentralized manner. Increasingly, we can expect corporations to serve less of a “command and control” function and instead provide the rules, standard and culture that define the environment within which more autonomous workers operate.

Technology also facilitates telecommuting and other forms of distance work such as long-distance teams. As of 2004, about 21 million workers or 15 percent of the workforce usually did some work at home (at least on day a week) as part of their primary job (Bureau of Labor Statistics (BLS), 2005b). As might be expected, about four out of five workers who worked regularly at home were managerial, professional, or sales positions, jobs with more authority and autonomy. Looking ahead, we can expect growth in home-based work and telecommuting, facilitated by technological change and demanded by workers looking for ease in balancing work and family commitments. As the location of the employer and employee become less geographically connected—particularly when state or national boundaries are crossed—it raises questions about which jurisdiction's work-related policies apply.

Beyond telecommuting, the forces driving the reorganization of production are also expected to shift toward nonstandard work arrangements such as self-employment, contract work, temporary help, part-time work, and so on. One view of these trends foresees the evolution in some sectors toward numerous, IT-enabled, networked entrepreneurs, or “e-lancers” (Malone and Laubacher, 1998; Malone, 2004). In this business model, individuals may compete in a global marketplace for project opportunities and work on multiple projects at a time. Teams continuously dissolve and reform as old projects are completed and new projects begin.

According to BLS data as of 2005, about 1 in 10 workers was in an alternative employment arrangement, consisting of independent contractors, on-call workers, temporary help agency workers, and workers provided by contract firms (BLS, 2005a). When self-employed individuals and those working part-time are included, about one in four workers is currently in a “non-standard work arrangement”—in other words, a job that would not be expected to provide traditional employer-provided benefits. Further shifts may be spurred by technology or by demand on the part of subgroups of workers such as older workers, the disabled, or those caring for dependent family members. A great example of the new business model is e-Bay. Recent figures indicate that eBay had over 55 million active buyers and sellers, but even more pertinent is that an estimated 430,000 of those sellers consider eBay to be their primary source of income. If eBay actually employed those individuals, it would make it the second largest private employer in the country after Wal-Mart (Malone, 2005).

To the extent that nonstandard work arrangements expand in the future, one key issue will be access to and delivery of traditional workplace benefits. The traditional employment benefits associated with jobs that confer at least a middle class standard of living include health insurance and pension coverage, and often include other benefits as well such as life and disability insurance, and employer-supported education and training and other aspects of professional development. In the traditional employer-employee paradigm, workers might have expected such benefits as part of explicit or implicit employment contracts that confer long-term stable employer-employee relationships governed by the internal labor market of the firm. At the other extreme is an alternative paradigm where workers are independent of traditional employers, engaging in freelance or e-lance work that takes place over weeks or months—often as part of collaborative project teams that form and then dissolve—all governed by the marketplace and institutional rules.

In the first case, the employment relationship offers both employment continuity and economic security, insuring the worker to some extent against fluctuations in the economy. There are opportunities for career progression and constraints on the distribution of wages based on the internal wage structure of the firm. At the other extreme, the individual is responsible for generating the demand for their skills and for riding

out periods of slack demand. There is no well-defined career ladder and the rewards may be more extreme, with those who don't succeed contrasted with the "winners who take all."

**Second, the skills of the U.S. workforce will determine how competitive our economy remains in a global marketplace.** The key will be whether the skills of the U.S. workforce can keep pace with the growing demand for skill and the extent of global competition. Overall educational attainment among the U.S. population increased rapidly throughout the twentieth century (Karoly and Panis, forthcoming). In 1940, only about 4 in 10 persons age 25 to 34 (cohorts born as early as 1905) completed high school. By 1980, more than 8 in 10 persons (cohorts born as early as 1945) reached this level of educational attainment or higher. During this 40-year period, the proportion completing a college degree or more rose from 6 percent to 24 percent. As a result of these large cohort differences in educational attainment, those workers retiring in the latter half of the twentieth century after a 40-year career were replaced by considerably more educated labor force entrants and larger absolute cohorts as a result of the baby boom. After 1980, there has been a slowdown in the trend toward higher educational attainment so that the difference in educational attainment between cohorts entering and retiring from the labor force is becoming smaller. While some scholars suggest education levels will continue to rise on average, others project stagnation in the educational attainment of the workforce (see Day and Bauman, 2000, and Elwood, 2001). To the extent that educational levels are projected to increase in the future at all, however, the rate of increase in the next several decades will be slower than what was experienced in the past several decades.

