Chapter 1

Pursuing Growth-Enhancing Policies in Today's Changing World

Economists often tout the value of economic growth. They argue that as the size of the economic "pie"—the value of all goods and services produced in a year—increases, everyone can get a larger slice of it, making them better off. Of course, growth is not the only economic goal a society may prioritize. Many societies also have notions of fairness and justice such as lower poverty and inequality, so they are attentive to how the slices of the pie are shared. That said, sustained economic growth is an important priority for most societies and, over long swaths of history, is an indispensable driver of improvement in human well-being.

Economic growth is constrained, however, when the size of the economy reaches what economists call "potential gross domestic product (GDP)" or "capacity." An economy's long-run capacity depends on such factors as a growing and skilled labor force, high-quality physical infrastructure, and the efficiency of the production process. Actions that affect any of these factors can either constrain or enhance the capacity of the economy over time. Investing in increased economic capacity enables the economy to accommodate more demand in the medium to long run, which can make it more resilient to economic shocks and minimize the risk of inflationary episodes. The core of the Biden-Harris Administration's economic agenda is building a foundation for steady, sustainable, and shared growth by increasing economic capacity.

Over the last 50 years, the United States' social and economic context has changed, leading to both opportunities and challenges for increasing

economic capacity. This has been for a variety of reasons, but three important ones are worth noting. First, women have surpassed men in educational attainment, and they joined the labor force in historic numbers through the late 1990s, though there has been a slowdown in their labor force participation gains in recent years. Women's increased participation—and thus an increase in the size of the labor force generally—helped drive economic growth in the second half of the 20th century. At the same time, a lack of public investment in care has challenged workers, especially working women, with caregiving responsibilities.

Second, soaring carbon emissions in the second half of the 20th century have exacerbated global warming, and the resulting climate change will increasingly become a barrier to economic growth without effective adaptation. Interrelated with the climate crisis, the damage to ecosystems continues to accelerate, creating significant risks for businesses and the wider economy (World Economic Forum 2020).

Third, computers have entered virtually all aspects of life and can now perform tasks that previously were thought not able to be automated. The Internet has changed how people find information, learn, do business, and communicate with one another. These changes have spurred growth and helped some industries weather economic shocks like the COVID-19 pandemic better than they otherwise would have. But they have also raised important issues about how established economic policy can and should adapt to the new digital world.

To expand the potential growth of the U.S. economy, policymakers need to adjust how the Nation invests in response to these kinds of changes. This year's *Report* highlights selected areas where the changing economic and social context calls for a new approach to increasing the capacity for economic growth. The *Report* discusses how the relevant context in these areas has changed, analyzes pressing current challenges to sustained economic growth, and highlights potential strategies to confront these challenges.

Investing in Production Drives Economic Growth

The inputs to sustained economic growth can be understood through the lens of an aggregate production function, which is explained in box 1-1. According to such a function, an economy's output depends on its stock of human and physical capital as well as on a productivity factor that summarizes how efficiently workers, machines, and other types of inputs are put to use. Thus, sustained output growth relies on continuing private and public investments in the economy's workforce, physical capital, and productivity (Mankiw 2010).

In general, well-functioning markets incentivize households and firms to make investments that expand the economy, even when these households and firms do not have the larger economy in mind as they make their individual decisions. For example, a high school graduate who anticipates enhanced career opportunities from attaining a higher degree will likely pursue a college education. A firm that wants to grow but is having trouble hiring may invest in making its workplace more attractive to potential employees or pursue a management strategy to improve the efficiency of its existing workforce. These decisions are made independently throughout the economy without considering their effect on aggregate production, yet they jointly increase total economic capacity and growth.

Unlike the private sector, the public sector is designed to invest in the economy with explicit consideration of the aggregate context. This is reflected in the types of investments it should ideally make, many of which are aimed at markets' overall efficient functioning. The public sector operates the basic institutions that enforce the rule of law and property rights and thus enable households and firms to engage in the complex market system. It is also tasked with promoting competition and preventing socially destructive profit-seeking behavior, ensuring the stability of the financial infrastructure that greases the economy, and representing the interests of the U.S. economy in negotiating terms of trade with the rest of the world.

In addition, when the private sector underinvests, the public sector can step in to invest in human and physical capital. Private underinvestment occurs for various reasons but often entails some combination of coordination failure, externalities, and credit constraints. For example, although virtually all firms benefit directly or indirectly from having functional roads running across the United States, it would be nearly impossible for them to coordinate a plan of action to build them. Compared with what would be best for society, firms tend to underinvest in the use of clean energy because they do not bear the full burden of the cost of pollution (costs are externalized). And information asymmetries in private credit markets can make it difficult for some entrepreneurs to access funding for upfront investments

Box 1-1. What Is an Aggregate Production Function?

An "aggregate production function" summarizes the process whereby an economy transforms inputs into goods and services. Consider a tomato farmer. She needs the input of *labor*—workers—to run and maintain her farm; the input of *human capital*—the education, training, skills, health, and other valuable resources embodied in a person—to know how to plant, raise, and harvest the tomatoes; and the input of *physical capital*—raw materials like seeds, along with harvesting and hydration equipment. The farmer uses these inputs to produce tomatoes as her output. Some of these tomatoes will be sold to consumers at the grocery store or at farmers' markets as final goods; others will themselves become inputs into different products like ketchup and pizza sauce. When all the individual production functions like this farmer's are combined in an economy, the result is an *aggregate* production function, which gives the aggregate output of the entire economy resulting from all its inputs.

Aggregate output increases when there are more workers with in-demand skills, when these workers work more hours, and when they have access to more and better facilities and equipment to help them effectively perform their jobs. Physical capital also captures the broader infrastructure of roads, bridges, and broadband that allows goods, services, and information to move throughout the economy; note that this infrastructure is often public.

An economy also grows when it becomes more efficient at combining labor and capital to produce output—that is, when it can produce more output with the same amount of inputs. Economists call this "total factor productivity." In the tomato farmer example, agricultural innovations such as better farm management techniques, including crop rotation, have enabled farmers to grow tomatoes more easily.

When total factor productivity grows, output increases, even if an economy's inputs—labor, human capital, and physical capital—are kept constant, because the economy becomes more efficient at using these inputs.

Economists tend to discuss total factor productivity in shorthand as "technology"; but in reality, total factor productivity has many different drivers and constraints beyond what one might typically think of as technology. For instance, culture and norms can have a substantial impact on output (Guiso, Sapienza, and Zingales 2006). And corruption holds back economic growth not just by disincentivizing investment in human and physical capital, but also by decreasing the amount of economic growth that an economy sees from a given amount of human and physical capital (Mauro 1995).

Summarizing aggregate production as a function of physical capital, human capital, and total factor productivity is a useful abstraction that provides a framework to understand differences in economic

activity across time and countries. For certain questions, it makes sense to extend the basic model. One increasingly relevant extension is explicitly to include natural capital—the stock of water, land, air, and renewable and nonrenewable resources—as a distinct production factor in addition to built or produced physical capital. In the example given above, factors such as soil quality and quantity, climate, irrigation water, and the populations of insect pollinators provide important contributions to the tomato farmer's output production. As natural capital becomes an increasingly important driver of variation in economic activity due to climate change, more questions will benefit from a direct inclusion of natural capital. Indeed, the Biden-Harris Administration recently launched a multiyear effort to put nature on the nation's balance sheet for the first time (White House 2023).

in their businesses, even when those investments promise private and social returns in the future, resulting in credit constraints.

The United States' Economic Growth Over Time

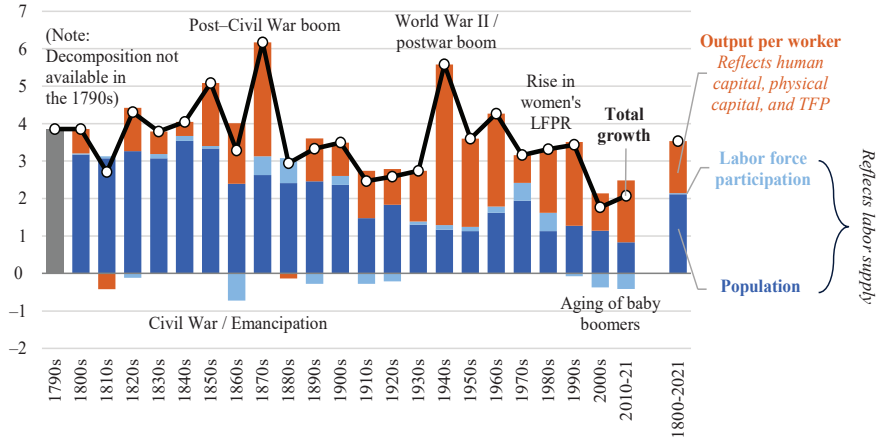
The last two centuries have seen remarkable gains in material well-being around the world, driven by rapid output growth. The United States is an excellent example of a country that has experienced this economic transformation.

