



The Impact of Human Capital in the American Labor Market Series

Human Capital and the Labor Force Participation Behavior of American Men and Women

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Table of Contents

Preface	1
Introduction	4
Factors Influencing the Labor Force Participation Rate	7
Labor Force Participation Among Working-Age Men and Women in the United States	12
Regression Analysis of Labor Force Participation among Working-Age Men and Women in the United States	28
Some Implications of the Findings	41
Appendices	55
Appendix A: Cut Scores and Task Descriptions of PIAAC Literacy and Proficiency Levels	55
Appendix B: Definitions of Variables in Labor Force Participation Regression	58
Appendix C: Estimated Regression Coefficients and Standard Errors of Each Regression Model	62
Appendix D: PIAAC and CPS Labor Force Measures	68
About the Authors	69
Endotes	72

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Preface

This report, the seventh in a [series](#) of policy reports published by ETS that explore the impact of foundational skills on American labor markets, focuses on the role of foundational skills in adults' decisions to engage in the world of work. The earlier studies in this series reveal the essential role that human capital traits of foundational skills, educational attainment, and work experience play in almost every dimension of labor market success. Taken together, this series of studies finds very strong earnings advantages to literacy and numeracy skills, even after accounting for educational attainment and work experience, two very important proxy measures of ability that are valued in the labor market. These gains to skills prevailed in full-time and part-time work for teens and young adults, prime-aged and older workers, and high school dropouts and college graduates. In addition to earnings, skills have positive effects on employment stability, employment intensity, and reduce the chances of unemployment as well the duration of a spell of unemployment. The present study finds that skills influence the most basic labor market outcome: the likelihood of engaging in paid work.

A nation's labor force is the fundamental source of its economic prosperity. The pace of long-term economic growth is largely determined by the quantity and quality of the nation's labor force. Foundational skills influence the labor force in two ways: First, raising the skills of the population result in an increase in the productive capabilities of the population thereby increasing the quality of the labor force. Second, foundational skills bolster labor force attachment among working-age adults. This study finds that better-skilled individuals are considerably more likely to participate in the job market. Therefore, raising the skills of the population directly contributes to increasing the size of the labor force as higher skilled men and women opt to participate more extensively in the nation's labor markets.

Slow labor force growth has characterized the United States in recent years, falling to just an average annual increase of about 0.5 percent over the 2011–2021 period. Recent labor force projections imply a further slowing in the pace of U.S. labor force growth through 2031. This, of course, means slower economic growth, a great concern in a nation with a federal government debt equal to more than 120 percent of gross domestic product.

Consistent with earlier findings in this series, higher levels of skills are positively associated with labor force participation for both men and women. However, the analyses in this paper suggest that this association is stronger for women. Literacy and numeracy skills exert greater influence on the labor force participation choice of women. Similarly, the association between levels of educational attainment and labor force participation is strong for both men and women, but more so for women. It is unsurprising that educational attainment is closely linked with the likelihood of labor force participation; men and women with higher levels of education are more likely to participate in the labor force. However, it

is important to understand that an educational credential per se contributes little to the productivity of workers. Rather, it is the knowledge, skills, and abilities developed during the process of formal education that contribute to the productivity of workers and the quality of the nation's workforce. Unfortunately, in recent years a decoupling of academic awards from the development of commensurate levels of literacy and numeracy skills has developed. If the connection between skills development and diploma and degree awards continues to weaken, then the nation can expect a further slowdown in the pace of economic growth.

The declining labor force participation of prime-aged men has been an important contributor to slow labor force growth. The authors report that family formation and fatherhood are closely related to labor force participation of men, in addition to skills and educational attainment. Changing social norms resulting from long-term social, political, and economic forces have resulted in declining rates of marriage and family formation. These trends seem to contribute to reduced labor force participation among men. In contrast, the authors find that women's decisions to participate in the labor market are much less influenced by their marital/cohabitation status than is the case for men.

One can conclude from the findings of an overall positive association between higher skills, higher levels of educational attainment, and labor force participation in this paper that, in general, policies and programs focused on increasing the skills of a population have the best potential to increase the quality (productivity) of the workforce as well as the quantity of the workforce as more individuals develop the skills needed to participate in the labor force. Nevertheless, the authors note that reversing the trend of declining labor force participation of American adults will likely prove difficult. The labor force attachment of women appears to have plateaued in the last decade while the participation rate of prime-aged men continues to fall. A large and expanding elderly population will also contribute to further reductions in the job market attachment of the working-age population.

The authors also address ways in which changes to immigration policies could add among the most productive workers to the American labor force. PIAAC data show that foreign-born men and women who obtain college degrees from U.S. colleges and universities have literacy and numeracy skills that are like their native-born counterparts. As such, they represent potential productive contributors to the workforce. Limiting their access to permanent residency, at a time when our economy depends on our ability to expand our workforce with skilled and productive workers, squanders an opportunity that should, instead, be seized.

—*Paul Harrington and Irwin Kirsch*

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Introduction

Growth in the productive capacity of the American economy, also known as potential gross domestic product (GDP), is influenced by the size and productivity of the nation's labor force. Changes in either factor—size and/or productivity of the labor force—influence the pace of economic growth in the United States. Both factors serve as a constraint on the ability of producers to increase the quantity and value of output.

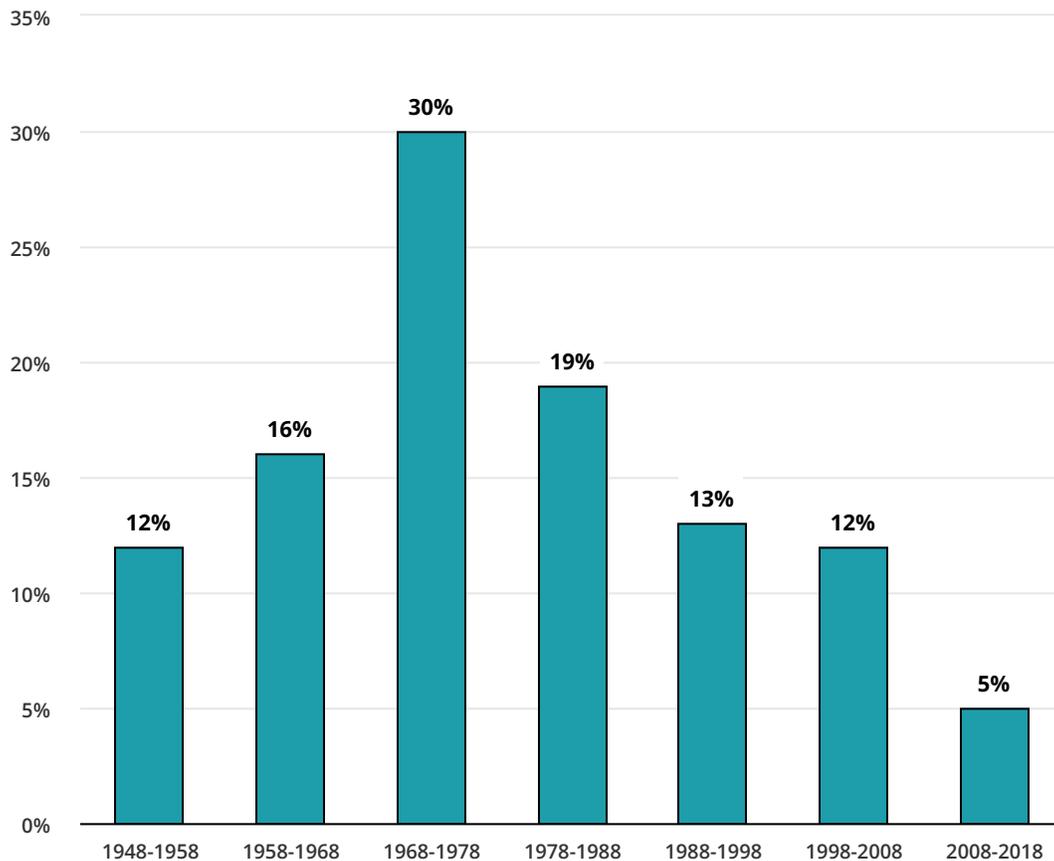
Over much of the post-World War II period, strong growth in the size of the nation's labor force has helped fuel rapid growth in the potential GDP of the nation. Between 1950 and 2006 the productive potential of the U.S. economy increased by about 3.4 percent per year. About half of that increase was the result of growth in the size of the labor force, and the remaining half was the result of rising labor force productivity.¹ The sharp increase in the labor force attachment of married women with children that is labeled as the "quiet revolution" by Claudia Goldin² along with a very large surge in the size of the working-age population associated with the baby boom generation contributed to the strong growth in the size of the labor force over this period.

Since 2008, the pace of growth in potential GDP has slowed markedly. Over the last 10 years, the growth rate of the productive potential of the U.S. economy has slowed; rising by an average of just 1.6 percent per year; half the average growth rate observed during the prior five decades. The slowdown is the result of a sharp decrease in the pace of labor force growth combined with a slowdown in labor force productivity.

The rate of growth in the size of the labor force in the U.S. labor force has steadily declined over the past four decades (Figure 1). By these historical standards, the pace of labor force growth in the past decade has fallen sharply. Since the beginning of the Great Recession in 2008 through 2018, the size of the nation's labor force grew by just 5 percent, less than half the pace of labor force expansion for any decade since these data were first collected in 1948 (Figure 1).

The new trend of slow labor force growth is expected to continue. Every two years the U.S. Bureau of Labor Statistics (BLS) prepares a set of labor force projections for the nation. Its most recent round of BLS projections suggests a continuation of the very slow labor force growth over the next decade. Between 2018 and 2028, the BLS projects that the nation's labor force will increase by .5 percent per year or just 5 percent over the decade.

Figure 1: Trends in the Rate of Growth of the Labor Force in the United States by Decade, 1948 to 2018



Source: Retrieved using the data retrieval tool of the U.S. Bureau of Labor Statistics: Labor Force Statistics from the Current Population Survey, U.S. Bureau of Labor Statistics tabulations by authors.

The quantity of human resources available to produce goods and services or the labor supply is measured by the number of people who are available to supply labor services to produce goods and services. The labor supply of a nation is measured by the labor force that includes all working-age individuals (16 years and older) who are employed and those who are unemployed (not employed but actively seeking employment). The sum of these two groups (employed and unemployed) represents the labor force.³ The remainder of the working-age population is out of the labor force; that is, they are not working and not actively looking for work in the labor market.