Even if the education level of the workforce continues to grow, what is even more relevant is whether U.S. workers will have the capabilities that will be valued in the future, as technological shifts place a premium on such skills as abstract reasoning, problem solving, communication, and collaboration. On this front, internationally comparable data indicate that the level of skills acquired by U.S. students and workers are outmatched by their counterparts in other developed countries. In terms of proficiency in mathematics and reading, U.S. 15-year-olds rank at or near the bottom in comparison with 21 OECD (Organisation for Economic Development) countries (OECD, 2004). When U.S. adults are compared with their counterparts in other developed countries on the workplace literacy skills relevant for functioning in white-collar jobs, they too rank in the bottom half of the distribution (OECD, 2000; Lemke et al., 2005).

Technological advances will also require a workforce with training in the sciences and engineering in order to undertake the basic research necessary for scientific and technological innovations, develop applications from the advancements, and bring new products to market. However, the share of U.S. bachelor's degrees awarded in the sciences and engineering has fallen from 36 percent in the late 1960s to 32 percent as of 2001 ((National Science Foundation (NSF), 2004).

At the graduate level, the United States has long relied on top students from universities and engineering schools abroad who receive their Ph.D.s in the sciences and engineering from U.S. universities and remain after they complete their degree. Recent estimates suggest as many as 70 percent of foreign-born U.S. Ph.D. recipients remain in the United States rather than returning to their country of origin (Bhagwati, 2003). Overall, estimates from the 2000 U.S. Census indicate that 51 percent of all engineers with doctorates were foreign born and the share was 45 percent for individuals with doctorates in the life, physical, mathematical, and computer sciences (NSF, 2004). Yet, more restrictive immigration policies in the wake of September 11<sup>th</sup>, coupled with increased competition from universities in other countries have led to a decrease, at least in the short-term, in the number of foreign students studying for advanced degrees in the United States (Dillon, 2004). If this recent experience continues, the United States may find it increasingly difficult to attract highly skilled immigrants or to retain those who are educated at U.S. colleges and universities, thereby limiting the supply of scientists and engineers in the U.S. labor market (NSF, 2004).

**Third, while education and training prior to starting a career will be important, the ability to retool and retain mid-career will be essential at all skill levels.** The present education and training system largely evolved to meet the needs of the early 20<sup>th</sup> century workforce. That system was predicated on the model of first obtaining education and knowledge through young adulthood, followed by entry into the labor market. Increasingly, this system is less relevant for the 21<sup>st</sup> century workforce. Given the pace of technological change and the heightened competition from abroad, skills obtained early in an individual's career may soon become obsolete. Thus, individuals will be required to be re-educated and re-trained to respond to changes in skill demands and the requirements of jobs.

The growing importance of skill in the U.S. economy, both for new labor force entrants and current workers, highlights the need of an education and training system that can prepare workers to enter the labor market and offer opportunities for skill upgrading throughout an individual's working life. At the primary and secondary level, a focus on improving educational outcomes in mathematics and the sciences is critical given the expected pace of technological change and the extent of global competition (National Commission on Mathematics and Science Teaching for the 21<sup>st</sup> Century, 2000). The need to expand the number of undergraduate and graduate degrees in the sciences and engineering was noted above, as well. There is also a need to develop opportunities for lifelong learning through formal and informal training programs, whether offered by employers or public or private educational institutions.

While employers can be expected to support some opportunities for obtaining job-specific skills, they are less likely to invest in general skill acquisition as those skills are more readily transferable to another employer. Nevertheless, U.S. employers make substantial investments in training their workers, whether through on-the-job training, formal in-house education programs, or through partnerships with external

training institutions such as community colleges. In some cases, opportunities for continued education and training may become an important fringe benefit used by employers to attract and retain a highly skilled workforce. One challenge is that opportunities for employer-provided training typically increase with education levels, so that less-educated workers do not have the same opportunity for upgrading their skills as their more-educated counterparts (Ahlstrand, Bassi, and McMurrer, 2003).