Estimates of historical output suggest that in 1800, the United States was not even among the world's 10 largest economies (Groningen Growth and Development Centre, n.d.). But its rapid growth ever since—averaging about 3.5 percent a year between 1800 and 2021—has turned the United States into the world's largest economy in nominal terms. Figure 1-1 decomposes U.S. economic growth since 1800. Total output can be mechanically separated into (1) labor supply (how many workers there are)—which in turn depends both on population size and labor force participation—and (2) how much average output these workers produce. Output per worker reflects the growth drivers other than labor supply mentioned above: human capital, physical capital, and total factor productivity.

This decomposition of economic growth highlights how the relative importance of the American workforce's size versus its productivity in driving growth has changed over time. Productivity-driven economic growth is ultimately what spurs sustained growth in output per capita, which better reflects how growth translates into improved living standards for individuals. In the first half of the 19th century, aggregate growth was driven mainly by the country's increasing population and by its larger workforce. This

Figure 1-1. Average Annual U.S. Real GDP Growth since 1790, by Decade and Contributor

Percent average annual growth over the period



Sources: Weiss 1999; Lebergott 1966; Bureau of Economic Analysis; Bureau of Labor Statistics; Census Bureau; CEA calculations.
Note: LFPR = labor force participation rate; TFP = total factor productivity.

implied comparatively more limited gains in material well-being for the average person. In contrast, aggregate growth in the 20th century was driven mostly by an increasingly productive workforce and thus translated more directly into higher individual output and incomes.

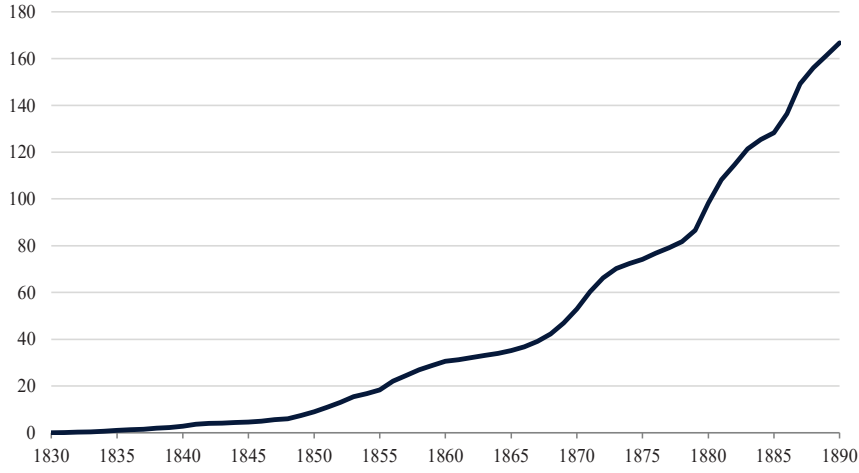
Productivity-driven output growth in the United States has been the result of private and targeted public investment in the skills of its workforce, its equipment and infrastructure, and the technologies that enable its workers to most efficiently use their skills.

Two decades in particular—the 1870s and 1940s—stand out for having the highest average growth in American history. These decades serve as case studies for some of the factors that drive economic expansion.

Economic historians sometimes mark the 1870s as the start of a period of advancement called the "Second Industrial Revolution" (e.g., DeLong 2022). Some of the investments during this decade were made to repair the infrastructure that had been damaged or destroyed during the Civil War. But investment in the 1870s went well beyond replacement. In 1860—on the eve of the Civil War—there were about 31,000 miles of railroads in operation in the United States. By 1870, this had increased to 53,000 miles; and by 1880, to 98,000 miles (see figure 1-2). In 1869, Western Union operated about 105,000 miles of telegraph wires and handled just under 8 million messages annually. Ten years later, it had doubled the mileage of its wires and was handling more than three times the number of telegraph messages (Carter et al. 2006, series Dg 9 and Dg11). And this surge in investment in the 1870s was not limited to physical infrastructure but also extended

Figure 1-2. Miles of U.S. Railroads, 1830–90

Miles operated, thousands



Source: Carter et al. 2006, series Df874.

to ideas. The United States issued roughly 72,000 patents for inventions between 1860 and 1869; the next decade, it issued about 125,000 (see figure 1-3). Moreover, the Nation's labor supply grew strongly during the 1870s: the U.S. labor force was about 35 percent larger in 1880 than it was in 1870, thanks both to natural population growth and immigration (Migration Policy Institute, n.d.). In comparison, the labor force grew by a total of 5 percent between 2011 and 2021.

The expansion of physical capital and ideas, combined with the increasing labor force, corresponded with strong growth in the 1870s and beyond.

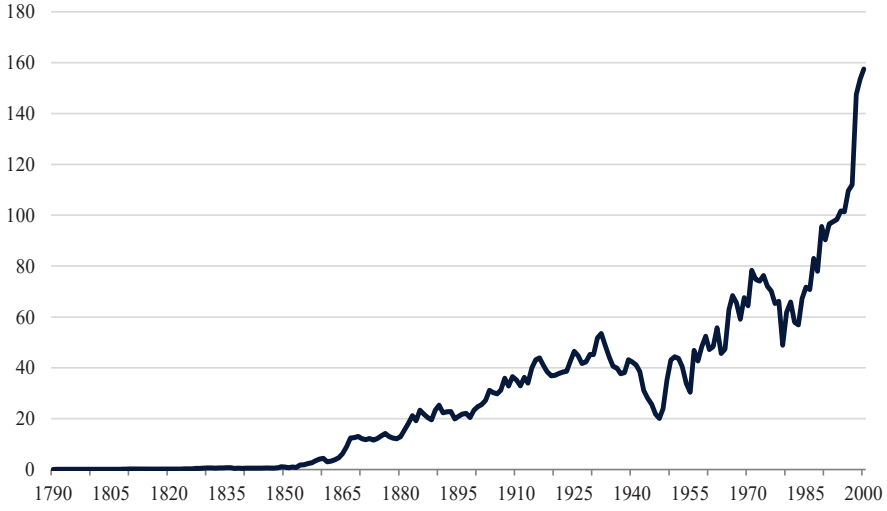
Like the 1870s, the 1940s came on the heels of a catastrophe—in this case, the Great Depression. However, growth in the 1940s was less about an increase in the labor supply, given that the labor force grew at about half the rate it did in the 1870s. Instead, growth in the 1940s was driven by a combination of public investment and greater utilization of a labor force with a high unemployment rate at the start of the decade: although unemployment had fallen substantially from its 1932 peak of 22.9 percent, in 1940 it was still at an elevated rate of 9.5 percent (Carter et al. 2006, series Ba475).[1]

The United States' entry into World War II accelerated this growth. The number of active-duty military personnel grew from just over 300,000 in 1939 to 12 million by the war's end in 1945 (National World War II

[1] This series treats workers participating in Federal emergency New Deal programs like the Works Progress Administration and Civilian Conservation Corps as "employed"; official labor market statistics, which were still in their infancy at the time, classified these workers as "unemployed."

Figure 1-3. U.S. Patents Issued, 1790–2000

Patents issued for inventions, thousands



Source: Carter et al. 2006, series Cg30.

Museum, n.d.). This mobilization, in combination with increased private hiring (driven itself in large part by wartime government orders) pushed the unemployment rate down to 1.2 percent by 1944 and expanded women's labor force participation (Acemoglu, Autor, and Lyle 2004; Carter et al. 2006, series Ba475; National Archives, n.d.).

Public investment in physical capital also skyrocketed. The Federal Government's gross investment rose from $12 billion in 1940 to $270 billion in 1944 (inflation-adjusted).[2] Growth in government consumption and investment was responsible for adding 10 percentage points to real GDP growth in 1941 and an astounding 28 percentage points in 1942 (see figure 1-4).

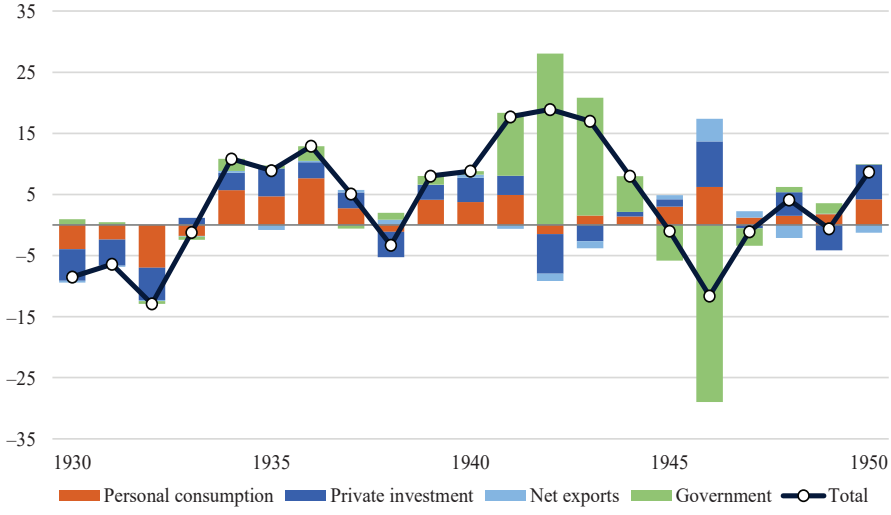
The end of the war did not mean a return to the prewar economy of the 1930s that was characterized by high unemployment and depressed output. Demobilization led to a mild recession in 1945, as the United States began shifting away from the wartime economy, and the unemployment rate crept back up in the years after the war. But it did not return to its prewar levels of 9.5 percent and above (Carter et al. 2006, series Ba475).