The size of the labor force of a nation is determined by the size of its working-age population and the labor force participation rate, which measures the proportion of the working-age population that participates in the labor force. The labor force participation rate is measured as the number of individuals in the labor force divided by the total number of working-age individuals. Not all working-age individuals participate in the labor force. Many working-age individuals choose to not participate for various personal and household-related reasons including but not limited to retirement, family and childcare

responsibilities, disability, school enrollment, and the like. Some of these nonparticipating individuals, such as retirees or individuals with severe disabilities, might be permanently separated from the labor force while others, such as mothers of young children or those who are enrolled in school, are likely to return to the labor force as their non-labor market commitments recede.

As mentioned previously, BLS projects a continuation of slow labor force growth over the next decade; by 2028, the number of working-age adults actively participating in the labor force will increase to 171 million, from 162.1 million in 2018, representing an increase of 8.9 million or 5.5 percent. The size of the working-age population is also expected to continue a pattern of relatively slow growth rising from 257.8 million in 2018 to 279.5 million in 2028; an 8 percent increase over the decade. BLS expects that a smaller share of the working-age population will participate in the job market by 2028. The nation's labor force participation rate is expected to decline from 62.9 percent in 2018 to 61.2 percent by 2028.

Recent projections of the growth in the size of the potential GDP of the nation prepared by the Congressional Budget Office (CBO) forecast continued slow growth in the productive potential of the U.S. economy.⁴ Although the lockdowns resulting from the COVID-19 pandemic have reduced the demand for labor temporarily, in the long run, slow labor force growth will continue to be a fundamental constraint on the ability of employers to hire workers and increase revenues and employment. CBO expects real potential GDP to increase by 1.9 percent annually between 2019 and 2029 and three-quarters of this gain is expected to come from a rise in labor force productivity. Between 2024 and 2029, potential labor force productivity is forecast to increase at 1.3 percent per year, while the size of the labor force will increase by only about 0.4 percent per year.

Long-term economic growth is heavily influenced by the quantity of labor supply and the productive abilities of workers embodied in their human capital traits that determine labor force productivity. Barring a dramatic increase in the flow of working-age international immigration to the United States, the slow pace of growth in the size of the working-age population is unlikely to change in the foreseeable future. Therefore, increases in both the labor force participation rate of the nation's working-age population and increases in labor force productivity are the best options to bolster the pace of long-term economic growth.

In this paper, we examine factors that are associated with the labor force participation behavior of working-age men and women in the United States with a focus on the connection between labor force participation and human capital skills and educational attainment. We examine male and female labor force participation separately because of differences in the patterns of labor force participation of men and women; particularly by marital/cohabitation⁵ and parental status. Among men, marital/cohabitation status is known to be closely related to their labor force participation; married or cohabiting men or

are more likely to participate in the labor force than single men. Among women, the link between marital/cohabitation status and labor force participation is not as strong as that found among men. However, women's participation in the labor force is closely connected to their parental status, particularly among mothers of young children. Women with young children are less likely to participate in the labor market than those without young children; especially among married/cohabiting women. Among mothers of young children, those who are married/cohabiting are less likely to participate in the labor market than those who are single.

The paper begins with an examination of trends in the labor force participation of American men and women and the factors that are known to influence the decision of men and women to participate in the labor market.⁶ The next section presents a descriptive analysis of patterns of labor force participation among working-age men and women in the United States based on the findings from the Programme for the International Assessment of Adult Competencies (PIAAC) 2012/2014 survey sample in the United States. Rates of labor force participation are presented separately for men and women by their human capital traits, including educational attainment and levels of literacy and numeracy proficiencies, and their demographic traits, including age, race/ethnicity, nativity status, English speaking proficiency, and sensory/learning disability status,⁷ marital/cohabitation status and parental status. These descriptive data are provided to summarize the array of relevant data in a constructive way that helps to illuminate patterns and associations in the data.

Following the descriptive analysis, the paper presents findings from regression analysis of labor force participation among men and women. In this section, we examine associations between the likelihood of participating in the labor force and the skills and educational attainment of working-age men and women, with regression controls for demographic traits and region of residence. Regression analysis will also identify associations between non-human capital characteristics of men and women and their likelihood of participating in the labor force.

Factors Influencing the Labor Force Participation Rate

A wide variety of factors influence the decision to participate in the labor market. The business cycle exerts an independent influence on individuals' choice to participate in the labor market. Strong employment growth combined with low and/or falling unemployment induces more individuals to enter the job market as the likelihood of finding employment improves. Current economic conditions characterized by more vacant jobs than unemployed workers encouraged potential new entrants who were moving from a primary

life activity of school to one focused on participation in the job market. Adults with prior work experience who had withdrawn from the job market were more likely to re-enter as job prospects brightened.⁸

During periods of economic slowdown or recessions, individuals, particularly those who endure long spells of unemployment, may quit looking for work and, by doing so, withdraw from the active labor force.⁹ Potential new entrants into the labor force, especially new graduates from high school and college may stay in school during periods of job losses and declining job vacancies.¹⁰ Adults with previous work experience who had left the labor market due to a change in their life circumstances (perhaps in their health status or family responsibilities) and are considering returning to the job market as those circumstances have changed, might also delay re-entry when job market conditions are poor.¹¹

While business cycle conditions clearly influence individual choices in a person's decision to work, demographic factors have been the primary source of decline in the overall share of working-age adults who participate in the labor market. Changes in the size and composition of the working-age population as well as changes in labor force participation behavior among different subgroups (age, race, gender, etc.) of the working-age population appear to explain much of the slowdown in the pace of labor force growth in the nation.¹²

After rising for half a century, the labor force participation rate reversed course and began declining after reaching its peak in the year 2000. Since then, the nation's labor force participation rate continued to decline until 2015 when the decline stopped as the strength of the U.S. economy led to an increase in labor force entry raising the labor force participation rate, primarily among older workers aged 65 and above.

Currently, demographic change is the primary source of overall change in the labor force participation rate; that is, the overall labor force participation rate change as the demographic mix (especially the age distribution) of the working-age population has changed so markedly over the last two decades. The aging of the baby boom generation is the most important source of decline in the nation's overall labor force participation rate. As individuals age, particularly past the traditional retirement age of 65,¹³ and even in the preretirement age of 55 to 64, their likelihood of participating in the labor market declines as they leave work because of retirement and/or health and disability issues that are more likely to arise with aging. Therefore, an increase in the share of older individuals in the working-age population is associated with a decline in the overall labor force participation rate.¹⁴

Even though the labor force participation of older workers (55 and older) has been increasing for many years, they are still much less likely to participate in the labor force than prime-age workers (ages 25–54).¹⁵ Between 1998 and 2018, the labor force participation rate of the nation's 55-plus population saw a sizable increase from 31.3 to 40.0

percent. However, even after this increase, the 2018 labor force participation rate of the nation's 55-plus population (40%) was only about three-quarters of the overall labor force participation rate in the nation (62.9%) and half of the labor force participation rate of the nation's prime-age population (82.1%). The downward pressure on the nation's labor force participation from the aging of the baby boom generation is expected to continue. The share of the 55-plus population among the nation's working-age population, which rose from 27 percent in 1998 to 36 percent by 2018, is projected to rise to 39 percent by 2028.¹⁶

But the entire decline is not attributable to the aging of the population, particularly since labor force participation declines have also occurred among teens, young adults, and the prime-age population. Declines in the labor force participation of the nation's prime-age population remains a puzzle. Investigations into the causes of the decline in labor force participation have attributed about one-half to two-thirds of the decline to demographic forces (aging of the population).¹⁷

The labor force participation rate can also change because of changes in the labor force participation behavior of different segments of the working-age population. For example, there have been sizable changes in the labor force participation behavior of men and women in the United States. Among women, the labor force participation rate increased sharply during the 1970s and 1980s and continued to increase in the 1990s, albeit at a slower pace, reaching a peak at 60 percent in 2000.¹⁸ A number of reasons, including economic factors, have been cited as drivers of this increase. Rapid expansion in the nation's service sector meant expanded employment opportunities in a sector of the labor market that is an intensive employer of women. New employment opportunities, particularly associated with an emerging technology sector, resulted in higher wage premiums to high-skill jobs that enticed more women to acquire additional education, dramatically expanding their human capital investments, and enter the labor market. Many adult women mixed work and school. Noneconomic factors such as rising divorce rates, which resulted in more women relying on the labor market for self-sufficiency; improvements in household technology, which reduced time costs of home production; and changes in social attitudes, such as about family formation, child bearing, child rearing; and shifts in roles of husbands and wives within the family unit all contributed to the rising labor force attachment of women.¹⁹

After reaching a peak in 2000, the labor force participation rate of women declined through the recession of 2001 and the subsequent recovery as well as through the Great Recession of 2007–09 and the subsequent weak recovery all the way through 2015. Although some of this decline might be attributable to aging, the 15-year period during which the American economy experienced two recessions (including the Great Recession) also saw a decline in the labor force participation of prime-age women (25–54); from 76.7 percent in 2000 to 73.7 percent in 2015.²⁰ However, since 2015, the labor force participation rate of prime-age

women has increased, recovering nearly 70 percent of the decline in their participation rates since 2000.²¹ The rise has been mostly attributed to the strength of the labor market and consequent increases in employment opportunities and wages that likely attracted many women to return to the labor market.²² The COVID-19 pandemic and the resulting lockdowns across many states have resulted in a decline in the labor force participation rate of prime-age women from a high of 77 percent in February 2020 to 73.6 percent in April 2020; followed by an increase to 75.1 percent in July 2020.²³

While the female labor force participation rate was increasing between 1970 and 2000, the male labor force participation rate declined, dropping from 79.7 percent in 1970 to 74.8 percent in 2000 and then to 69.1 percent in 2018. More puzzling is the drop in the labor force participation among prime-age men among whom the rate fell from 95.8 percent in 1970 to 91.6 in 2000. After 2000, the prime-age male labor force participation rate continued to decline through the two recessions and subsequent recoveries, reaching a low of 88.2 percent in 2014 before inching up each year to reach 89.1 percent in 2019.²⁴ Labor force participation rate of prime-age men continued to increase in 2020, rising to a peak of 89.3 percent in February after which the COVID-19 pandemic-related lockdowns resulted in a decline reaching a low of 86.4 percent in April followed by an increase to 87.6 percent in July 2020.²⁵

The labor force participation behaviors of age and gender subgroups of the population vary for different reasons. The labor force participation of older individuals is expected to be lower because of higher rates of withdrawal from retirement and health/disability issues and other personal reasons. Women's labor force participation is often interrupted during childbearing years, although the number and duration of these interruptions have declined over time. The labor force attachment of younger individuals is expected to be affected by their schooling decisions.

