



---

Chapter Title: INTRODUCTION

Book Title: The 21st Century at Work: Forces Shaping the Future Workforce and Workplace in the United States

Book Author(s): LYNN A. KAROLY and CONSTANTIJN W. A. PANIS

Published by: RAND Corporation

Stable URL: <https://www.jstor.org/stable/10.7249/mg164dol.10>

---

JSTOR is a not-for-profit service that helps scholars, researchers, and students discover, use, and build upon a wide range of content in a trusted digital archive. We use information technology and tools to increase productivity and facilitate new forms of scholarship. For more information about JSTOR, please contact [support@jstor.org](mailto:support@jstor.org).

Your use of the JSTOR archive indicates your acceptance of the Terms & Conditions of Use, available at <https://about.jstor.org/terms>



This content is licensed under a RAND Corporation License. To view a copy of this license, visit <https://www.rand.org/pubs/permissions.html>.



JSTOR

*RAND Corporation is collaborating with JSTOR to digitize, preserve and extend access to The 21st Century at Work: Forces Shaping the Future Workforce and Workplace in the United States*

In the next 10 to 15 years, work in the United States will be shaped by a number of forces, including demographic trends, advances in technology, and the process of economic globalization. In many respects, these key factors have already played a role in shaping the world of work in today's economy. They have influenced the size and composition of the labor force, the features of the workplace, and the compensation structures provided by employers. How these factors continue to evolve will further influence the workforce and the workplace, often in ways that can be predicted. In some cases, however, conditions will change in ways that are, as yet, more uncertain. The evolution of these trends and their eventual consequences will clearly depend, to a great extent, on the decisions made by workers, employers, educators, and policymakers. To make informed decisions, these individuals need to understand their evolving context, and that is what we hope to bring about in the study that has resulted in this book. In particular, we attempt to answer two sets of questions about work in the twenty-first century:

- What are the major factors that will shape the future of work in the current century and how are those factors likely to evolve over the next 10 to 15 years?
- What are the implications of these future trends for key aspects of the future workforce and the future workplace, including the size, composition, and skills of the workforce; the nature of work and workplace arrangements; and worker compensation?

To address these questions, this book focuses on three major factors expected to shape the world of work in the coming decades: shifting demographic patterns, the pace of technological change, and the path of economic globalization.

When we have finished, we hope that current and prospective workers will benefit from an understanding of how the future world of work is likely to evolve and how they might respond in terms of investments they make in their education and training and other labor market choices. Employers can use the information in their decisionmaking regarding their business approach, investments in their employees, the nature of the employer-employee relationship, and the structure of compensation, including fringe benefits. The perspective we provide will inform policymaking at the federal, state, and local level with regard to laws and regulations that govern the workplace, the workforce, and compensation. Other interested parties include decisionmakers at public and private education and training institutions that contribute to the skills and knowledge development of current and future workers.

We seek to provide an assessment based on relevant data and research. Our focus is on a medium-term horizon—10 to 15 years—and a broad-brush perspective on the trends that are likely to shape the future. We are less concerned about the inevitable ups and downs of the business cycle as that future unfolds. Even aside from such fluctuations, the future is difficult to predict. Some developments can be foreseen with more confidence than others. In demographics, for example, the composition of the future population, outside of immigration patterns, is well defined for our time horizon because future cohorts of adults are today's children and youth. However, more uncertainty will be associated with the path of other forces.

In the remainder of this chapter we set the stage for our analysis of the forces shaping the future world of work in the United States. We begin by identifying some of the challenges associated with anticipating the future direction and implications of such complex systems as the U.S. labor market. We then outline a conceptual framework that guides our analysis, particularly our focus on the three key forces: demographics, technology, and globalization.

## THE CHALLENGES OF LOOKING TO THE FUTURE

Efforts to anticipate the course of future events range from simple extrapolation of existing trends to wishful thinking. One of the earliest systematic efforts to anticipate the future that lay ahead was the Commission on the Year 2000 established in the late 1960s under the auspices of the American Academy of Arts and Sciences. The seminal volume published by the Commission in 1967, *Toward the Year 2000: Work in Progress*, has been viewed as the forerunner of what would become the field of futurism (Bell and Graubard, 1967). Rather than setting out to *predict* the future, the contributors to the Commission aimed to identify the *structural changes* under way and the issues they raised and challenges they posed for society (Bell and Graubard, 1997). Actual predictions were viewed as less relevant, given the complexity of the interrelated systems of interest and the potential for behavioral responses to forces that might not be anticipated. History is also often marked by important unforeseen turning points—the assassination of Archduke Franz Ferdinand in 1914, for example—that in turn set in motion other events that could not have been predicted. Thus, *Toward the Year 2000* did not feature findings but conjectures on possible future courses.