Even as Federal investment retreated in the years following World War II, private investment picked up. Between 1944 and 1950, real Federal defense investment fell by $257 billion (in 2021 dollars). But real private fixed investment rose by $224 billion over that same period, and real personal consumption was $444 billion higher. Indeed, increased private

[2] This is measured in inflation-adjusted 2021 dollars.

Figure 1-4. Contributors to U.S. Real GDP Growth, 1930–50

Percentage points, annual real GDP growth



Source: Bureau of Economic Analysis.

investment and consumption were even able to substantially offset the massive 29-percentage-point deduction to GDP growth from the postwar demobilization in 1946 (see figure 1-4). Government investments during World War II helped pave the way for private investments that sustained renewed economic growth throughout the latter half of the 20th century (Goodwin 2001).

The Inputs to U.S. Economic Growth Over Time

The economic growth of the United States over the last two centuries would not have happened without investments in the labor force, the physical capital stock, and total factor productivity. The previous pages of this section discussed what some of these investments looked like during two key rapid-growth decades: after the Civil War, and around World War II. This subsection steps back and considers each of these factors over a wider span of American history, highlighting key public and private investments for each one and discussing selected available measures of how they have evolved over time.

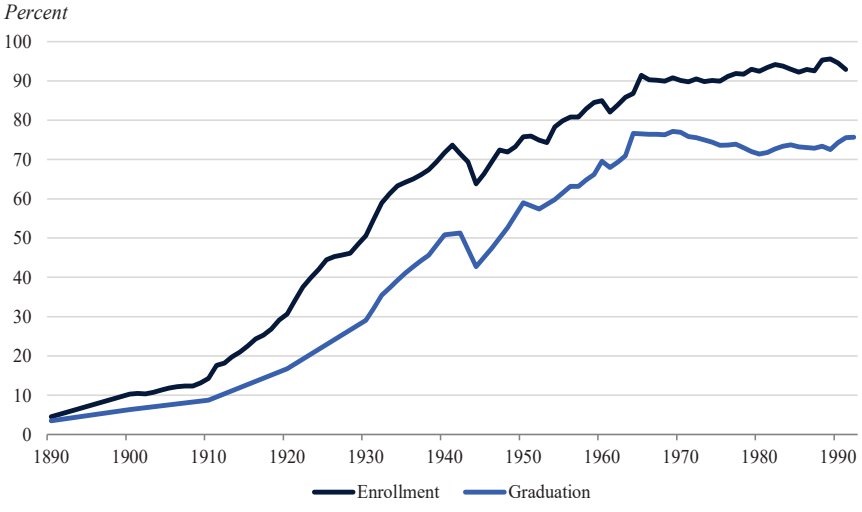
The labor force. Over the past 200 years, both public and private actors have invested in the skills and size of the labor force. Consider the key input of education. For centuries, the United States has been a world leader in public education. Beginning in the 1700s, American communities began to establish publicly funded or free schools, along with land grants

to support the creation and maintenance of schools (Kober and Rentner 2020). Over time, an array of private and nonprofit institutions—including private schools, universities, and vocational training programs—have also become integral to the U.S. educational landscape. Investments in education transformed the skills of American workers. In the first several decades of the 20th century, the United States underwent what is now termed the "high school movement" (see figure 1-5); between 1910 and 1940, the share of those age 18 years with a high school diploma (from a private or public institution) rose by over 40 percentage points (Goldin and Katz 2009). However, progress has at times been uneven; segregation and other forms of race and gender discrimination in the education system have presented barriers to educational attainment for women and people of color.

The U.S. labor force has also grown—from roughly 1.5 million workers in 1800 to over 160 million today—with particularly rapid growth in the second half of the 20th century, although there has been a gradual decline in the growth rate since the 1980s (see figure 1-6).

The physical capital stock. Investment has also focused on physical capital and productivity. This has included investments by the public sector, such as under the Rural Electrification Act of 1936, which provided loans to farmers and investors to expand electricity to rural communities, with remarkable results, as depicted in figure 1-7 (Sablik 2020). Later in the 20th century, the United States built out the Interstate Highway System, which is often described as one of the greatest public works projects in history

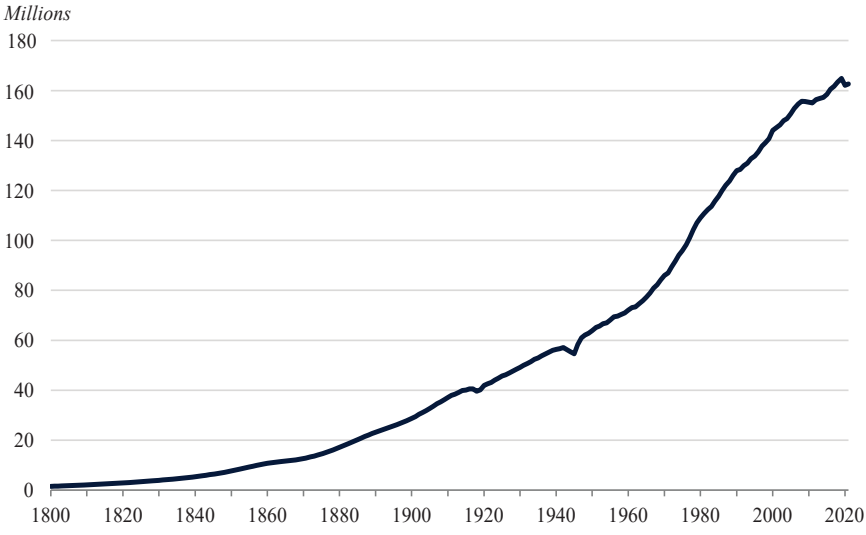
Figure 1-5. U.S. Secondary School Enrollment and Graduation Rates, 1890–1991



Sources: U.S. Department of Education; Goldin and Katz 2009; CEA calculations.
Note: Graduation data were reported every 10 years before 1930; some years are missing after 1930.

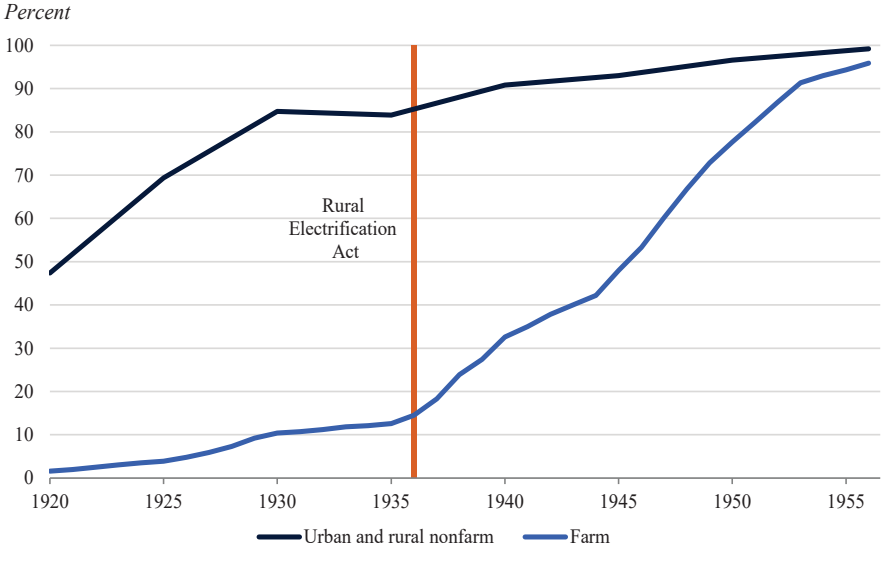
(Capka 2006; Pfeiffer 2006). In parallel with the public sector's investments, the private sector has invested in physical capital, such as by constructing

Figure 1-6. The U.S. Labor Force, 1800–2021



Sources: Weiss 1999; Carter et al. 2006, series ba1-10; Census Bureau; Bureau of Labor Statistics; CEA calculations.

Figure 1-7. U.S. Residences with Electricity, 1920–56



Sources: U.S. Census Bureau 1975, table S 108-119; Sablik 2020.
Note: Data on the percentage of dwelling units with electric service in urban and rural nonfarm settings are only available every five years.

factories, farms, and office buildings—in 2021, gross private domestic investment exceeded $4 trillion (FRED 2022).