However, in contrast to these various groups, prime-age men are expected to be actively engaged in the labor force. The labor force participation behavior of prime-age men is less likely to be affected by demographic factors such as retirement, birth of a child, or schooling decisions. The decline in the labor force participation of prime-age men in the United States is therefore quite puzzling. And it is not unique to the United States. The labor force participation rate of prime-age men has declined in most Organisation for Economic Co-operation and Development countries. However, the decline in the United States has been among the sharpest.²⁶

Studies examining the potential causes of this trend in the United States have identified a number of economic factors as well as social drivers.²⁷ Included among these are the technology and international trade-driven decline in jobs in manufacturing and other goods-producing industries, historically staffed by men, that have resulted in permanent

employment declines in these sectors of the economy. Rapidly rising rates of physical and mental disability and availability of alternative sources of income, like earnings of a working wife, and expanded participation in benefit transfer programs, such as food stamps, Medicaid, and/or disability benefits, have also contributed to declines in participation among prime-age males. Shifts in cultural norms, including declining marriage rates and the increased acceptance of labor force withdrawal among healthy and able-bodied prime-age men, also contributed. And barriers to finding work among previously incarcerated men underlay some of the decline in the labor market participation of prime-age men.²⁸

The overall labor force participation rate of the working-age population in the United States reached a peak in 2000 at 67.1 percent after rising for three decades; then, it declined. The rate of decline accelerated during and after the Great Recession of 2007–2009 with the labor force participation rate reaching a low of 62.7 percent in 2015. The decline stabilized and even reversed slightly after 2015 with the labor force participation rate increasing to 62.8 percent in 2016, 62.9 percent in 2017 and 2018, and 63.1 percent in 2019.²⁹ Over the same time period, the labor force participation rate of the prime-age population increased steadily from 80.9 percent in 2015 to 81.3 percent in 2016, 81.7 percent in 2017, 82.1 percent in 2018, and 82.5 percent in 2019. The recent uptick in the labor force participation rate, particularly of the prime-age population is attributable to the strength of the U.S. labor market.³⁰

By most economic measures, the U.S. labor market was operating at a full-employment level until the onset of the COVID-19 pandemic and the subsequent lockdowns. The February 2020 unemployment rate was just 3.5 percent, a level of unemployment that is considered to be "full-employment level of unemployment." Another gauge of the strength of the labor market is the ratio of the number of unemployed individuals (U) which represents available (unutilized) labor supply and the number of unfilled job vacancies (V) which represents the (unfilled) demand for labor. A U/V ratio of 1 indicates a full employment balance between labor supply and labor demand; that is, for every unemployed individual there is one vacant job.³¹ A U/V ratio that is greater than 1 represents excess labor supply, meaning that there are more unemployed individuals than there are vacant jobs. Since February of 2018, the number of unemployed individuals and job vacancies indicate a U/V ratio that is less than 1, which represents a situation of excess demand in the labor market. The U/V ratio fell from 1.00 in February 2018 to 0.81 in February 2020, just before the COVID-19 lockdowns. The U/V ratio rose sharply during the COVID-19 lockdowns, up to 4.99 in April 2020, and falling thereafter. The most recent data show that in September 2021, the U.S. economy had 10.4 million vacant jobs and just 7.7 million unemployed individuals, yielding a U/V ratio of $7.7/10.4 = 0.74$.³²

During economic downturns, the economy operates below its maximum production potential resulting in underutilization of resources. The unemployment rate is a measure of the underutilization of labor resources available for production of goods and services, whereas the labor force is a measure of the labor resources that are available for utilization in production.

With the U.S. unemployment rate as low as 3.5 percent, sustained economic growth will require an increase in the rate of labor force growth. Before the pandemic, the CBO concluded that the U.S. economy was operating at an unsustainable over-full-employment level, which meant that the rate of economic growth, although positive, could not have been sustained.³³ After reversal of the pandemic-related economic downturn, slow labor force growth will once again continue to act as a fundamental constraint on economic growth. Projections of the size of the working-age population are unlikely to change as they are simply the product of domestic births and deaths and net foreign immigration. However, labor force attachment is much more fluid. As noted above, it is influenced by a variety of economic and noneconomic forces. An examination of the forces that drive participation in the labor market is an important step in designing policies to increase labor force participation among working-age Americans, thereby increasing the nation's labor supply and loosening this constraint on economic growth.

Labor Force Participation among Working-Age Men and Women in the United States

Human Capital and Labor Force Participation

Individuals with higher levels of human capital are more likely to engage in the labor force and have better employment and earnings outcomes than those with lower levels of human capital. Research has consistently shown a close and positive connection between human capital (skills and educational attainment) and the labor force participation rate and other labor market outcomes.³⁴ Individuals with higher skills and educational attainment are more likely to have higher earnings and other benefits in the labor market than their counterparts with low levels of these measures of human capital,³⁵ increasing their likelihood of participation in the labor market.

Labor supply and productive ability (or human capital) discussed in this report is based upon analysis of data from the 2012/2014 PIAAC Restricted Use Data File (RUF) for the United States. All findings are restricted to the 16- to 74-year-old noninstitutional population. There were 8,670 persons between the ages of 16 and 74 in the 2012/2014 PIAAC sample for the United States. Out of this total, literacy and numeracy skills scores and labor force status were missing for 182 persons. In addition, 68 respondents were missing information for some of the other variables used in this paper, such as educational

attainment, presence of children, disability status, and self-reported English-speaking ability. In total, 250 respondents with missing data were excluded from the analysis presented in this paper. Thus, the total PIAAC sample used was 8,420 respondents, with 3,885 men and 4,535 women. Analyses of literacy and numeracy proficiency scores and levels appearing in this paper are based on averages of 10 plausible scores, and standard errors include both sampling and measurement errors. Any discussion of differences in labor force participation rates between groups is restricted to only those differences that meet a minimum statistical significance threshold of $p < .05$. Details on proficiency levels including the range of cut scores and task descriptions for each level of literacy and numeracy proficiency are provided in Appendix A.

Labor Force Participation by Level of Literacy and Numeracy Proficiencies

We begin the descriptive section with analysis of rates of labor force participation of men and women by two measures of their human capital characteristics: literacy and numeracy proficiencies and educational attainment. The PIAAC household survey of 2012/2014 included questions designed to measure the employment status of the working-age population in the United States aged 16 to 74. The PIAAC survey found that nearly 81 percent of working-age men and 72 percent of women were active participants in the U.S. labor market (employed or jobless, but actively looking for work). Despite our earlier finding about the increase in women's labor force participation over time, the PIAAC survey still found a 9-percentage-point labor force participation rate gap between the sexes (Table 1).

Table 1: The Labor Force Participation Rate of 16- to 74-Year-Old Men and Women in the United States, PIAAC 2012/2014

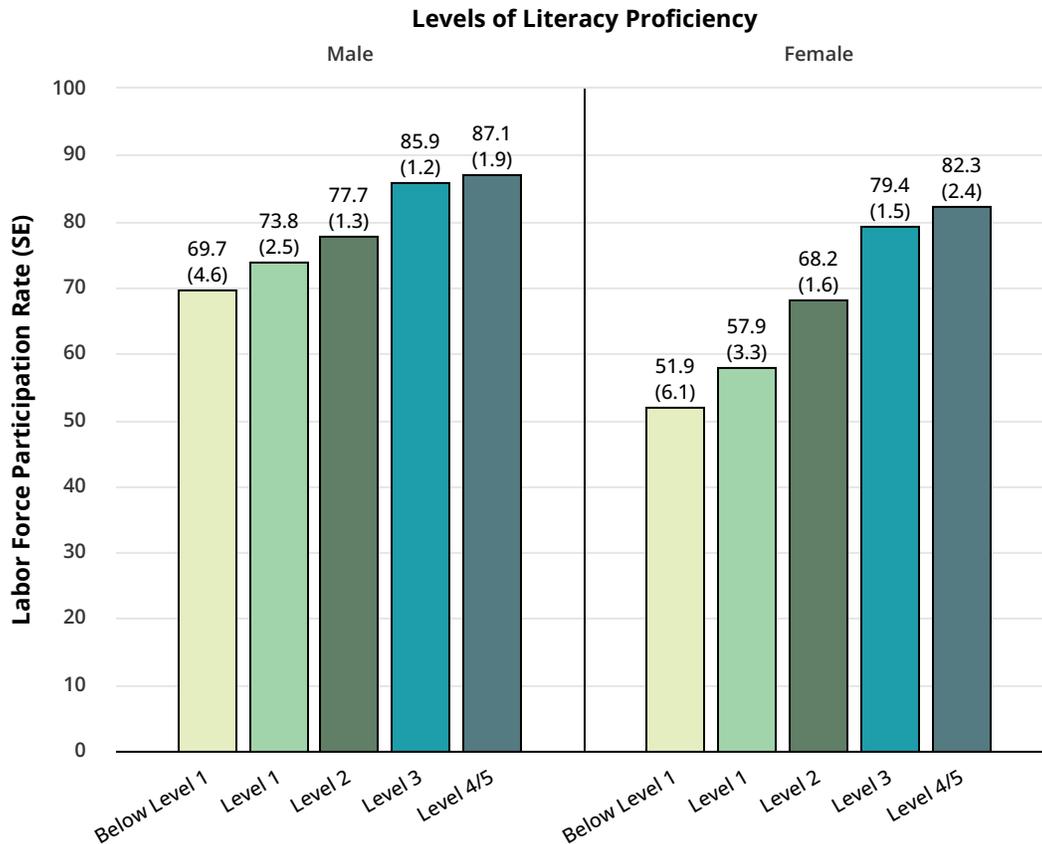
GENDER	LABOR FORCE PARTICIPATION RATE	STANDARD ERROR
Male	80.9	0.7
Female	71.7	0.9
Difference (Male minus Female)	9.2	—

— Not applicable.

SOURCE: Organisation for Economic Co-operation and Development (OECD), Programme for the International Assessment of Adult Competencies (PIAAC), 2012/2014.

Findings from an examination of the labor force participation rate by levels of literacy proficiency of men and women presented in Figure 2 indicate a positive link between skills and labor force participation. For men and women, the labor force participation rate increased with literacy skill levels.

Figure 2: Labor Force Participation Rates of 16- to 74-Year-Old Men and Women by PIAAC Literacy Proficiency Levels, PIAAC 2012/2014 (Standard Errors in Parentheses)



Source: Organisation for Economic Co-operation and Development (OECD), Programme for the International Assessment of Adult Competencies (PIAAC), 2012/2014.