The need for lifelong learning is one area where technology may be part of the solution. The Internet and other communication technologies have great potential for improving worker skills through technology-mediated learning that is available any time, anywhere (Karoly and Panis, 2004). Such tools as computer-based instruction, Internet-based instruction, and other methods of customized learning are gaining ground in a number of settings, although their cost-effectiveness remains unproven. Nevertheless, if lower-skilled workers, in particular, can take advantage of such technology-driven learning opportunities, it may allow for skill upgrading of the current workforce in response to the anticipated growth in demand.

**Fourth, as the labor force grows more slowly, employers will compete to attract new workers, particularly those currently underrepresented in the labor force.** In light of the prospect of near-zero growth in the workforce, employers are likely step up recruitment among subpopulations that are currently underrepresented in the workforce. While the current projections forecast a sizeable slowdown in the growth rate of the future labor force, the growth rate can exceed those projections to the extent that labor force participation rates can rise for groups not fully employed. For employers, this may mean focusing on benefits or other accommodations to encourage greater workforce participation on the part of older workers, women with children, persons with disabilities, and so on.

Consider as an example, the labor force participation of those with work-limiting disabilities. Not surprisingly, labor force participation among persons with a disability is lower than among those without. In 2002, the employment rate for non-disabled persons age 21 to 64 was 88 compared with 56 percent for those with a disability and 43 percent for those with a severe disability (U.S. Bureau of the Census, 2006). Several technological and institutional developments are under way that may allow greater work participation among the disabled (Karoly and Panis, 2004). Medical technology is undergoing rapid change, so that some disabilities may be cured, prevented, or rendered more manageable in the future; progress in IT may help persons with disabilities perform tasks that they currently cannot, either by helping directly with the task or by enabling remote work from home; and the Ticket to Work program of the Social Security Administration aims to induce more Disability Insurance recipients to return to work. Countering these developments, however, is the prospect that the prevalence of disability may be on the rise due to general population aging and the increasing incidence and prevalence of such precursors to disability as diabetes, asthma, and obesity (Lakdawalla et al., 2003).

As another example, older workers often point to a desire for greater flexibility in job responsibilities, hours of work, and pay and benefits at the end of their career. For a variety of reasons, older workers are already shifting toward longer work careers (Karoly and Panis, 2004). Yet, employer behavior and government policies may serve to further increase labor force participation rates among older individuals. Research has demonstrated that workplace flexibility and employers' accommodations of older workers can increase their anticipated work-life. When employer accommodations are not possible, the transition to retirement can be postponed for some older workers by shifting to self-employment as a type of bridge job (Karoly and Zissimopoulos, 2004). Indeed, in many sectors, information technologies have reduced the costs of entry into self-employment and the Internet provides an avenue for wider marketing of products and services.

### **Implications for Policy**

These factors shaping the world of work in the next several decades are also relevant for policymakers at the federal, state, and local level who make decisions that shape the laws and regulations governing the workplace and other policies that affect the various actors in the labor market. Many of the institutional features of the U.S. labor market evolved in the context of the 20<sup>th</sup> century workplace, many dating to the first half of the last century. These features include:

- the regulations that govern employment, hours, wages, fringe benefits, and occupational health and safety;
- the tax treatment of workplace benefits;
- the structure of social insurance programs such as social security, disability insurance, and unemployment insurance;
- the organization and operation of unions and other worker associations.

In light of the changes we can see coming, policymakers need to reexamine various public and private sector policies and institutions to determine whether (1) present policies introduce distortions or unintended consequences; (2) the market failures of the past are less relevant but new ones have emerged; or (3) there are distributional consequences that make a case for a government role in the marketplace.

For example, as employers and employees are increasingly located across state boundaries, which state laws or state-based social insurance programs apply to the worker and employer? The rapid pace of technological change and shifts in demand due to global competition places workers at greater risk of displacement, with consequences for employment security, income and access to benefits. Which workers should be compensated for such losses and how? What is the role for government, if any, in supporting the need for workers to engage in lifelong learning and adjust to changes in skill demands?

These are just some of the questions that merit greater attention as we navigate the future of work in the 21<sup>st</sup> century.

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