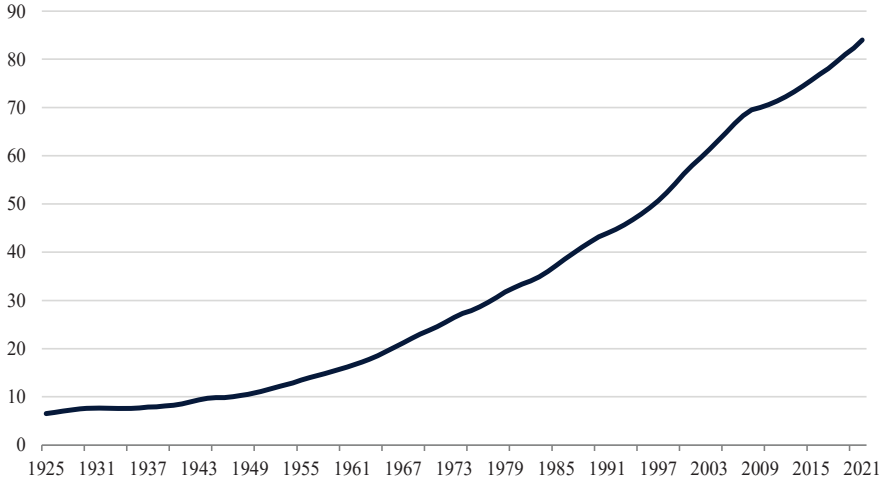
Public and private investments have combined to facilitate the continued growth of the Nation's capital stock over the past century, as highlighted in figure 1-8. (The capital stock includes physical capital, ranging from trucks to houses to software to roads.)

Total factor productivity. As discussed above, total factor productivity is the most amorphous input into economic growth. It captures many aspects, from technological innovation to the quality of institutions that promote competition and the efficient allocation of scarce resources.

Consequently, historical public and private investment in total factor productivity is multifaceted and not always straightforward to measure. For example, one paper estimates that between 20 and 40 percent of growth in aggregate output per person in the United States between 1960 and 2010 can be explained by improved talent allocation brought on by reduced discrimination and changing preferences among Black and white women and Black men (Hsieh et al. 2019). The Civil Rights Act of 1964 likely contributed to this reduced discrimination and thus, in addition to rectifying long-standing injustices, it functioned as an investment in the economy. But this type of investment is difficult to quantify, given that it is concurrent with broader social change.

Figure 1-8. U.S. Capital Stock, 1925–2021

Trillions of 2021 dollars



Sources: Bureau of Economic Analysis; CEA calculations.

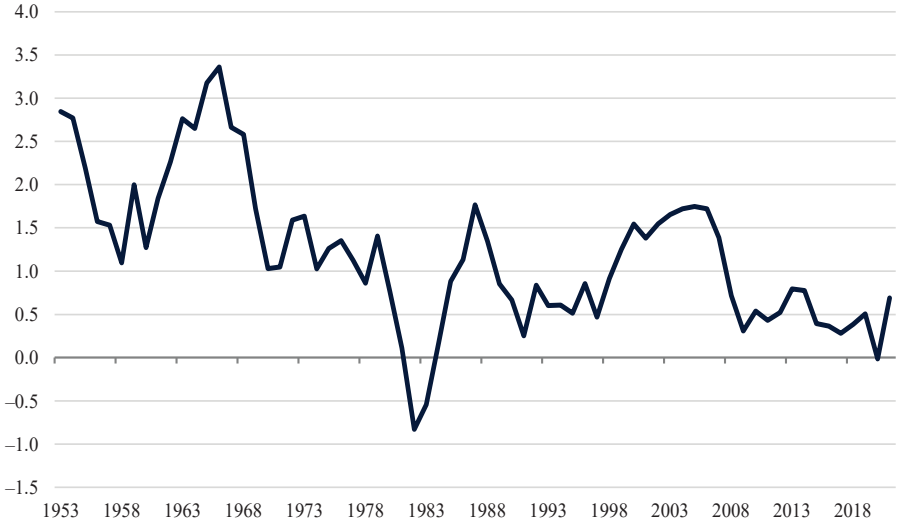
Other forms of investment are more tangible, such as investments in research and development. The United States is consistently one of the top spenders on research and development (OECD 2022a). The majority of this spending comes from the private sector, but the public sector also plays an important role, especially in funding basic research (Burke, Okrent, and Hale 2022).

The information technology revolution exemplifies the complementary roles of public and private investment in the economy. The government played an essential role in developing groundbreaking technologies, such as the Internet and the Global Positioning System. These early-stage investments were arguably too risky for any private firm to undertake (Mazzucato 2013). But it was the private sector that transformed these base technologies into the market-oriented ones that have shaped the way people work and live. Unlike the number of workers or the stock of physical capital, the return on these investments cannot be measured directly. However, economists can infer that total factor productivity is changing when total output changes more or less than would be expected based on observed changes in the labor force and the physical capital stock. That is, a greater-than-expected increase in total output suggests that total factor productivity has increased, whereas a smaller-than-expected increase suggests that it has decreased.

Figure 1-9 shows total factor productivity growth in the United States since 1953. In the short term, productivity growth fluctuates considerably,

Figure 1-9. Total Factor Productivity Growth, 1953–2021

Percent annual growth, five-year moving average



Source: Bureau of Labor Statistics.

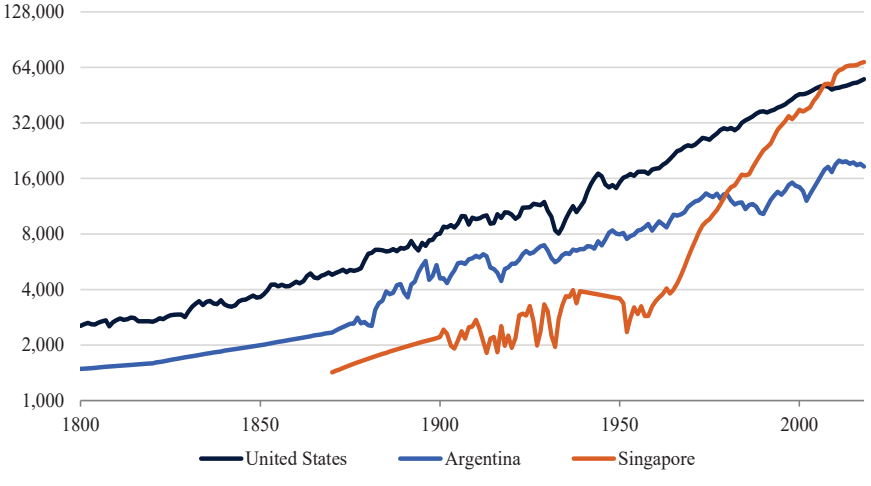
partly because it can only be inferred from other measurements. Still, there are some notable trends over time. The postwar decades were marked by relatively high productivity growth, before a notable slowdown in the 1970s and through the mid-1990s. Productivity growth picked up again into the 2000s, but it fell during the Great Recession. The decade of slow productivity growth in the 2010s was common to most advanced economies, and it is still not fully understood (Dieppe 2020).

U.S. Economic Growth in Context

Although economic growth in the United States over the past 200 years has led to enormous gains in material well-being and life expectancy, and has given the United States an economic and political leadership role on the global stage, it cannot be taken for granted. For example, in the 1800s, the United States' GDP per capita was about 70 percent larger than that of Argentina. But faster average U.S. GDP growth starting in the second half of the 20th century caused the two countries to diverge further, and today U.S. GDP per capita is about three times as large as Argentina's (figure 1-10). Singapore, conversely, experienced slower growth for much of the 20th century before growing rapidly—more quickly than the United States—beginning in the 1960s; the country's GDP per capita is now above that of the United States.

Figure 1-10. GDP per Capita for the United States, Argentina, and Singapore, 1800–2018

Log scale, real GDP per capita, 2011 dollars



Source: Groningen Growth and Development Centre, n.d.
Note: Missing values are interpolated.

Economies have diverged widely in modern history, and though there have been various factors in this divergence, both public and private institutions—and economic policies—are a central part of the story. Indeed, Argentina and Singapore are telling case studies in this regard. The Argentine economy accelerated in the late 1800s thanks to immigration, exports, and foreign investment. However, productivity and economic growth in the country stagnated in the 20th century in the context of the Great Depression and political instability, beginning with the military coup in 1930 (Spruk 2019). Singapore's economic growth, conversely, is generally considered an example of successful economic policy. The rapid rise of Singapore and the other "East Asian Tigers" has been attributed to a set of common, market-friendly economic policies that targeted macroeconomic stability, public infrastructure and education, and export orientation (World Bank 1993; Lee 2019).

Sustaining Economic Growth in Today's Changing World

The preceding discussion highlighted the importance of past and continued private and public investments in the U.S. economy. Many of these historical investments remain relevant today. The Nation must continue to make investments to ensure access to high-quality education, from childhood through adulthood; to maintain its physical infrastructure; and to ensure that markets remain fair and competitive.

However, these investments are not being made in a vacuum. They are influenced by changes in society and the economy that have an impact on the need for, and value of, different kinds of investments—in human and physical capital, as well as in total factor productivity. Sometimes the private sector adapts quickly and well to these changes; other times, the public sector needs to spur private investment and provide the necessary guardrails to protect individuals and the U.S. economic system.