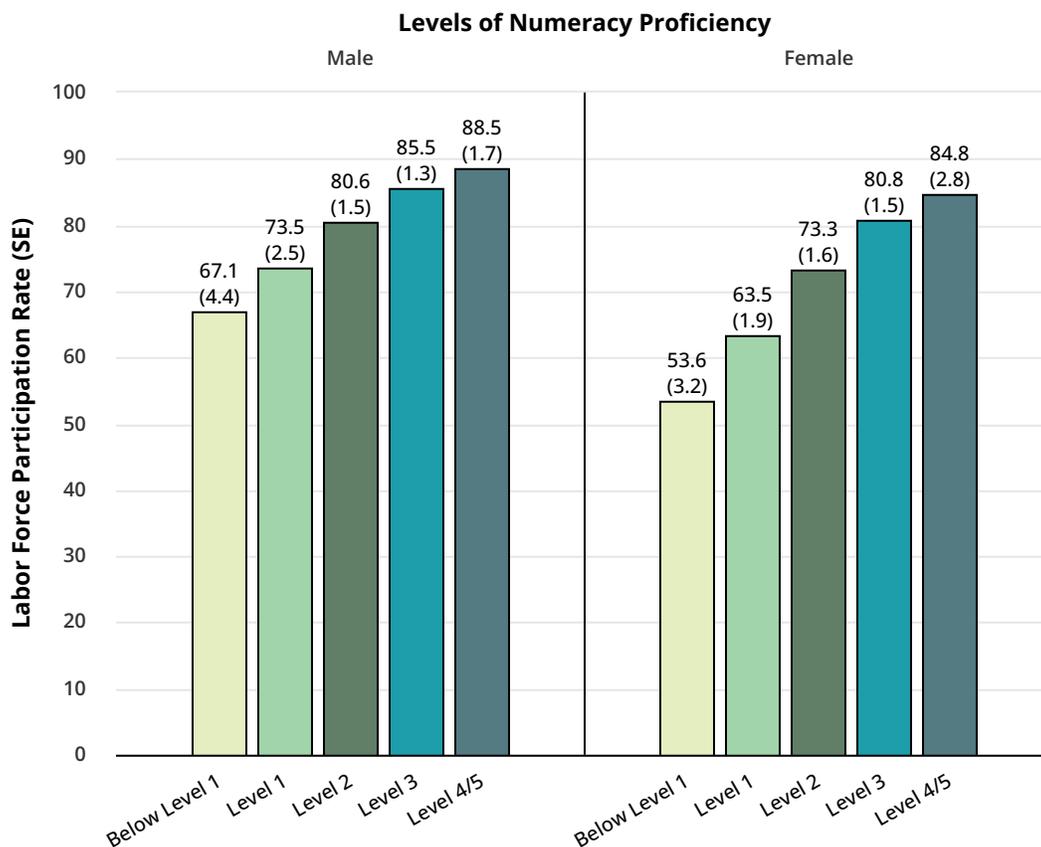
Among men, just 70 percent of those with the lowest level of literacy proficiency (below level 1) were engaged in the labor force at the time of the PIAAC surveys. In contrast, the labor force participation rate of men with the highest literacy skills (levels 4/5) was 87 percent.³⁶ The gap between the labor force participation rate of men with the lowest (below level 1) and highest (levels 4/5) literacy skills was 17.4 percentage points.

The relationship between literacy skills and the likelihood of participating in the labor force is stronger among women than among men. The labor force participation rate of women with below level 1 literacy skills was only 52 percent; a rate that was 30.4 percentage points lower than the rate of participation among women with the highest level of literacy skills (levels 4/5; Figure 2).

Similar comparisons of the labor force participation rates of men and women across levels of the PIAAC numeracy test are presented in Figure 3. There is a slightly stronger connection between numeracy skills and labor force participation than between literacy

skills and labor force participation, especially among men. Men with the best literacy skills (levels 4/5) were more than 21 percentage points more likely to participate in the labor market than their counterparts with the poorest numeracy skills (below level 1).

Figure 3: Labor Force Participation Rates of 16- to 74-Year-Old Men and Women by PIAAC Numeracy Proficiency Levels, PIAAC 2012/2014 (Standard Errors in Parentheses)



Source: Organisation for Economic Co-operation and Development (OECD), Programme for the International Assessment of Adult Competencies (PIAAC), 2012/2014.

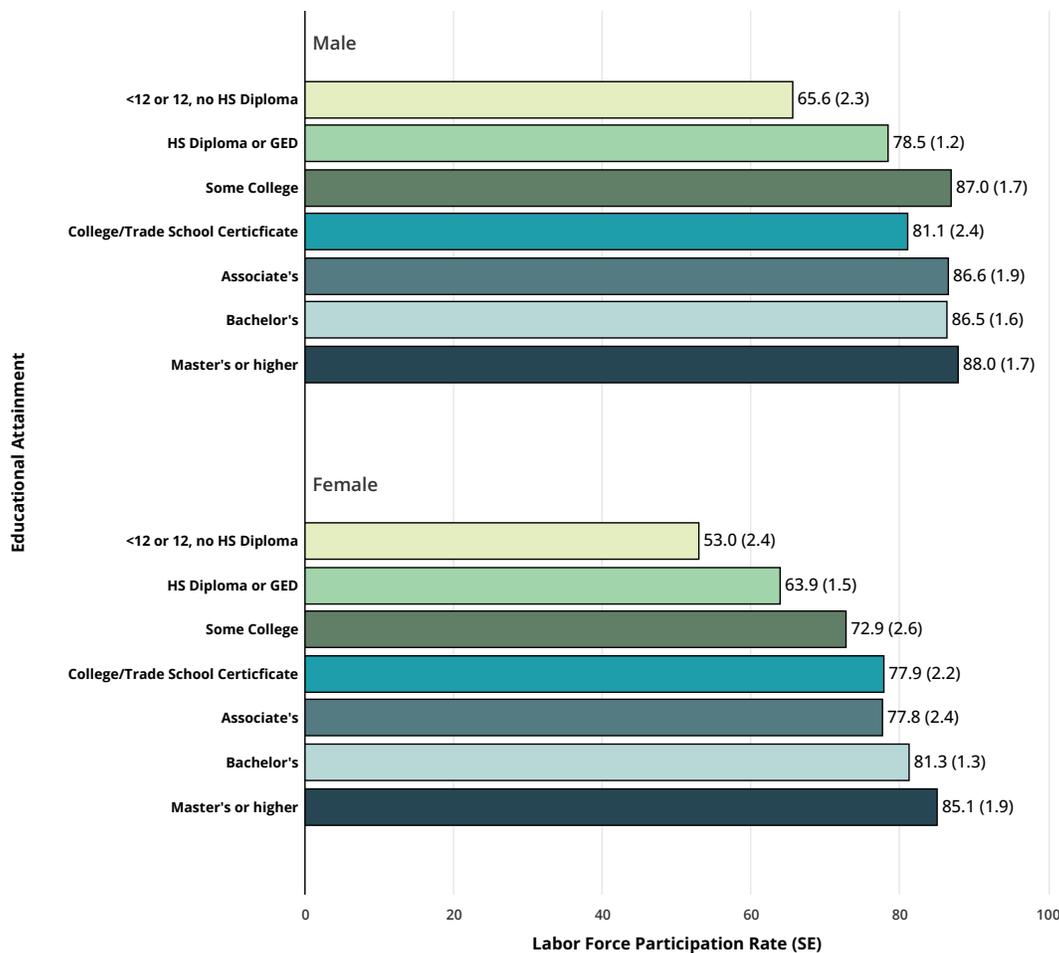
The labor force participation of women by their numeracy skills increased from just 54 percent among those with below level 1 skills. In contrast, 81 percent of women in level 3 and 85 percent in levels 4/5 participated in the labor force. The gap in labor force participation rate between women in the lowest and the highest levels of numeracy proficiency was 31 percentage points.

Labor Force Participation and Educational Attainment

Labor force participation rates of men and women by their level of their educational attainment are presented in Figure 4. Just two-thirds of working-age men who failed to earn a regular high school diploma were active participants in the labor force at the time of the

PIAAC survey administration. Men who had completed high school were nearly 13 percentage points more likely to participate in the labor force than their counterparts who did not complete high school (78.5% versus 65.6%). Men with an associate's, bachelor's, master's or higher degree were much more likely to participate in the labor force (87% to 88%) than men without any postsecondary degrees. However, there was no statistical difference in the labor force participation rate among men with college degrees by the level of their college degree; nearly 87 percent among men with an associate's or bachelor's degree and 88 percent among their counterparts with a master's or a higher degree (Figure 4).

Figure 4: Labor Force Participation Rates of 16- to 74-Year-Old Men and Women by Educational Attainment, PIAAC 2012/2014 (Standard Errors [SE] in Parentheses)



Source: Organisation for Economic Co-operation and Development (OECD), Programme for the International Assessment of Adult Competencies (PIAAC), 2012/2014.

The connection between labor force participation and educational attainment was also strong among women. Only 53 percent of women without a high school diploma participated in the labor force at the time of the PIAAC surveys, compared to 64 percent

among high school graduates.³⁷ Labor force participation was much higher among women with a college credential, ranging from 78 to 81 percent among those with a college/trade school certificate, an associate's degree, or a bachelor's degree and over 85 percent among those with a master's degree or higher level of education (Figure 4).

Labor Force Participation of Men and Women by Select Demographic Characteristics

In this section of the paper, we present a descriptive analysis of the differences in the labor force participation rate of men and women by their demographic characteristics. Regression analysis presented in the subsequent section is designed to disentangle independent connections between the likelihood of labor force participation and the human capital traits and demographic characteristics of working-age men and women in the United States.

Age

The labor force participation rate typically increases with age, reaching a maximum in prime working years and declining as individuals approach retirement age and continuing to decline thereafter. During the teen and young adult years (16 to 24), labor force participation is lower as many of these youth are engaged in schooling activities. During prime working years, typically ages 25 to 54, labor force participation increases and reaches a peak after which, as individuals approach traditional retirement age of 65, their participation in the labor force declines.

The labor force participation of men presented in Table 2 reflects this pattern of participation. Fewer than three-quarters of 16- to 24-year-old males were participating in the labor force at the time of the 2012/2014 PIAAC surveys. There was a nearly 20-percentage-point jump in the labor force participation rate for 25- to 34-year-old and 35- to 44-year-old men, among whom 94 percent were active labor force participants. The male labor force participation rate began to decline as age increased; down to 90 percent among 45- to 54-year-old men, 76 percent among men in preretirement years of 55 to 64, and down to 34 percent among 65- to 74-year-old men. The mean labor force participation rate of all men in what is termed as the prime working-age (25–54) was over 92 percent (Table 2).