Among the conjectures, many were prescient. Although the commission did not focus explicitly on the world of work, their deliberations anticipated the continued emergence of a postindustrial society and the associated changes in the structure of industry and occupations. They also anticipated the communications revolution and the associated growth of a national information infrastructure. The changing age distribution of the population was highlighted, as well as the growing importance of education. The rise of biology, including genetic engineering, within the sciences was also anticipated. Looking back with 30 years of hindsight, the original editors of the commission report note with regret their most serious omission: the failure to anticipate the changing role of women in the economy and society (Bell and Graubard, 1997). Another omission was the lack of focus on the role of minorities and the persistence of economic disparities across groups. The editors note the latter oversight may have been due to optimism that minorities would be integrated into society in much the same way as past waves of immigrants. Finally, the

growing interconnectedness of economies and societies around the world was underappreciated.

Two other studies speak more directly to the subject matter of this book. In 1987, the Hudson Institute published *Workforce 2000*, a study commissioned by then Secretary of Labor William E. Brock to provide “basic intelligence on the job market” in order to evaluate then existing policies and for undertaking new initiatives (Johnston and Packer, 1987). Based on analysis of trends and forecasts using an econometric model, the study reached four central conclusions:

- Economic growth would be strong, propelled by exports, a strong world economy, and rising productivity.
- Manufacturing’s share of employment would continue to decline, with most new job creation in the services sector.
- The workforce would become steadily older, more female, and include more minorities.
- New jobs in the services sector would require a more highly skilled workforce.

By and large, these predictions held up, along with some of the other findings of the study. Perhaps the greatest oversight was the lack of attention to the information technology (IT) revolution, although in 1987, personal computers (PCs) were just starting to penetrate the workplace.

A decade later, the Hudson Institute published a follow-up volume to the original study titled *Workforce 2020* (Judy and D’Amico, 1997). Like the first study, this follow-up analysis continues to emphasize the aging of the workforce, along with the increased share of the future workforce that will be made up of females and minorities. The study projects that automation, as a result of accelerating technological change, will continue to displace unskilled and lower-skilled workers, although technology is expected to create more jobs than it destroys. The greater integration of the U.S. economy with the rest of the world is highlighted as well, with implications that include a high reliance of the manufacturing sector on exports and a shrinking, but higher-skilled, employment base in manufacturing. The combination of globalization and technological change is expected to increase

volatility in product and services markets, as well as their associated labor markets, implying, for example, more frequent job changes. While it is too soon to grade these forecasts with respect to eventual outcomes, many of the same themes emerge from our analysis based on more recent data.

Like the Commission on the Year 2000, we seek in this book to identify the underlying structural forces likely to shape the future world of work. The next section provides our underlying conceptual framework that links the roles of demographics, technology, and globalization to the key labor market outcomes of interest:

- Who will be working and what skills they will they bring to the labor market.
- The types of jobs the future workforce will fill and the type of work arrangements future workers will make.
- How much workers will earn and how their compensation will be structured in terms of wages and such employment benefits as health insurance, pensions, and other benefits.

In general, our objective is neither to provide future estimates of the number of workers in a given industry or occupation nor to pinpoint the expected growth rate in real wages or the future level of wage dispersion. Rather, we seek to understand key structural trends under way in the economy today, the factors associated with those trends, and whether we can expect such trends to continue or to deviate from their present course. We also aim to identify the implications of the trends and the challenges they pose for decision-makers in the public and private sectors. In some cases, our inferences will be more speculative because future outcomes are not predetermined. They depend not only on the future evolution of key forces but also on how behavior might change in response to those forces. Unanticipated events and the uncertain timing of business cycle upturns and downturns further complicate efforts to forecast even broad trends with certainty.

In some cases, we will draw on existing forecasts of future economic outcomes to illustrate the likely trend in the outcome, given the best available forecasts. However, all such forecasts are inherently limited

in that they do not typically anticipate the ways in which economic actors—consumers, workers, firms—may respond to shifts in economic forces and other social, political, or cultural phenomena. For example, future projections of the wage premiums offered to highly skilled workers assume that technological change will continue its rapid pace and that workers' educational attainment will increase only modestly, as it has in the recent past. Instead, it is possible that young people will anticipate the increasingly large rewards to skills and respond by seeking more education. This would change the relative supply of highly skilled workers and reduce future wage disparities.