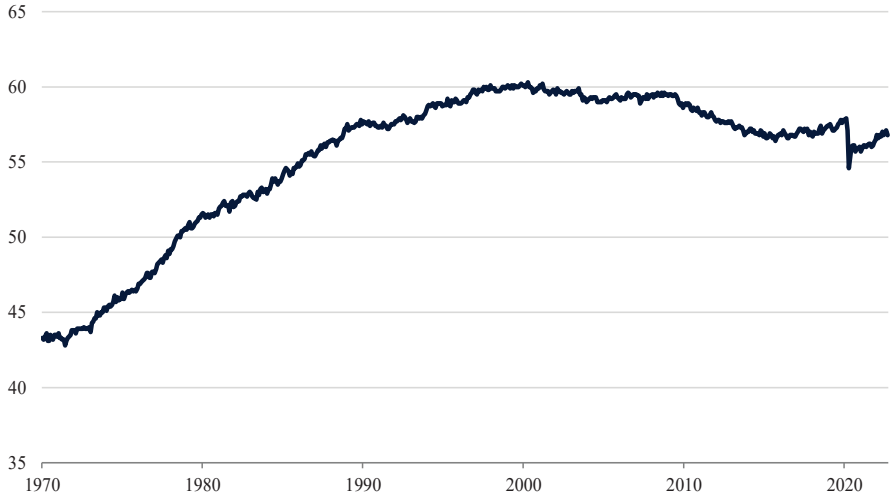
Investing in Human Capital and the Labor Supply: Implications of More Women Participating in the Labor Force

Millions of American women entered the labor force in the latter half of the 20th century—with substantial implications for society, economic growth, and public policy. Between 1970 and 2000, U.S. women's labor force participation rose from roughly 43 percent to 60 percent (figure 1-11). Although this overall trend masks important differences in levels of participation by dimensions such as race, age, income, and family status, virtually all groups of women saw large participation gains over these decades.

This period has been termed the "Quiet Revolution" by the economist Claudia Goldin, who has identified turning points in the late 1960s and early

Figure 1-11. Women's Labor Force Participation Rate, 1970–2022

Percent



Source: Bureau of Labor Statistics.

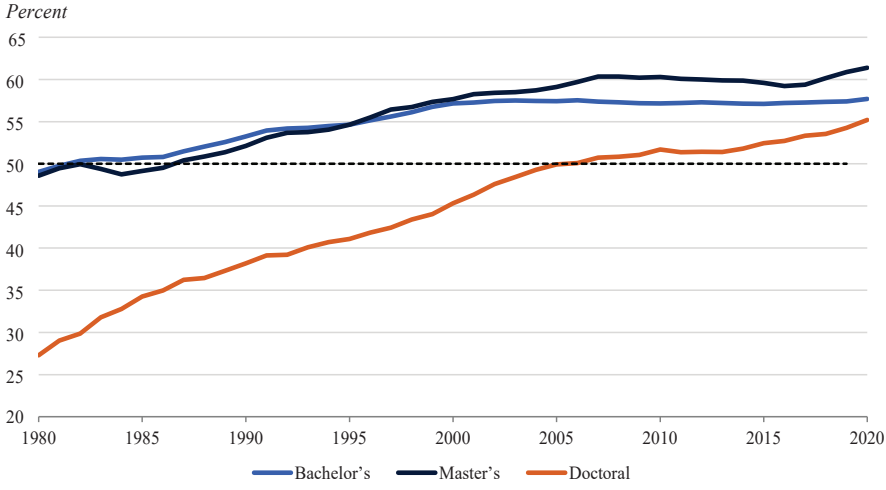
1970s in the marriage age, college graduation rate, and extent of professional school enrollment for women—along with the gradual lifting of some discriminatory barriers for women, shifts in social norms for women's family and career decisions, and factors accounting for women's life satisfaction (Goldin 2006). Thus, Goldin attributes the increase in women's labor force participation to many factors, such as reduced labor market discrimination against women and women's increased choice in making reproductive decisions through the invention, dissemination, and legalization of the birth control pill.

In addition to women's labor force participation, women's educational attainment increased drastically relative to men's. Today, women earn the majority of bachelor's, master's, and doctoral degrees (figure 1-12).

The economic consequences of these trends are significant. Using a methodology similar to the one used in the 2015 *Economic Report of the President*, updated CEA calculations indicate that the U.S. economy was almost 10 percent larger in 2019 than it would have been without the increase in women's employment and hours worked from 1970 to 2019 (Council of Economic Advisers 2015).

However, starting in about 2000, women's labor force participation plateaued and began to decline. Men for their part have also seen a multidecade decline in participation, although they continue to participate at a higher rate than women. Removing barriers to women's and men's participation and educational attainment would ease labor constraints on firms

Figure 1-12. Percentage of Postsecondary Degrees Received by Women, 1980–2020



Source: U.S. Department of Education, National Center for Education Statistics.
Note: The dashed line indicates 50 percent. Doctoral degrees include all doctoral degrees, including M.D., J.D., and Ph.D.

that want to open or expand, boost long-run economic growth, and increase prosperity.

One factor affecting labor force participation, particularly for women, is household, community, and care responsibilities. Before entering the labor force in large numbers, women had long provided a large share of unpaid work in their homes and communities, including household maintenance tasks, raising children, caring for elder family members, and volunteering for community projects—work typically not captured in economic measures like GDP. Today, women working outside the home continue to disproportionately undertake these tasks; one recent study found that in heterosexual marriages, even when women's wages are more than double those of their spouses, women do 44 percent more household work (Siminski and Yetsenga 2022).

At the same time, in recent decades, the aging of the so-called baby boom generation (people born roughly between 1946 and 1964) and reduced fertility rates have increased the demand for senior care while constraining the supply of younger workers. The ratio of people age 65 and above to the number of people age 16 to 64, sometimes called the old-age dependency ratio, has more than doubled during the past seven decades. This has contributed to increased demand for care from adult children, creating the so-called sandwich generation of people who have care responsibilities for both older

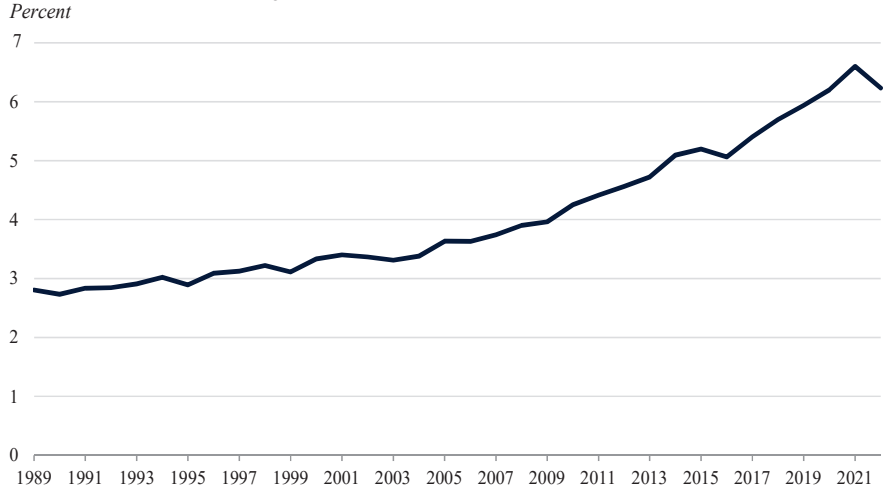
and younger family members (figure 1-13). In 2017 and 2018, more than 8 million parents of children under 18 also provided senior care, including nearly 5 million mothers (BLS 2019).

Women's shift into the labor force and demographic changes were associated with an increased demand for paid workers to provide what was previously unpaid labor, particularly caring for young children and older or disabled adults (figure 1-14). These care workers are often paid very low wages and are disproportionately women, particularly women of color.

To meet care needs, in recent years, multiple States and cities have passed legislation to provide paid family and medical leave for workers (National Partnership 2022). Additionally, private firms have increasingly provided paid family and medical leave, remote work adjustments, and other benefits to help workers balance their care and work responsibilities (figure 1-15). However, the lack of a national paid family and medical leave program, of adequate affordable child care, and of Federal labor laws to guarantee flexibilities for workers with care responsibilities has limited the ability for caregivers, especially women, to remain in the labor force.