The pattern of female labor force participation follows a slightly different path than that of men. The pattern of male labor force participation by age resembles an inverted letter *U*: it rises as men age, reaches a maximum in prime working-age, and then falls in retirement ages. The female labor force participation follows the letter *m*: it rises in younger ages, falls modestly in childbearing ages as women withdraw from the workforce to bear and raise children, rises slightly thereafter as they return to the workforce, and then falls as women

reach preretirement and traditional retirement ages. As labor force participation among women with young children has increased, substantially contributing to the overall increase in the labor force participation rate of American women, the pattern of female labor force participation, while still not a fully inverted *U*-shape like that of their male counterparts, is beginning to soften to a muted lower case letter *m* pattern.

The 2012/2014 PIAAC data show a muted *m*-shaped pattern of labor force participation among women. The labor force participation rate increased from 72 percent among 16- to 24-year-old women to 84 percent among 25- to 34-year-old women, declining slightly to 80 percent among 35- to 44-year-olds, rising to 82 percent among 45- to 54-year-olds, then falling again to 63 percent among women in preretirement ages (55–64), and finally dropping to 28 percent in postretirement ages of 65 to 74. Among prime-age women, nearly 82 percent were actively engaged in the labor force (Table 2).

Table 2: The Labor Force Participation Rate of 16- to 74-Year-Old Men and Women in the United States, by Age, PIAAC 2012/2014 (Standard Errors in Parentheses)

AGE	LABOR FORCE PARTICIPATION RATE	
	MALE	FEMALE
16-24	73.5 (1.7)	71.6 (2.3)
25-34	94.1 (0.9)	83.7 (1.1)
35-44	93.7 (1.2)	79.5 (1.8)
45-54	89.5 (1.5)	81.9 (1.4)
55-65	75.6 (2.2)	63.1 (2.2)
66-74	33.9 (2.9)	27.7 (2.2)
25-54	92.4 (0.6)	81.7 (0.9)

SOURCE: Organisation for Economic Co-operation and Development (OECD), Programme for the International Assessment of Adult Competencies (PIAAC), 2012/2014.

Race/Ethnicity

Male and female rates of labor force participation by race/ethnicity presented in Table 3 reveal that among men the labor force participation rate of Hispanic men was 6 percentage points higher than White men and 9 percentage points higher than Black men. There was no statistically significant difference between the labor force participation rates of White men and Black men, Asian men, or men of another race/ethnicity. Among women, there were no statistically significant differences in labor force participation rates between race/ethnicity groups.

Table 3: The Labor Force Participation Rate of 16- to 74-Year-Old Men and Women in the United States, by Race/Ethnicity, PIAAC 2012/2014 (Standard Errors in Parentheses)

RACE/ETHNICITY	LABOR FORCE PARTICIPATION RATE	
	MALE	FEMALE
White	80.7 (0.9)	71.7 (1.1)
Black	77.0 (2.2)	73.6 (2.5)
Hispanic	86.6 (1.4)	70.3 (2.7)
Asian, Pacific Islander	80.4 (3.5)	73.6 (3.4)
Other races	72.8 (5.6)	68.1 (4.9)

SOURCE: Organisation for Economic Co-operation and Development (OECD), Programme for the International Assessment of Adult Competencies (PIAAC), 2012/2014.

Nativity Status and English-Speaking Proficiency

Federal government data show that the labor force participation rate of immigrants exceeds that of native-born individuals. According to data from BLS, in 2018, the labor force participation rate of all working-age (16 years or older), foreign-born individuals was 65.7 percent versus 62.3 percent among their native-born counterparts. The entire immigrant labor force participation advantage is attributable to the higher labor force attachment of immigrant men. Foreign-born men were 10 percentage points more likely to participate in the labor force than native-born men (77.9% versus 67.3%) whereas the 2018 labor force participation rate among foreign-born women was 3 percentage points lower than native-born women (54.3% versus 57.6%).³⁸ The higher rate of participation among foreign-born men has often been attributed to traits such as strong earnings motivation and aspirations for economic improvement; the same traits that motivate them to migrate might also motivate immigrant men to participate more intensively in the labor force.³⁹

How does that square with the lower rates of labor force participation among foreign-born women relative to their native-born counterparts? Research on this issue attributes labor market behavior of immigrant women in the United States to gender roles in their native country, which often prioritizes traditional family-based roles for women rather than participating in the labor market. Over time, however, as immigrant women assimilate, their labor force behavior begins to resemble that of native-born women.⁴⁰

We used PIAAC data to take another look at this issue. One of the questions on the PIAAC survey asked respondents whether they were born in the United States. Using this variable, we have divided the 16- to 74-year-old population into two groups: native-born and foreign-born. The native-born group includes individuals who answered "yes" to the question "Were you born in the United States?"; those who answered "no" to that question are classified into the foreign-born group.

PIAAC-based labor force participation rates of 16- to 74-year-old men and women by their nativity status presented in Table 4 show that foreign-born males were over 7 percentage points more likely to participate in the U.S. labor market than native-born males (87.2% versus 79.9%). Among females, there was no statistical difference between the labor force participation rates of working-age women who were born abroad and their native-born counterparts (70.6% versus 71.9%).

Table 4: The Labor Force Participation Rate of 16- to 74-Year-Old Men and Women in the United States., by Nativity Status, PIAAC 2012/2014 (Standard Errors in Parentheses)

NATIVITY STATUS	LABOR FORCE PARTICIPATION RATE	
	MALE	FEMALE
Native-born	79.9 (0.8)	71.9 (0.9)
Foreign-born	87.2 (1.6)	70.6 (2.5)
Difference (foreign-born minus native-born)	7.3	-1.3

SOURCE: Organisation for Economic Co-operation and Development (OECD), Programme for the International Assessment of Adult Competencies (PIAAC), 2012/2014.

Labor force participation of men and women by their English-speaking skills is presented in Table 5. Respondents to the PIAAC survey self-rated their English-speaking skills on a four-point Likert scale representing the following categories of English-speaking proficiency: very well, well, not well, and not at all. Findings in Table 5 reveal that men with the poorest English-speaking skills—those who speak English not well or not at all—had the highest rate of labor force participation (87.5%). This group of poor English speakers is comprised mainly of foreign-born men who, as we saw, had much higher labor force participation rates than native-born men. The labor force participation rate among men with the best English-speaking skills (those who speak English very well) was 81 percent, and men with mid-level English speaking skills (those who speak English well) had a labor force participation rate of 77.4 percent.

In contrast, the labor force participation rate of women was positively related to their English-speaking skills. Women with the best English-speaking skills had the highest rate of labor force participation (73.6%) and those with the poorest English-speaking skills were least likely to participate in the labor force (55.3%; Table 5). These differences reflect the lower likelihood of labor force participation among foreign-born women who comprise a majority of the poor English-speaking group of women.

Table 5: Labor Force Participation Rate of 16- to 74-Year-Old Men and Women in the United States, by English Speaking Proficiency, PIAAC 2012/2014 (Standard Errors in Parentheses)

ENGLISH SPEAKING PROFICIENCY	LABOR FORCE PARTICIPATION RATE	
	MALE	FEMALE
Very Well	81.2 (0.9)	73.6 (0.9)
Well	77.4 (2.2)	62.8 (3.0)
Not well or not at all	87.5 (3.4)	55.3 (3.8)

SOURCE: Organisation for Economic Co-operation and Development (OECD), Programme for the International Assessment of Adult Competencies (PIAAC), 2012/2014.

Sensory/Learning Disability Status

The labor market outcomes of persons with disabilities are found to be consistently lower than persons without disabilities, based on standard Census Bureau household surveys such as the American Community Survey (ACS) and the Current Population Survey (CPS). Individuals with disabilities are less likely to participate in the labor market than their counterparts without disabilities, and when they do participate in the labor market, those with disabilities are less likely to find employment than those without disabilities.⁴¹

Analysis of the 2018 CPS data by the BLS found that the labor force participation rate of persons with a disability was under 21 percent, compared to 68 percent among those without disabilities. Among the nonelderly population (16–64), the labor force participation rate was 33.3 percent among persons with disabilities and nearly 77 percent among persons without disabilities. Across all age and educational groups, persons with disabilities were considerably less likely to participate in the labor force than persons without disabilities.⁴²

The measure of disability on the PIAAC survey differs from the CPS and ACS. PIAAC limits the scope of its disability measure to sensory and learning disabilities. The PIAAC measure of disability does not include physical or mental/emotional disabilities. Another difference is the absence of information in PIAAC regarding activities of daily living that pertain to the effect of a physical, mental, or emotional disability (that has lasted 6 months or more) on the respondents' ability to go outside the home, to work at a job or business, or to perform basic self-care functions such as bathing, dressing, or getting around the home. Because of these differences in the measure of disability in PIAAC data, we use the term sensory/learning disability status instead of disability status in this paper.

A comparison of the labor force participation rates of 16- to 74-year-old individuals with and without sensory/learning disabilities reveals a gap of 12.5 percentage points among men and 14 percentage points among women; both gaps are in favor of people without disabilities. The rate of labor force participation was 72 percent among men with sensory/

learning disabilities compared to 84 percent among their counterparts without them. Among women, 61 percent of those with sensory/learning disabilities participated in the labor force compared to 75 percent among those without them (Table 6).

Table 6: The Labor Force Participation Rate of 16- to 74-Year-Old Men and Women in the United States, by Sensory/Learning Disability Status, PIAAC 2012/2014 (Standard Errors in Parentheses)

SENSORY/LEARNING DISABILITY STATUS	LABOR FORCE PARTICIPATION RATE	
	MALE	FEMALE
Without sensory/learning disabilities	84.1 (0.7)	74.9 (0.9)
With sensory/learning disabilities	71.7 (1.6)	60.9 (2.0)
Difference (with disabilities minus without disabilities)	-12.5	-14.0

SOURCE: Organisation for Economic Co-operation and Development (OECD), Programme for the International Assessment of Adult Competencies (PIAAC), 2012/2014.

School Enrollment Status

The basic framework that economists use to study labor supply decisions is the labor-leisure trade-off that postulates that the "price" for every hour of work "labor" is an hour of "leisure"—a term used to include all activities other than labor market work. Nonlabor activities such as housework, family responsibilities, and caring for children and other adults are often cited as reasons for lower labor market participation of women compared to that of men. One of the non-labor market activities that affect the labor-leisure trade-off and the decision to participate in the labor market is enrollment in school. Individuals who are enrolled in school, particularly if they are enrolled full time, have fewer hours available to participate in the labor market and are therefore less likely to participate in the labor market.