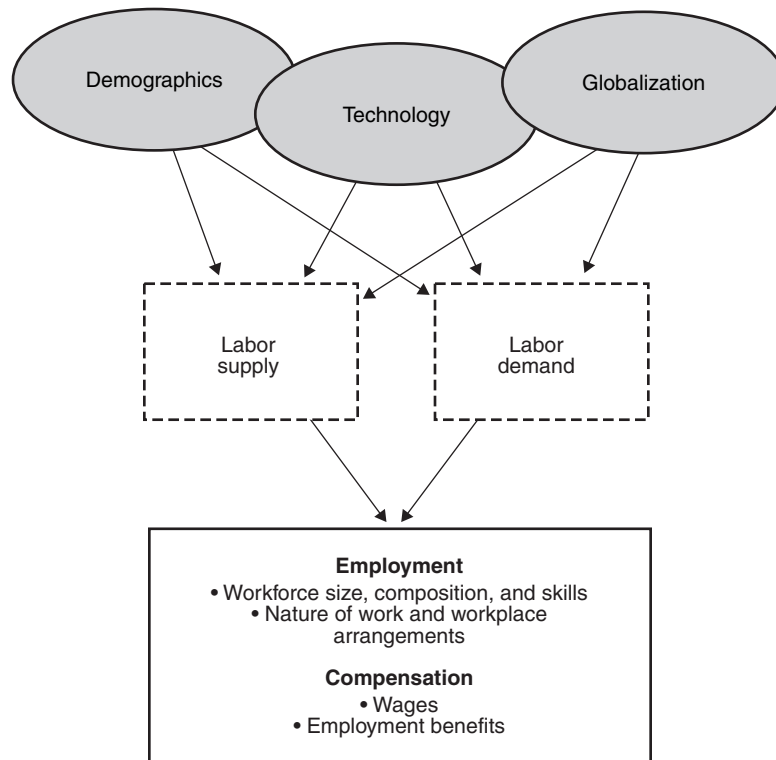
As another example, forecasts of the future labor force may assume that older workers will retire at the same rate at each age as they do today. Instead, it is possible that older workers may choose to extend their careers in the future in response to other external forces, such as improving health and longevity or changes in such social insurance programs as Social Security. Nevertheless, it can be useful to present relatively naive forecasts, so that policymakers, employers, and future workers can prepare and benefit from upcoming opportunities. At the same time, we exercise caution in placing too much weight on mechanical forecasts, especially when we can identify important changes under way that would induce behavioral responses.

## A GUIDING FRAMEWORK

In undertaking our analysis of the forces that are likely to shape the future of work in the United States, we are guided by the conceptual framework illustrated in Figure 1.1. Our ultimate interest is in understanding the outcomes of the labor market (bulleted above and shown in the box at the bottom of the figure).

To address these labor market outcomes, we first require an understanding of the forces that will shape them—the subject of our first question on p. 1. In seeking to answer this question, we adopt an economic perspective that views the labor market outcomes in the bottom half of the figure as determined by labor supply and demand.

RANDMG164-1.1



**Figure 1.1—Conceptual Framework**

By labor supply, we mean those willing and available to work, how much they can work, and what skills they bring to the labor market. By labor demand, we mean the number of jobs employers seek to fill, and the associated skill requirements, to produce the goods and services demanded. In such a market, following the neoclassical economic tradition, compensation is assumed to adjust to balance supply and demand. This will occur separately for each type of labor—both more- and less-skilled workers—to adjust both the demand for each type of labor and the relative demand for different types of labor. Finally, compensation should be viewed broadly. Firms compensate workers in the form of cash wages, noncash benefits (e.g., pensions, health insurance), and working conditions (e.g., flex time,



attractive work sites). Workers and firms may negotiate a varying mix of wages, benefits, and working conditions in the compensation package. For example, working parents may prefer greater scheduling flexibility in exchange for lower cash wages. While this is a simplistic view of how labor markets actually operate, given various deviations from the assumptions that underlie the neoclassical model, it nevertheless provides a useful framework.