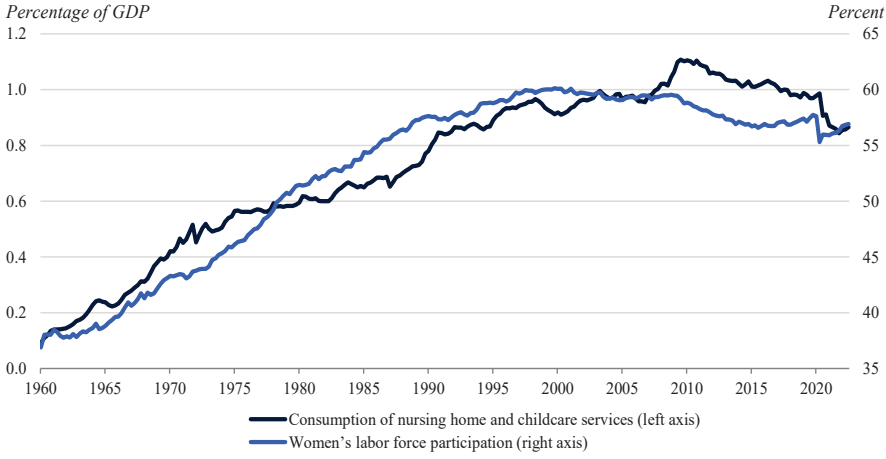
The actions of the private sector have not been enough to meet the scale of the problem. Inequality in who has access to these benefits means that workers in the top 10 percent of the wage distribution are nearly eight times as likely as the lowest-paid workers to have access to paid family leave and more than four times as likely to have access to childcare through their work (BLS 2022a). Low-wage and hourly workers can particularly struggle to

Figure 1-13. Percentage of Households with a Child under 18 That Have an Adult over Age 65 Years, 1989–2021



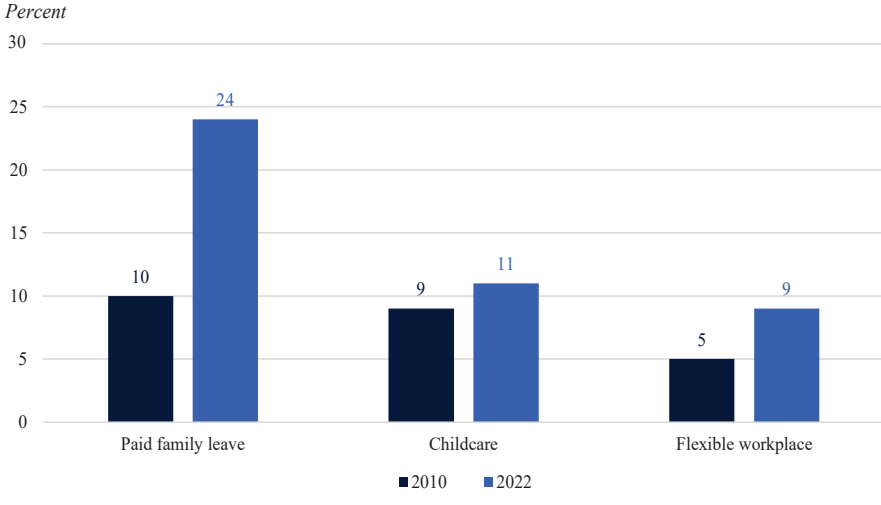
Sources: Current Population Survey; CEA calculations.

Figure 1-14. Consumption of Nursing Home and Childcare Services and Women's Labor Force Participation, 1960–2022



Sources: Bureau of Economic Analysis; Bureau of Labor Statistics; CEA calculations.

Figure 1-15. Share of Private Industry Workers with Access to Benefits



Source: Bureau of Labor Statistics.

manage work and care responsibilities due to limited workplace flexibilities, such as fair and predictable scheduling. Although data are limited, evidence suggests that the market and public sector underprovide both childcare and senior care. For example, the CEA's analysis of the 2019 National Survey of Early Care and Education indicates that nearly three-quarters of childcare centers are experiencing excess demand (i.e., have a waiting list or reject children due to limited capacity).

There are many reasons that the care industry has not been able to evolve to meet current needs. Among other issues, even as other service-providing industries have benefited from productivity-enhancing technological advances, the care industry has not; it still takes roughly as many people to watch 10 children today as it did 50 years ago, and the cost of childcare has risen in part due to increases in provider wages (although they are still quite low).[3] Between 1990 and 2021, the price of childcare rose by 225 percent while the median household income rose by roughly 150 percent. In addition, because families face liquidity constraints, like the inability to borrow against future income, they are often unable to afford the childcare that best meets their needs.

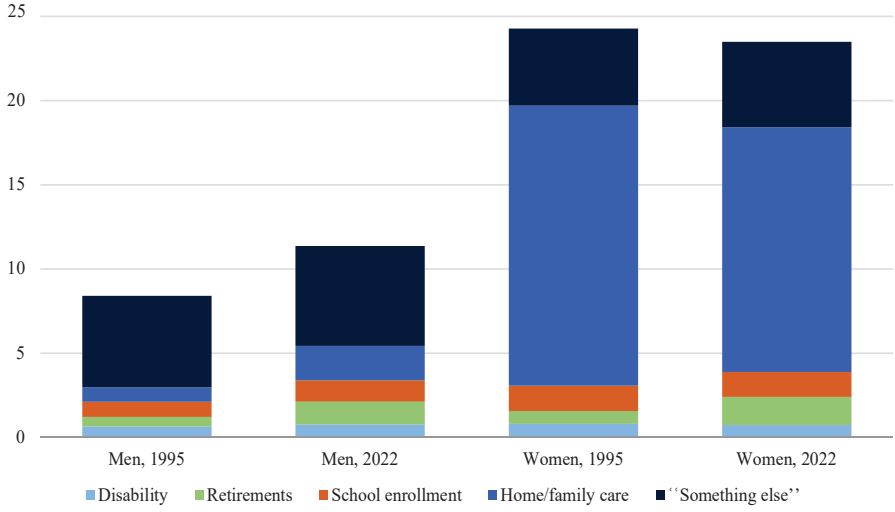
These challenges have a negative impact on labor force participation, particularly for women. In 2022, 14.6 percent of women between the age of 25 and 54 said that they were not in the labor force because they were caring for their home or family, representing roughly 60 percent of all the prime-age women not working. While some women may prefer providing family care to participating in the labor force, research suggests that for others, the cost of care limits their choices. Studies indicate that government policies that reduce the costs of care can strengthen participation, particularly for women (Morrissey 2017; Shen 2021). But relative to its peers, the United States provides few policies that could help families meet these care needs, such as paid family and medical leave and childcare investments—an observation researchers often make when discussing trends in U.S. female labor force participation (Blau and Kahn 2013). Whereas in 1985, the participation rate among women age 25 to 54 in the United States exceeded the rate in Canada, the United Kingdom, Japan, Australia, and the European Union, in recent years, the United States has experienced *lower* women's participation than Canada, the United Kingdom, Japan, Australia, and the European Union (OECD 2022b).

Further, care responsibilities affect men's participation in the economy along with women's, particularly as gender norms evolve (figure 1-16). In 2022, 2 percent of men between the age of 25 and 54 said they did not work due to home or family responsibilities, up from 0.9 percent in 1995. Subsidizing care for families while simultaneously investing in the supply of childcare would likely increase the overall number of workers who are able to enter the workforce, and thus facilitate economic growth.

[3] The Baumol-Bowen cost disease is what economists call this tendency for wages and costs to rise in industries that see smaller productivity gains in response to increases in wages and costs from industries that have seen larger productivity gains (Maiello 2017).

Figure 1-16. Nonparticipation in the Labor Force, by Reason

Percentage of prime-age people



Sources: Current Population Survey; CEA calculations.

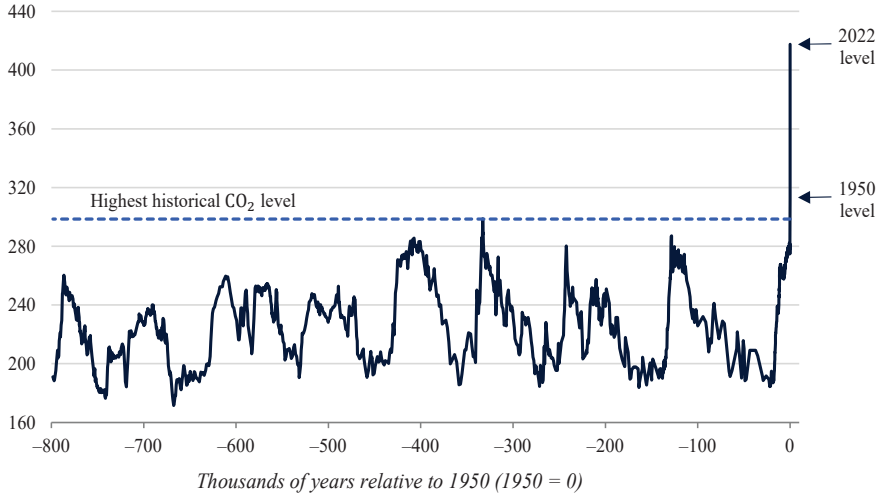
Investing in Physical Capital: Adapting to the Increasing Effects of Climate Change

Physical capital is the next important input for economic growth. The kinds and quantities of physical capital needed are in a constant state of flux. For much of human history, infrastructure was designed around animal power, such as horses. In the 19th century, infrastructure began shifting to railroads, while the 20th century saw rapid shifts toward infrastructure for automobiles and airplanes. Although much of the transportation infrastructure built in the 20th century remains useful today, the 21st century has seen massive investments in network infrastructure to allow for faster and more reliable communications and Internet access.