Using school enrollment status information from the PIAAC database, we analyzed the rate of labor force participation of men and women by their school enrollment status.⁴³ Findings are presented in Table 7. Among men, those who were enrolled in school were much less likely to participate in the labor market than those who were not. Nearly 83 percent of out-of-school men were labor market participants at the time of the 2012/2014 PIAAC surveys compared to just 71 percent of their school enrolled counterparts; yielding a difference of 11.3 percentage points in favor of nonenrolled men.

Table 7: The Labor Force Participation Rate of 16- to 74-Year-Old Men and Women in the United States, by School Enrollment Status, PIAAC 2012/2014 (Standard Errors in Parentheses)

SCHOOL ENROLLMENT STATUS	LABOR FORCE PARTICIPATION RATE	
	MALE	FEMALE
Enrolled	71.4 (2.1)	73.4 (2.0)
Not enrolled	82.8 (0.6)	71.4 (1.0)
Difference (Enrolled minus not enrolled)	-11.3	2.1

SOURCE: Organisation for Economic Co-operation and Development (OECD), Programme for the International Assessment of Adult Competencies (PIAAC), 2012/2014.

Women's labor force participation was not sensitive to their school enrollment status. There was no statistically significant difference between the labor force participation rate of enrolled and nonenrolled women; 73 percent among those who were enrolled in school and 71 percent among those not enrolled. It is likely that there were other confounding factors such as age and presence of children that influenced women's labor force participation rate.

Marital/Cohabitation Status

Findings from our examination of the differences between labor force participation rates of men and women by their marital/cohabitation status are presented in Table 8. We use the label marital/cohabitation status instead of just marital status or cohabitation status because the PIAAC survey includes individuals living with their spouse (married) and those living with a partner (cohabiting) in one category. The difference between "married" and "married/cohabiting" in the United States is not large since a large majority of couples comprise individuals living with their spouse. Our analysis of 2017 American Community Survey data found that 89 percent of those who stated they were living with a spouse or a partner were married, and the remaining 11 percent were cohabiting. A large majority of respondents to the U.S. PIAAC survey who answered yes to the question about living with a spouse or a partner also were likely to be married individuals.⁴⁴

A look at the labor force participation of men and women by their marital/cohabitation status finds men who were married or living with a partner were considerably more likely to participate in the labor force than men who were single at the time of the 2012/2014 PIAAC surveys. Over 84 percent of married or cohabiting men were active labor force participants at the time of the 2012/2014 PIAAC surveys; a rate of participation that is 8.4 percentage points higher than that of single men. In contrast, the difference between the labor force participation rates of married/cohabiting women and single women was less than 1 percentage point (72.0% versus 71.4%; Table 8).

Table 8: The Labor Force Participation Rate of 16- to 74-Year-Old Men and Women in the United States, by Marital Status, PIAAC 2012/2014 (Standard Errors in Parentheses)

MARITAL/COHABITATION STATUS	LABOR FORCE PARTICIPATION RATE	
	MALE	FEMALE
Married/Cohabiting	84.3 (0.7)	72.0 (1.2)
Single	75.8 (1.3)	71.4 (1.2)
Difference (married/cohabiting minus single)	8.4	0.6

NOTE: Married/cohabiting individuals include those who are married (living with a spouse) as well as those who are cohabiting (living with a partner).⁴⁵

SOURCE: Organisation for Economic Co-operation and Development (OECD), Programme for the International Assessment of Adult Competencies (PIAAC), 2012/2014.

The connection between marriage and labor market outcomes of men has been widely studied. In 1998, George Akerlof found that married men were more likely to participate in the workforce, less likely to become unemployed from quitting their job, more likely to work full time, less likely to work just part of the year, and have higher wages.⁴⁶ Gary Becker in 1981 contended that because of specialization of household functions, there was a sexual division of labor in families. The result was that married men could focus more on their labor market work because wives took on the responsibility of caring for children and housework.⁴⁷ Marriage was therefore expected to result in an earnings premium for men and a penalty for women.

Over time, marriages have become more egalitarian. Although women still bear primary responsibility in the caring of children and also for many household functions, men increasingly share in the performance of household functions especially as married women have become more engaged in the labor market.⁴⁸ Still, despite more egalitarian marriages and a reduction in the sexual division of labor in performing household functions, the marriage premium for men has remained high. This suggests that something other than sexual division of household labor underlies marriage premiums for men. Married men might be more responsible, motivated, and productive than single men, or perhaps men who are productive, motivated, and responsible are more likely to marry.⁴⁹

Among women, although marital/cohabitation status by itself was not connected to their labor force participation, there were sizable differences in labor force participation between married/cohabiting mothers and single mothers. These differences are examined in the next section.

Marital/Cohabitation Status and Parental Status by Age of Youngest Child

In this section, we present findings from an examination of the labor force attachment among eight groups of men and women classified by their marital/cohabitation status and parental status by age of their youngest child. The definition of "individuals with children" differs considerably between PIAAC⁵⁰ and major U.S. household surveys such as the CPS and the ACS. The PIAAC survey identifies individuals with children by their *parental status*, that is, individuals who are parents of children (of any age) regardless of whether the child/children reside with them. ACS and CPS surveys (and analyses based on these surveys) focus on *household living arrangements*, identifying individuals with children as individuals whose children live with them in the same household.

The difference between the two definitions (PIAAC versus ACS/CPS) pertains to noncustodial parents, that is, parents who do not live in the same household as their child/children. For example, because of divorce or separation or another reason, men who have children that do not live with them are identified as having children according to the "fathers of children" definition in PIAAC data but are not identified as having children based on the "presence of children in the household" definition in ACS and CPS data. Therefore, PIAAC-based research measures the association between *parenthood* and labor force participation, whereas research based on other household data such as ACS and CPS measures the association between the *presence of children in the household* and labor force participation. The difference between PIAAC and ACS/CPS-based definitions is particularly important for men because, in a large majority of divorced or separated couples with children, mothers are the custodial parent. In 2015, custodial mothers represented 80 percent of custodial parents in the United States.⁵¹

Our analysis of PIAAC data focuses on the labor force participation rates of men and women by a combination of their marital/cohabitation status and parental status by age of their youngest child. Findings are presented in Figure 5 for the following eight groups of men and women: four parental status groups of married/cohabiting individuals and four parental status groups of single individuals. The four parental status groups include the following: without any children, with youngest child under age 6, with youngest child between ages 6 and 17, and with youngest child aged 18 or older.

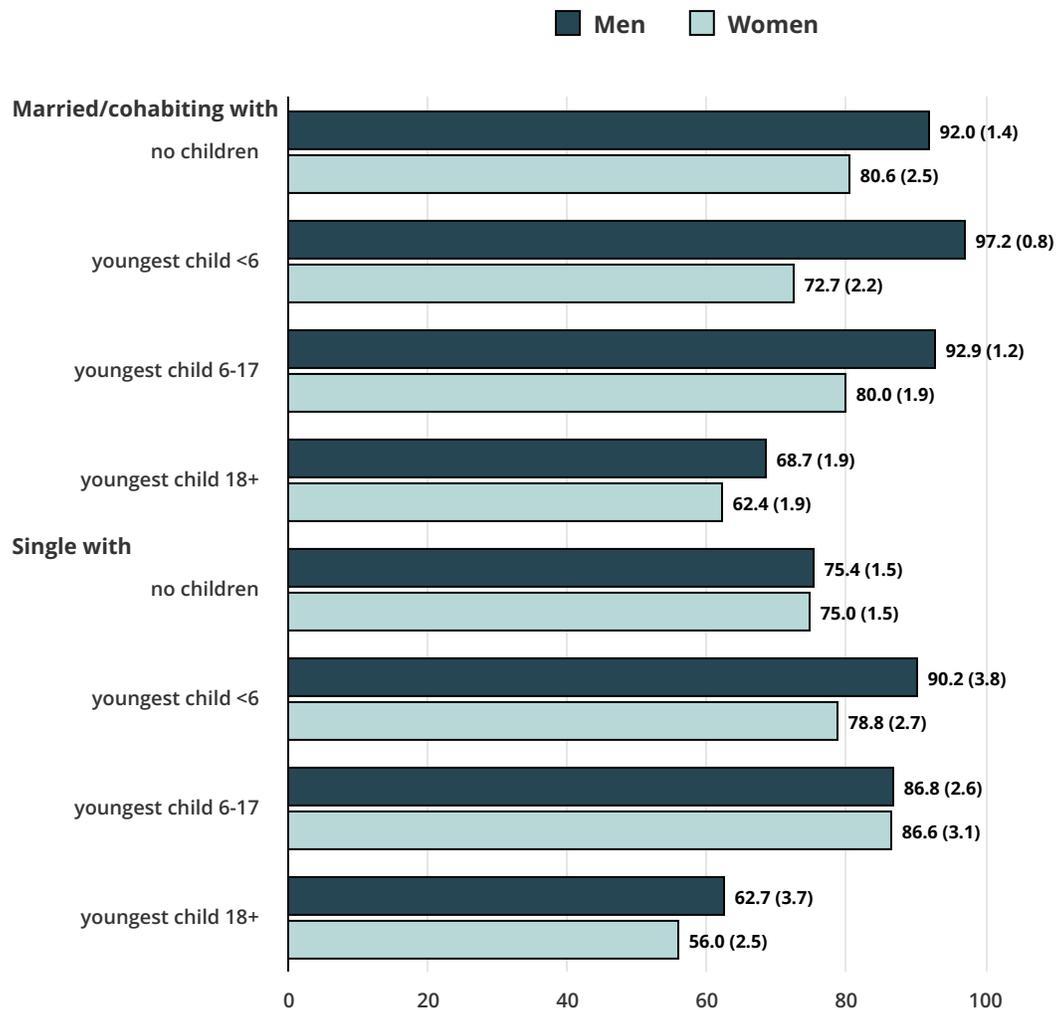
Our analysis of women revealed sizable differences between the labor force participation of married/cohabiting and single women by parental status, especially mothers of young children.⁵² Mothers of school-age children (ages 6–17) had the highest rate of labor force participation; nearly 87 percent among single mothers of school-age children and 81 percent among their married/cohabiting counterparts. Married/cohabiting women without any children had the same rate of labor force participation as married/cohabiting mothers of school-age children: 81 percent.