The key then is understanding which factors are likely to shift underlying supply and demand in the U.S. labor market in the coming years. We view three key forces as important drivers of future outcomes in the U.S. labor market through their effect on the supply and demand for labor (shown in the ellipses at the top of the figure): demographics, technology, and globalization.

The demographic force encompasses the manner in which births, deaths, and net migration determine the size and composition of the U.S. population. The total supply of labor is obtained by multiplying the population by the labor force participation rate, the percentage of the population working or actively looking for work. Labor force participation is determined by, among other factors, people's health, family structure, and nonlabor income (Blundell and Macurdy, 1999). The labor supply can be broken down demographically by considering the population and labor force participation rate specific to people of the same sex, age, race and ethnicity, marital status and family composition, country of birth, and education. In addition to affecting the available supply of workers, demographic factors also influence the demand side of the labor market. The mix of jobs employers seek to fill by industry and occupation is derived from the underlying demand for goods and services, either for consumption by U.S. residents or, through export, by populations in other countries. To the extent that consumption needs vary with different characteristics of the U.S. population or populations abroad, demographic factors can influence the types of jobs required. For example, older individuals consume more health care goods and services than younger individuals do. Thus, if the population composition becomes older, that will increase the demand for physicians, nurses, home health care workers, pharmaceuticals, medical devices, and so on.

The force of technology captures the ongoing, and by all evidence accelerating, process of technological innovation across a wide range of applications that can influence the world of work. Like the demographic force, technology affects both the demand and supply side of the labor market. New technologies may generate new products that give rise to new industries and occupations. The invention of the PC, for instance, generated an entire new industry dedicated to its production and the associated occupations required to create software and install, service, and repair the machines. New technologies may also change the process of producing goods and services in new and in established industries and thus alter the nature of work and worker productivity. Again, the incorporation of the PC and micro-processors more generally into machine tools and office processes has fundamentally altered a wide array of manufacturing processes and services-sector occupations, shaping how and where work is performed. The supply side of the labor market can also be affected by technological change. For instance, medical advances may improve the physical and mental functioning of individuals with disabilities or individuals as they age, thereby affecting who is available for work. Technology may also alter the process of workforce preparation in secondary and postsecondary education, as well as the ability of older workers to retrain, thereby altering the mix of skills in the workforce.

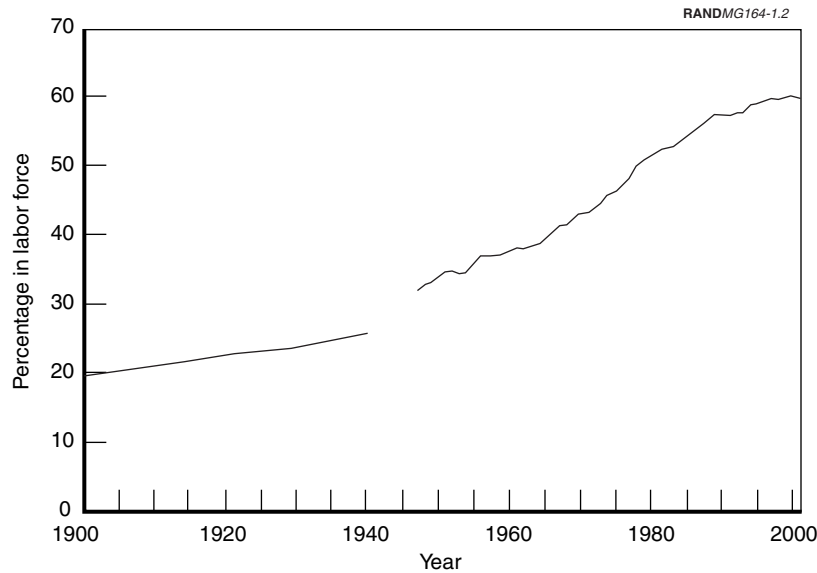
Finally, the force of globalization represents the economic integration of the U.S. economy with those of the rest of the world in terms of trade, capital flows, labor mobility, and knowledge transfers. As the U.S. economy becomes more integrated with others, the markets for goods and services and even the market for labor become global rather than domestic. Thus, the demand for labor is driven not only by domestic demand but by world demand for U.S. goods and services. Just as U.S. firms compete in a global marketplace, U.S. workers increasingly compete with workers in other countries as employers make decisions, on the basis of labor and other cost differentials, whether to locate production facilities in the United States or overseas.