At the same time, the large and growing effects of climate change pose a significant, broad-based risk for physical capital. Over the past century, the level of carbon dioxide (CO2) in the air has risen drastically (figure 1-17). In 2013, atmospheric CO2 concentration surpassed 400 parts per million for the first time in recorded history (Blunden 2014). In 2021, it averaged nearly 415 parts per million (Lan, Tans, and Thoning 2022). Climate models find that the increased level of greenhouse gases in the atmosphere is in turn responsible for rising sea levels, hotter weather, and more common and severe extreme weather events—trends that are predicted to continue even with an ambitious reduction of greenhouse gas emissions.

Figure 1-17. Carbon Dioxide Levels Over Time

Parts per million

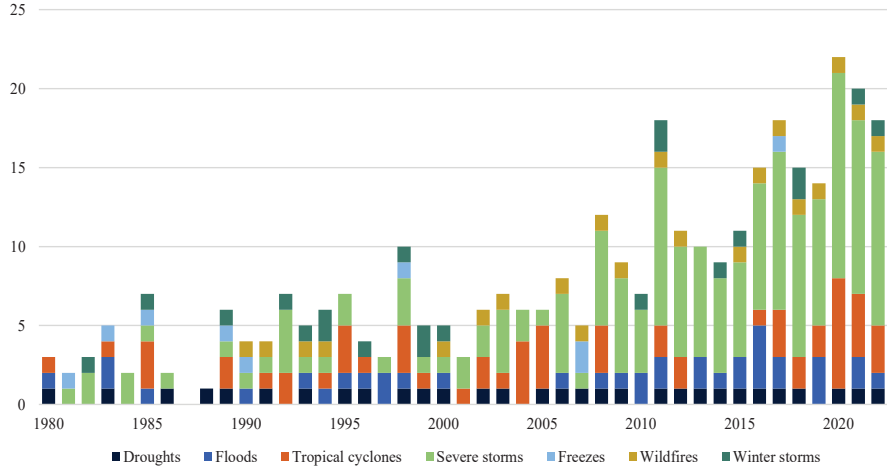


Source: Lüthi et al. 2008.
Note: Data come from reconstructions from ice cores.

The economic damage from climate change has already begun to accrue and have an impact on communities around the globe. Some of these types of damage emerge in human capital: beyond the effects on human health (e.g., Carleton et al. 2022), researchers have documented the effects of climate change on migration flows (Missirian and Schlenker 2017; Jessoe, Manning, and Taylor 2018), violent crime (Ranson 2014), labor productivity (Graff Zivin and Neidell 2012), and learning (Park et al. 2020; Park, Behrer, and Goodman 2021). However, this damage has also been observed in physical capital. In the United States, the damage from billion-dollar disasters (see figure 1-18) now averages roughly $120 billion a year (Smith 2023). Costs from rising extreme weather are being driven both by the changing climate and by rapid development in risky areas (Climate Central and Zillow 2018; Iglesias et al. 2021). Climate change has been found to affect crop yields and agricultural productivity, and increasingly frequent heat waves will likely exacerbate increasing strain on electrical grids (Woetzel et al. 2020; Auffhammer, Baylis, and Hausman 2017). Instability due to climate change is expected to cause new systemic risks for financial markets (Financial Stability Oversight Council 2021; Brunetti et al. 2021). In insurance markets, extreme weather events are driving higher payouts, which can raise premiums and reduce insurance availability (Lara 2019; Botzen, van den Bergh, and Bouwer 2010). Large disasters could cause insurance companies to fail altogether—as seen after Hurricane Andrew's $15.5 billion in property damage in 1992, and along the Gulf

Figure 1-18. Number of Billion-Dollar Natural Disasters in the United States, 1980–2022

Number of billion-dollar natural disasters



Source: NCEI 2022.
Note: Disaster costs are adjusted for inflation using the Consumer Price Index for All Urban Consumers.

Coast after more recent hurricane strikes (Gelzinis and Steele 2019; Elliott 2022). Even if markets continue to adapt to past experiences, rising climate uncertainty may increase the risks of future failures as unanticipated costs rise for insurance companies.

These effects of climate change have important consequences for physical capital and will likely require adaptation by institutions—from insurance and financial markets to construction firms, energy producers, and the government. To lessen the economic damage of climate change, these institutions, and many other actors throughout the global economy, will need to quickly transition away from fossil fuels and emit fewer greenhouse gases (known as "mitigation"). They will also need to protect physical capital from damage ("adaptation"), such as by building resilient infrastructure, employing nature-based solutions to improve resilience in the face of more frequent extreme weather events, and shifting new investments away from high-risk areas. The scale and timing of climate change have led many researchers to conclude that both mitigation and adaptation are necessary (IPCC 2014). Adaptation measures may range from actions on the individual level, like raising the foundations of houses to accommodate rising sea levels and changing agricultural cropping practices, to community-level actions, like building seawalls and expanding reservoirs' capacities to deal with more variable rainfall.

Climate change is also expected to alter the productivity and value of different forms of capital in complex ways. The existing infrastructure,

which was designed for older climate conditions, may underperform in these new conditions. For instance, major hydropower dams in the Southwest may soon cease being able to produce electricity because of the decades-long drought (Ramirez 2022; Partlow 2022; Kao et al. 2022). In contrast, other forms of capital may become more valuable. Existing sea-walls and riverine flood defenses provide greater value in the face of the changing climate that is increasing coastal and inland flooding risks. Additionally, with the rise of clean energy technologies, some resources like the Sun and wind have acquired new value and have become important kinds of capital. For example, though societies have used windmills for centuries, wind has only become a widely used source of electric power in the last few decades as technological advances have met the energy needs in a changing climate.

Climate change is already reducing—and will very likely continue to reduce—growth in GDP (Burke, Hsiang, and Miguel 2015; Newell, Prest, and Sexton 2021; Kalkuhl and Wenz 2020); this type of harm could be reduced with greater investment in adaptation. A recent summary of the literature from the Council of Economic Advisers and the Office of Management and Budget (2022) shows substantial variation in the estimates of the impact of global warming on U.S. GDP. For example, the Congressional Budget Office estimates that climate change will reduce the average annual GDP growth rate by 0.03 percentage point from 2020 to 2050 (Herrnstadt and Dinan 2020), which implies that the level of U.S. GDP would be just under 1 percent lower by 2050, whereas a study by the Bank of England (2021) finds that climate damage could reduce U.S. GDP by over 11 percent by 2050 in a worse-than-expected scenario. These estimates only capture a fraction of climate change costs, however, since many effects, such as increasing mortality risk and ecosystem disruption, are not fully reflected in market transactions or GDP estimates (Rennert et al. 2022; Bastien-Olvera and Moore 2021). By one estimate, more than half of global GDP is moderately or highly dependent on nature, which is being lost or dramatically altered by human activity (World Economic Forum 2020).

Investing in the Economy's Productivity: The New World of Digital Markets

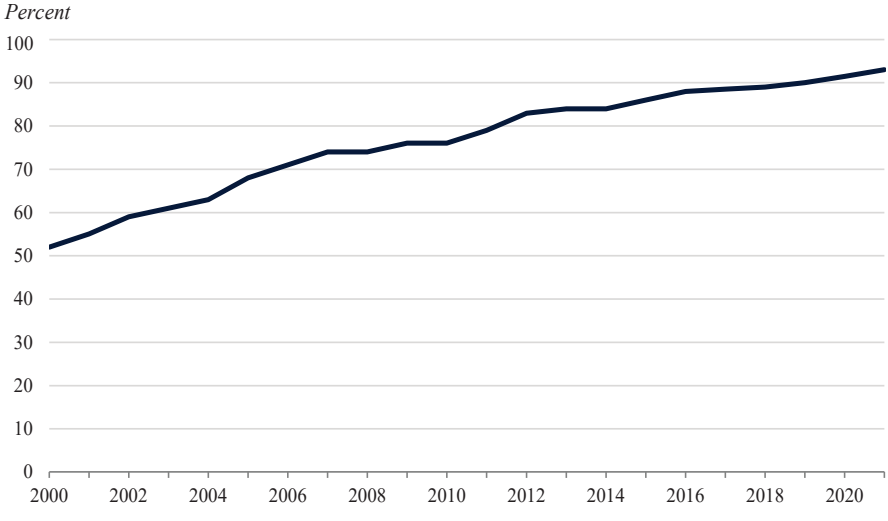
Rapid advances in information technology in recent decades have had a substantial impact on how Americans work and live. Computer and information technology occupations now account for 3 percent of all employment in the United States, and the Bureau of Labor Statistics (BLS) projects that the number of these jobs will increase by 15 percent over the next decade (BLS 2021, 2022b). Moreover, other occupations that are not explicitly computer-related increasingly also rely on strong digital skills (Muro et al. 2017).