Single mothers have always had high rates of participation in the labor force. In fact, very little of the increase in women's labor force participation during the 1970s and 1980s is attributable to single mothers. Almost the entire rise came from married women, particularly those with children, whose labor force participation increased very rapidly in the 1970s and 1980s. This rise was then followed by a slowdown in the 1990s and a slight decline in the 2000s.⁵³ The sole breadwinner responsibility of single mothers has likely resulted in higher rates of participation among them. Juhn and Porter's analysis of the labor force participation of 20- to 60-year-old women in the United States found that even in 1969, when only 39 percent of married mothers were in the labor force, nearly 63 percent of single mothers were active labor force participants. By 2004, the gap between married and single mothers had narrowed considerably. The rate of labor force participation among married mothers increased to 68 percent (nearly 30 percentage points) and among single mothers it increased to 72 percent, representing an increase of 9 percentage points.⁵⁴

At the time of the 2012/2014 PIAAC surveys, nearly 79 percent of single mothers of young children (under age 6) were active labor force participants (Figure 5). The labor force participation rate of married/cohabiting mothers of young children was 73 percent, 6 percentage points lower than their single counterparts. Three-quarters of single women without children were in the labor force. Married/cohabiting or single mothers of adult children (age 18 or older) had the lowest rates of labor force participation. At the time of the 2012/2014 PIAAC surveys, 62 percent of married/cohabiting mothers of adult children and 56 percent of their single counterparts were participating in the labor force.

Part of the reason for lower job market attachment among women with adult children might be attributable to their age. Our analysis in this paper includes 16- to 74-year-old persons. Mothers of adult children are more likely to be older and, therefore, less likely to participate in the labor force. As noted in a previous section (on labor force participation patterns by age), after age 55, the labor force participation rate of women declined sharply (from nearly 82 percent among 45- to 54-year-olds to 63 percent among 55- to 64-year-olds and only 28 percent among women between the ages of 65 and 74). Regression analysis presented in the subsequent section, which is designed to disentangle the independent connection between each variable and the likelihood of labor force participation, will shed light on the likelihood of labor force participation among different marital/cohabitation and parental subgroups of women, including those with adult children.

Figure 5: Labor Force Participation Rate of 16- to 74-Year-Old Women and Men, by Marital/Cohabitation Status and Parental Status by Age of Youngest Child, PIAAC 2012/2014 (Standard Errors in Parentheses)



Source: Organisation for Economic Co-operation and Development (OECD), Programme for the International Assessment of Adult Competencies (PIAAC), 2012/2014.

In contrast, men's labor force participation behavior varied quite sharply by marital/cohabitation and fatherhood status. However, the link between marital/cohabitation and parenthood status and labor force participation among men was very different from that among women. At the time of the 2012/2014 PIAAC surveys, married/cohabiting fathers of young children (under 6 years old) had the highest rate of labor force participation: 97.2 percent. In sharp contrast, the labor force participation rate of married/cohabiting mothers of young children was among the lowest compared to other marital/cohabiting subgroups. The only other group of women with a lower rate of labor force participation was mothers of adult children whose older age might underlay their lower labor market attachment.

Among other groups of men, the labor force participation rate was between 90 and 93 percent among married/cohabiting fathers of school-aged children, married/cohabiting men without any children, and single fathers of young children. Single men with no children were considerably less likely to participate in the labor force than fathers of younger children. Only three out of four single, childless men were participating in the labor force at the time of the 2012/2014 PIAAC surveys. It is likely that the factors (discussed above) that motivate married/cohabiting men to participate in the labor market might also underlie higher likelihood of labor market participation among fathers, compared to men without any children.

Men with adult children, regardless of their married/cohabiting status, had the lowest rate of labor force participation. Similar to the potential cause of lower rates of labor force participation among mothers of adult children, the lower job market attachment of fathers of adult children might also be attributable to their age. Our analysis in this paper includes 16- to 74-year-old persons. Fathers of adult children are more likely to be older and, therefore, less likely to participate in the labor force.

Regression Analysis of Labor Force Participation among Working-Age Men and Women in the United States

Previous sections of this paper presented findings from a descriptive analysis of the labor force participation patterns among different groups of working-age (16–74) men and women. Findings show large labor force participation gaps by the level of human capital—literacy skills, numeracy skills, and educational attainment. Men and women with higher levels of skills and educational attainment were considerably more likely to participate in the labor force than their counterparts with lower levels of human capital. Analysis of labor force participation rate by age indicates a typical inverted *U*-shaped pattern among men and a moderately *m*-shaped pattern among women. There were some differences by race/ethnicity among men with a higher rate of labor force participation among Hispanic men compared to White and Black men, but there were no differences in the rate of labor force participation by race/ethnicity among women.

The descriptive analysis also found a higher rate of labor force participation among immigrant men compared to native-born men and no difference by nativity status among women. An examination of labor force participation rates by English-speaking proficiency found that men with poor English-speaking skills had a higher rate of labor market participation than men with mid- or high-level English-speaking skills. Among women, in contrast, those with the highest level of English-speaking skills had the highest rate of labor force participation.

Individuals with sensory/learning disability were found to have lower rates of participation than those without sensory/learning disabilities among men and women. Enrollment in school was associated with a lower rate of labor force participation among men but not among women.

Married/cohabiting men were more likely to participate than single men, but among women, there was no statistical difference between labor force participation rates of married/cohabiting and single women. However, there were significant differences in labor force participation rates among married/cohabiting mothers and single mothers by the age of their children. Single mothers were more likely to participate than married/cohabiting mothers, and mothers with school-age children were more likely to participate in the labor market than mothers with young children (under 6). Mothers with adult children had the lowest rate of participation in the labor force. Among men, married/cohabiting fathers of young children had the highest rate of labor force participation, followed by married/cohabiting fathers of school-age children and married/cohabiting men with no children. The lowest male labor force participation rates were among fathers of adult children and single men with no children.

In this section of the paper we present findings from a regression analysis that is designed to estimate the independent association between human capital characteristics and other demographic traits and marital/cohabitation/parental status of men and women and the likelihood of labor force participation among 16- to 74-year-old men and women. Regression analysis disentangles the association of the dependent variable with each independent variable by statistically holding constant all other independent variables included in the regression. We have used logistic regression analysis for this study, which is appropriate for cases where the dependent variable is discrete, consisting of labor force participation status that takes on the value 1 if the individual was in the labor force at the time of the 2012/2014 PIAAC surveys and 0 if the individual was not in the labor force at that time.

The explanatory variables in the regressions consist of variables that are known to affect labor force participation and include the following: two measures of human capital—skills and educational attainment—age, race/ethnicity, nativity status, English-speaking proficiency, sensory/learning disability status, school enrollment status, and region of residence in the United States. Additionally, these regressions include variables representing the marital/cohabitation status of individuals along with their parental status by age of their youngest child. Definitions and specifications of all variables included in the regressions are presented in Appendix B.

Labor force participation regressions are estimated separately for men and women. We have estimated a total of four logistic regressions: two regressions for men and two for women. The only difference between the two regressions for each gender is the measure of skills; the first regression includes the PIAAC literacy skills score as a measure of skills, and the second includes the PIAAC numeracy score. Findings from the two regressions for men are presented in Table 9 and for women in Table 10. Estimated regression coefficients and their standard errors for all four regressions are presented in Appendix C.

Regression Analysis of the Likelihood of Labor Force Participation of Men

Human Capital: Skills and Educational Attainment

The descriptive section revealed a strong positive connection between skills and labor force participation of both men and women. The labor force participation rate of both genders increased sharply with literacy and numeracy proficiencies. Two statistical models designed to separately measure the independent effects of literacy and numeracy skills and other background variables on the likelihood of labor force participation are presented for men and women. Models were specified for men and women separately because the marital/cohabitation status and the presence of children seem to have a different relationship to the decision to work for men and women.

We begin our discussion with regression findings for men's labor force participation in Table 9. These two models reveal a positive association between literacy and numeracy skills and male labor force participation. After controlling for educational attainment and all the other explanatory variables included in Regression 1 (with literacy skills), the findings show that a 1 standard deviation unit increase in the PIAAC literacy test score of men was associated with an increase in the likelihood of participation in the labor force by 2.4 percentage points. Numeracy skills have a stronger association with male labor force participation. An increase in the PIAAC numeracy test score by 1 standard deviation unit was associated with an increase in the likelihood of male labor force participation by 3.6 percentage points.

The other measure of human capital—educational attainment—was also estimated to have a strong association with the likelihood of labor force participation among American men. Compared to high school graduates, men with lower than a high school education are 5.4 percentage points less likely to participate in the labor force. Males who completed some college without earning a college credential were 7.1 percentage points more likely to participate than high school graduates. The labor force participation of men with a college or postsecondary certificate below the associate degree level is not expected to be any different from that of high school graduates. Earning a college degree was associated with

sizable increases in labor force participation. Men with a college degree at the associate's, bachelor's, master's, or higher level were, respectively, 7.9, 5.7, and 9.3 percentage points more likely than their high school graduate counterparts to be active in the labor force, that is, employed or actively looking for work (Table 9, Regression 1).

Findings for numeracy (Regression 2) in Table 9 for males show similar a regression-adjusted association between education and male labor force participation. However, the sizes of the associations (percentage points) between the education variables and the likelihood of male labor force participation in Regression 2 (with numeracy skills) were somewhat smaller than in Regression 1 (with literacy skills).

Findings for the remaining variables in the male labor force participation regressions are very similar for literacy and numeracy. Therefore, discussion of the remaining variables from the male regressions will be based on findings for the literacy regression.

Age

As noted in the descriptive section, labor force participation is closely related to age for men as well as women. The labor force participation of men increased between teen/young adult years (16–24) and prime working-age (25–54) and declined thereafter. Findings in Table 9 reveal that compared to the base group (16- to 24-year-olds), men in the prime working-age group (25–54) were 5 percentage points more likely to participate in the labor force. And older men, those between the ages of 55 and 74, were 17 percentage points less likely to be in the workforce than their younger counterparts between the ages of 16 and 24 years.

Race/Ethnicity, Nativity Status, English Speaking Proficiency

Regression results show little variability in the likelihood of labor force participation of men by race/ethnicity. In the literacy regression (Regression 1), there was no statistically significant difference between the likelihood of labor force participation of men of all races compared to White men. The numeracy model also found no differences in participation by race/ethnicity. Neither model found any statistically significant differences between the labor force participation of men who are born abroad and their native-born counterparts. The regression also found no statistically significant association between English speaking proficiency and the rate of male labor force participation.