As Figure 1.1 is drawn, the three ellipses representing the forces of demographics, technology, and globalization overlap to indicate that in many ways, these factors are not acting independently but are interacting with one another. As we detail in our analysis, for exam-

ple, the process of economic integration across the world's economies is driven by technological innovations that are reducing the cost and raising the speed of communications and transmission of data and information. In turn, the competitive pressures brought about by a more open economy stimulate further technological innovation and more rapid adoption of new technologies. In many respects, these interactive effects across the forces we focus on make them even more powerful than if they were operating independently.

Our focus on demographics, technology, and globalization as major drivers of future labor market trends is consistent with the important role that these forces have played in shaping the world of work in the twentieth century as well. For example, one of the salient changes in the demographic composition of the labor force in the last century was the substantial rise in the rate of labor force participation among women. Figure 1.2 illustrates this trend from 1900 to 2002. At the turn of the last century, only about one in five U.S. women worked for pay in the labor market. By 2002, that fraction had tripled to three in five women. The rate of increase was markedly faster from about 1960 to the late 1980s, when the rate advanced almost 2 percent per year, more than three times the rate of increase for the early part of the century or of the 1990s. The transformation in women's paid work is even more dramatic among married women. For example, just 6 in 100 married women worked in paid employment as of 1900 in contrast to 61 in 100 a century later (Goldin, 1990; U.S. Bureau of Census, 2002c). In the Chapter Two, we consider not only the role of women in the labor market but a number of other aspects of population growth and change that will influence the labor market over the next several decades. We show that the U.S. workforce will continue to increase in size, but at a considerably slower rate, while the composition will shift toward a more balanced distribution by age, sex, and race/ethnicity. Slower workforce growth may make it more difficult for firms to recruit workers during periods of strong economic growth, although greater participation in the workforce by the elderly, women with children, persons with disabilities, and other groups with relatively low labor force participation could cause the workforce to grow faster.

The twentieth century was also marked by a revolution in technology that has transformed the economy from the industrial age to the

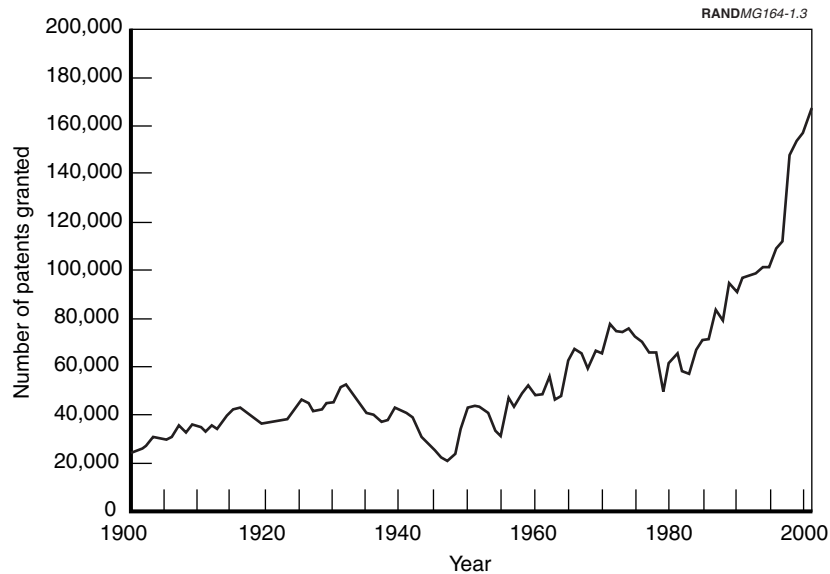


SOURCE: 1900–1954: U.S. Bureau of Census (1975), Series D29-41; 1955–2002: CEA (2003), Table B-39.

NOTE: Participation rates for 1900–1940 are for women age 14 and above. Participation rates for 1947 onward are for women age 16 and above.

**Figure 1.2—Female Labor Force Participation Rate, 1900–2002**

information age. As an illustration of the remarkable pace of change in the past century, Figure 1.3 charts the rapid rise in the number of U.S. patents granted since the middle of the last century. While the number of patents granted has oscillated somewhat, there has been a rapid pace of growth in patent awards since the late 1940s and what appears to be an acceleration of the upward trend since the mid-1990s. These patents capture everything from advances in telecommunications to the introduction and evolution of computing hardware and software to the revolution in biotechnology. These past and future trends in technological change are the subject of Chapter Three. There, we describe how trends in IT, biotechnology, and nanotechnology have led experts to conclude that the pace of technological change will almost certainly accelerate in the next 10 to 15 years. Synergies across technologies and disciplines will generate



SOURCE: U.S. Patent and Trademark Office (2002b).