The spread of computer use is not limited to the workplace. In 1984, 8.2 percent of households had a computer at home; by 2021, this share had climbed to 95 percent (File 2013; U.S. Census Bureau 2021). More recently, information technology has been applied to traditionally analog devices—telephones, cars, watches, and the like—in what is sometimes referred to as the "Internet of Things" (Armstrong 2022). Figure 1-19 shows how rapidly Internet use has expanded in recent decades, with almost all adults using the Internet in 2021 compared with just over half in 2000.

New technology is changing the way people interact with each other, both in markets and socially. Online sales now account for 14.8 percent of total retail sales, more than doubling their share over the last decade (U.S. Census Bureau 2023). Most job seekers now look for jobs online (Hernandez 2017). And people increasingly connect with each other on digital social media platforms to exchange ideas and information. The largest such platform, Facebook, counted 2.96 billion monthly active users as of December 2022 (U.S. Securities and Exchange Commission 2023).

Through the lens of the aggregate production function, the contribution of recent technological advances to economic growth has been twofold. First, it has increased the physical capital stock of the American economy. The fall in the cost of computing power and the more recent rise of machine learning and artificial intelligence have led to a proliferation of computers in workspaces and robots in factories, which are helping workers specialize

Figure 1-19. Percentage of Adults Who Report Using the Internet Over Time



Source: Pew Research.

in tasks for which they have the greatest comparative advantage, like big-picture strategizing, designing products, and interacting with consumers.

Second, at least in theory, recent technological advances have increased total factor productivity by enabling new production processes and making the allocation of resources more efficient. Indeed, increased investments in computers and software arguably played a substantial role in the fast productivity growth of the late 1990s and early 2000s (Weller 2002). The economic benefits of broadband Internet access, for example, have been widely accepted. One study comparing countries that belonged to the Organization for Economic Cooperation and Development between 1996 and 2007 found that a 10-percentage-point increase in broadband penetration increased per capita economic growth by 0.9 to 1.5 percentage points (Czernich et al. 2011). In the United States specifically, one study of the expansion of broadband access between 1999 and 2007 estimates that ubiquitous broadband access within a county would increase that county's employment rate by 1.8 percentage points compared with no broadband access (Atasoy 2013). And when the COVID-19 pandemic prevented many Americans from participating in in-person work and school, new online technologies enabled people to continue learning and working.

The practical importance of the productivity effect of more recent developments in machine learning and artificial intelligence remains a topic of debate, however, especially because the last decade saw the slowest productivity growth in the post–World War II era (according to CEA calculations using BLS data). One viewpoint is that recent innovations in technology have been more incremental and not as groundbreaking as previous technological changes (Gordon 2016). Other scholars, in contrast, have argued that traditional output measures fail to capture the full value of these new innovations and that their productivity gains will materialize in time (Brynjolfsson and Petropoulos 2021).

In addition to the direct effects of those technological advances on output growth, policymakers are paying increased attention to the more indirect ways that these advances are affecting the structure of the U.S. economy. For example, blockchain technology has fueled the rise of financially innovative digital assets that have proven to be highly volatile and subject to fraud (White House 2022). The Internet and other new technologies have allowed for the provision of digital services, increasing the ability of people to perform and access services remotely, which affects trade, given that technological advances make it easier for countries to import and export services than in the past. Additionally, technological advances have raised distributional concerns, both in terms of access and their usage. Black, Hispanic, and lower-income Americans are less likely to have home access to a computer and broadband and the opportunities that those technologies provide (Pew Research Center 2021b, 2021c). And artificial intelligence

has been argued to deepen racial and economic inequities by perpetuating discrimination in areas such as housing, the criminal justice system, or mortgage lending (ACLU 2021).

Addressing these areas of concern often draws on the traditional tools of policymakers in new contexts. For example, policymakers have focused on the high level of market concentration in the digital economy. Economic theory has long seen market power and monopolization as threats to productivity and output growth. The digital economy—broadly capturing the platforms that facilitate the online exchange of goods and information—is characterized by high levels of concentration, where markets are often dominated by a small set of firms (Digital Competition Expert Panel 2019). This concentration can be the result of the economic fundamentals of these platforms, whose scale can produce value for participants. Inherently, many of these markets exhibit some form of network externality. For example, buyers and sellers on an e-commerce platform are generally better off when more sellers and buyers are on the same platform.

The economics underlying the susceptibility of digital markets to concentration is not new. But the scale of digital markets is amplified by the fact that they typically allow for a virtually unlimited number of participants without congestion. This implies that the "winners" in digital markets—the small set of firms that dominate the market—end up being larger and are of significantly greater importance for the overall economy. Because it is notoriously hard to define markets and there are many ways to measure concentration, it is difficult to precisely quantify the degree of concentration in digital markets. Nevertheless, big tech firms such as Amazon, Alphabet, and Meta have provided some of the most widely used services in recent years and generally have few direct competitors that come close to their size.

From a policy perspective, these advances pose new challenges. The degree of concentration in digital markets raises long-standing concerns about whether dominant players in these markets leverage their market power to stifle competition and innovation. But unlike in some traditional markets, much of the value of digital companies comes from network effects—so antitrust actions may face greater challenges in preserving value for consumers while addressing problems associated with concentration. A world where digital technologies make services increasingly easy to trade requires adjustments to international trade policy. And digital assets require updating at least some regulations.

In the future, the Internet and digital markets—and further innovation—will have the potential to drive continued increases in productivity. However, careful policymaking to address both the new and old challenges presented by these technologies will be necessary to ensure that productivity and output gains remain strong.

Conclusion

This year's *Report* sheds light on these and other changes in the United States' economic and social systems and how they challenge established economic thinking and policymaking.

Chapter 2 summarizes the Nation's economy during the past year, characterizing how the continuing recovery from the COVID-19 pandemic and the impact of Russia's invasion of Ukraine have shaped the economy, and how sustained demand imbalances, supply chain delays, and pandemic policies have affected growth, inflation, and unemployment. It also presents the macroeconomic forecast underpinning the Biden-Harris Administration's Fiscal Year 2024 Budget.

Chapter 3 describes trends in international trade and investment in 2022 and characterizes how shifts over past decades in global interconnectedness have led to new challenges and opportunities for the United States. There is a need to balance the considerable benefits of globalization through economic linkages with the risks for economic and national security that international economic interconnectedness can entail. Working in concert with U.S. allies and partners can enable the Nation to effectively address shared challenges and take advantage of new opportunities in the changing global environment.

Chapters 4, 5, and 6 point to shortcomings in, respectively, the supply of care, the supply of higher education, and the supply of labor—and highlight their significance for economic prosperity. Chapter 4 illustrates the significance of early childhood care and education for economic well-being and prosperity, focusing on the effects of childcare on children and families as well as the broader societal benefits. The chapter characterizes gaps in access and availability, and it details how challenges in the childcare industry, including the high cost of providing care, prevent the market from delivering childcare of an optimal quantity or quality. The chapter explains how policies that address these challenges by supporting families accessing care and providers supplying care can have substantial, long-run economic benefits.

Chapter 5 highlights the importance of higher education in this context, with a particular focus on the role that postsecondary institutions play in creating the skilled workforce. The chapter notes that various features of the higher education market suggest that promising institution-focused policies and programs could meaningfully improve student outcomes and ensure that all students have access to a college degree of value.

The recovery from the COVID-19 global pandemic has highlighted the importance of the labor supply for the economy. Chapter 6 shows that current labor supply shortfalls in the United States are not merely a lingering effect of the pandemic but are also due to population aging and long-run

declines in labor force participation. Policies to draw more adults into the labor force will be needed, without which the labor supply is likely to be constrained for the foreseeable future.

Chapter 7 describes the significance of digital markets in the modern U.S. economy and the tension for this market environment's regulators between promoting competition and enabling economies of scale. Digital markets have grown rapidly, and high levels of consolidation suggest that the government has a role in protecting consumers and promoting innovation through antitrust action. The importance of network effects means that regulatory interventions in the digital economy have nuanced effects.

Chapter 8 explores recent developments in digital assets, along with their opportunities and risks. Although advocates often claim that digital assets, particularly crypto assets, are a revolutionary innovation, the design of these assets frequently reflects an ignorance of basic economic principles that have been learned in economics and finance over centuries, and this inadequate design is often detrimental to consumers and investors.

Finally, chapter 9 describes the physical risks that the changing climate poses for U.S. economic production, the well-being of U.S. communities, and the fiscal position of the Federal Government, as well as opportunities to manage and reduce these risks. International and domestic climate policy has historically focused on policies to reduce greenhouse gas emissions, which are critical for mitigating the worst effects of climate change. However, the effects of climate change are already being felt across the United States and, even with ambitious emission reductions, will continue to increase until net global emissions fall to zero. Policies that enable households, businesses, and communities to plan for the changing climate and to manage evolving weather risks are an important complement to emission reductions in reducing the costs of climate change. Chapter 9 thus describes the economic foundations of these adaptation policies and outlines four pillars that could inform the Federal adaptation strategy.