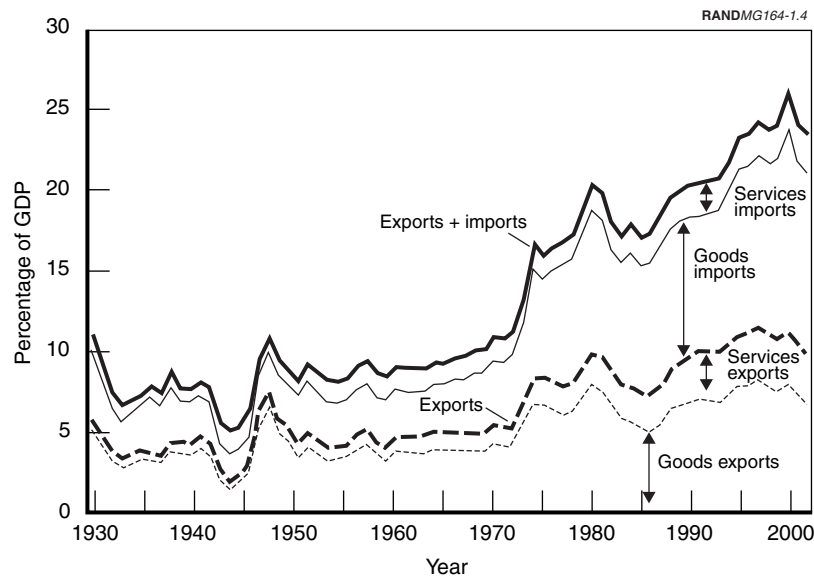
**Figure 1.3—Patents Granted, 1900–2001**

advances in research and development (R&D), production processes, and the nature of products and services, with wide-ranging implications for the workforce and workplace.

Another marked change in the past half-century was the increased integration of the U.S. economy with the rest of the world. Although the U.S. economy experienced considerable trade and capital flows in the early part of the twentieth century, protectionist pressures and other factors substantially dampened the importance of those flows within the U.S. economy in the interwar period. However, the U.S. emerged from World War II on a path toward greater openness. Figure 1.4 illustrates this trend with respect to trade in goods and services. As a share of gross domestic product (GDP, a measure of economic activity), exports and imports combined have climbed from about 10 percent of GDP in the late 1940s to 26 percent at the peak in 2000. Expanded trade has come through growth in both exports and imports, although since 1976 the U.S. trade account has been in deficit as exports have been smaller than imports. While the bulk of

U.S. trading activities in goods, trade in services, especially exports, has been growing in importance over time. We address the extent and nature of globalization and its implications for the labor market in Chapter Four. The central lesson we infer is that globalization will continue its record to date of contributing economic benefits in the aggregate. Although market share and jobs will be lost in some economic sectors with short-term and longer-term consequences for affected workers, the job losses will be balanced by employment gains in other sectors. The future reach of global competition will be even more expansive than before, affecting industries and segments of the workforce relatively insulated from trade-related competition in the past.

These patterns provide a preview of the forces that have shaped the world of work in recent decades and ones that we think will play an



SOURCE: BEA NIPA Tables, Tables 1.1 and 4.1 (<http://www.bea.gov/bea/dn/nipa/web/SelectTable.asp>).

**Figure 1.4—Exports and Imports as a Share of GDP, 1929–2002**

important role in the labor market in the next several decades as well. It is our intent that our assessment of these forces provide a framework for considering their implications for important dimensions of the workforce and the workplace. Thus, in the concluding chapter we discuss the implications for important dimensions of the workforce, workplace, and compensation that arise from the major forces shaping the world of work. Among those are the following:

- Employees will work in more decentralized, specialized firms.
- Employer-employee relationships will become less standardized and more individualized.
- Greater emphasis will be placed on retraining and lifelong learning as the U.S. workforce tries to stay competitive in the global marketplace and respond to technological changes.
- Slower labor force growth will encourage employers to accommodate women, the elderly, and persons with disabilities to increase their participation in the labor force.
- Future productivity growth will support rising wages and may affect the wage distribution. The tie between employment and access to fringe benefits will be weakened.