Sensory/Learning Disability and School Enrollment Status

Sensory/learning disability and enrollment in school are expected to have a strong negative association with the likelihood of male labor force participation. The regression results found that men with sensory/learning disabilities were 5 percentage points less likely to be in the labor force than their counterparts without these disabilities. Men enrolled in school are 11 percentage points less likely to be engaged in the labor market than those not enrolled in school.

Table 9: Regression-Based Estimates of Expected Percentage Point Change in the Likelihood of Labor Force Participation Rate of 16- to 74-Year-Old Men, PIAAC 2012/2014

VARIABLE	EXPECTED PERCENTAGE POINT CHANGE	
	LITERACY (REG. 1)	NUMERACY (REG. 2)
One standard deviation ¹ change in literacy score (Model 1)	2.4***	—
One standard deviation ² change in literacy score (Model 2)	—	3.6***
Educational attainment level (base group is high school graduates or GED)		
Less than high school	-5.4***	-4.9***
Some college	7.1***	6.5***
Certificate below Associate Degree	0.8	0.2
Associate's degree	7.9***	7.5***
Bachelor's degree	5.7***	4.7
Master's or higher degree	9.3***	7.9***
Age (base group is 16- to 24-year-olds)		
25-54	5.0***	5.1***
55-74	-17.2***	-17.1***
Race/ethnicity (base group is White)		
Black	0.8	2.4
Hispanic	5.7	6.3**
Asian/PI	-7.7	-7.3
Other races	-1.3	-0.8
Nativity status (base group is native-born)		
Foreign-born	5.4	5.2
English speaking proficiency (base group is Speak English "well")		
Very well	-0.6	-0.6
Not well or not at all	6.5	6.6
Sensory/learning disability status (base group is without disabilities)		
With sensory/learning disabilities	-5.4***	-5.1***
School enrollment status (base group is not enrolled in school)		
Enrolled	-11.1***	-11.5***
Marital/cohabitation & parental status by age of youngest child (base group is single with no children)		
Married/cohabiting with youngest child under 6	19.9***	19.6***
Married/cohabiting with youngest 6-17	10.6***	10.6***
Married/cohabiting with no children	12.8***	12.4***
Single with youngest child under 6 years	8.6	8.8
Single with youngest child 6-17	3.4	3.5
Single or married/cohabiting with adult children (18+)	2.9	2.7
Region of residence (base group is South region)		
Northeast	1.5	1.4
Midwest	5.5***	5.5***
West	2.4	2.4
N = 3,885		

¹ One standard deviation of the literacy score of all 16- to 74-year-old persons = 50.81

² One standard deviation of the numeracy score of all 16- to 74-year-old persons = 55.98

— Not applicable.

Statistical significance: *** sig. at .01 level, ** sig at .05 level.

SOURCE: Organisation for Economic Co-operation and Development (OECD), Programme for the International Assessment of Adult Competencies (PIAAC), 2012/2014

Marital/Cohabitation Status and Parental Status by Age of Youngest Child

As noted in the descriptive section, married/cohabiting men with young children (under 6) had the highest rate of labor force participation. The regression findings reveal that even after regression controls for skills, education, and other demographic traits, married/cohabiting men with children under 6 were nearly 20 percentage points more likely to participate in the labor force compared to single men without any children (the base group). The regression findings reinforce the strong association between marriage/cohabitation and labor force participation among men. Married/cohabiting men with school-aged children (6–17 years old) as well as married/cohabiting men without any children are expected to have a substantially higher likelihood of participating in the labor force (10.6 and 12.8 percentage points, respectively) compared to single men without any children.

Among single men, the presence of children was not associated with a different rate of labor force participation. After regression controls for skills, education, and demographic traits, the likelihood of labor force participation among single men with children (of any age: under 6, 6–17, and 18-plus) was not statistically different from that of single men without children. The likelihood of labor force participation among men with adult children, regardless of their marital/cohabitation status, also was not statistically different from single men without any children.

Region of Residence

Labor force participation measures the willingness of individuals to supply their labor services in the labor market. All the variables included in the male labor force participation regressions discussed above measure the connections between personal traits of men and their likelihood of participating in the labor force. The last variable in the regression, region of residence, measures the labor force environment in which individuals are making their labor supply decisions. The strength/weakness of the labor market in which individuals are operating influences their decision to participate/supply their labor services.

When the labor market weakens, individuals lose their jobs and become unemployed; that is, they are not working but actively looking for work. However, as employment opportunities diminish, many unemployed individuals who have been out of a job for long periods of time are likely to exit the labor force entirely by ceasing to look for work. This phenomenon was one of many factors that drove the labor force participation rates down during and after the Great Recession of 2008–2009. And, as stated in the introduction section, the strength of the labor market over the past few years resulted in a recent uptick in the labor force participation rate.

Regions in which individuals reside also differ in other ways such as industrial and occupational composition of jobs, skill and educational requirements of available jobs, the extent of competitiveness in the labor market (the skills and education of other workers in the region competing for the same jobs), and institutional factors such as minimum wage laws and other work-related regulations. Labor market conditions are known to influence labor force participation decisions of individuals.

Findings reveal there was no statistical difference in labor force participation of men residing in the South (the base group) and their counterparts in the Northeast and West regions. However, men residing in the Midwest region of the country are expected to be more likely (5.5 percentage points) to participate in the labor force than the base group (men residing in the South region). It must be noted that because these regions are large, they may not capture differences in the male labor force participation that may exist across smaller geographic areas. Unfortunately, these four regions are the smallest geographic areas identified in the PIAAC data file.

In summary, male labor force participation regressions found a strong positive association between human capital and the likelihood of labor force participation. Men with higher levels of literacy and numeracy skills and higher levels of educational attainment were more likely to participate in the labor force. Younger men (16–24) and older men (55–74) were less likely to participate in the labor force than men of prime working ages. The regressions found that there was no statistical difference between the likelihood of labor force participation by race/ethnicity, nativity status, and English-speaking ability with one exception: the regression for numeracy (regression 2) found that Hispanic men were 6 percentage points more likely than White men to participate in the labor market. The sensory/learning disability status and school enrollment status were found to have strong and statistically significant association with the likelihood of labor force participation among men. Men with disabilities and those enrolled in school were less likely to participate in the labor force than their counterparts without disabilities and school enrollment.

Regression analysis also found a very close association between the likelihood of labor force participation and the marital/cohabitation and fatherhood status of men. Findings point to a stronger association with marital/cohabitation status: the likelihood of labor market participation was found to be sharply higher among married/cohabiting men (with children under 18 or without children) compared to the single men without any children (the base group). Among single men, however, the regression analysis found no difference in the likelihood of labor force participation by fatherhood status; that is, no statistical difference was found between the likelihood of labor force participation of single men with children (of all ages: under 6, 6–17, and 18-plus) and single men without any children (the base group).

Regression Analysis of the Likelihood of Labor Force Participation of Women

Findings from logistic regression analysis of the labor force participation of 16- to 74-year-old women are presented in Table 10. Like the regression analysis for men, we have estimated two labor force participation regressions for women. The first regression includes the literacy test scores of women, and the second regression includes numeracy test scores.

Human Capital: Skills and Educational Attainment

Descriptive analysis presented in earlier sections of this paper indicated a close link between women's labor force participation and the stock of human capital that they possess. Increases in labor force participation with increases in levels of literacy and numeracy proficiency and educational attainment were much larger among women than among men. For example, the labor force participation rate gap between individuals with literacy proficiency level 4/5 and level 1 was 24.4 percentage points among women and 13.4 percentage points among men. Similarly, women's labor force participation rose more sharply with higher levels of educational attainment than it did for men. The labor force participation rate of women with a master's or higher degree was 21.2 percentage points higher than that of women with just a high school diploma; among men, this difference was 9.5 percentage points. Of course, some of the lower sensitivity of labor force participation among men might be attributable to their already higher rates of labor force participation, including among poorly educated men, leaving little room for increase. However, among women, higher levels of skills and educational attainment are indeed associated with sizable increases in labor force participation.

The size of labor force participation premiums associated with higher skills and educational attainment among women remained high even after regression controls for other demographic traits. The likelihood of participating in the labor force among women is expected to be 3.3 percentage points higher for 1 standard deviation unit increase in the PIAAC literacy test score and 4.2 percentage points for numeracy.

As with the regressions for men, since the literacy and numeracy regressions are similar for the remainder of the variables, the discussion below is based on findings for the regression with literacy scores (Regression 1).

In comparison with women who had completed a high school level education, the likelihood of participating in the labor force is expected to be about 8.5 percentage points lower among women with less than a high school level education. Women with some college education (without any college credentials) are expected to have the same likelihood of

labor force participation as high school graduates. Women with a postsecondary certificate award below the associate degree level are expected to be 9.5 percentage points more likely to participate in the labor market; this finding stands in sharp contrast from that observed for men, for whom no regression-adjusted gain in labor force participation was found for postsecondary education below the associate's degree. Women with an associate's, bachelor's, or master's and higher degree, respectively, are expected to be 6.4, 9.6, and 16.1 percentage points more likely to be in the labor force than women with just a high school diploma.

Age

In the descriptive analysis, the link between age and labor force participation among women was somewhat uneven compared to men. Among men, labor force participation started out low for 16- to 24-year-olds, many of whom were likely engaged in schooling at that age; increased as men crossed age 25; moved into the lower end of prime working age (25–54); peaked at ages 35 to 44; and declined thereafter. Among women, labor force participation started out low at young ages (16–24) when, like men, many women are primarily engaged in schooling activities, and increased among those at the lower end (25–34) of the prime working age (25–54) range. After that, women's labor force participation declined between ages 35 and 44, when many women likely withdrew from the labor force as they engaged in child rearing and other related family responsibilities. Between the ages of 45 and 54, women's labor force participation rate increased again, declined in the preretirement ages of 55 to 64, and sharply declined again as they crossed the traditional retirement age of 65.

Regression analysis found that compared to women between the ages of 16 and 24, there was no statistical difference in the labor force participation of prime working age women (25–54) and a nearly 19-percentage-point lower likelihood of labor force participation among older women, ages 55 to 74. These findings were different from male regressions that found a 5-percentage-point higher rate of labor force participation among prime-age men relative to younger men (16–24) after accounting human capital traits and other regression controls.

Race/Ethnicity, Nativity Status, English Speaking Proficiency

After regression controls, the likelihood of labor force participation among women is not expected to be different across race/ethnicity groups. There was an exception in the regression with numeracy skills (Regression 2), which found a 5-percentage-point higher likelihood of labor force participation among Black women compared to White women (the base group). Regression-adjusted estimates of the difference between the likelihood of labor force participation of foreign- and native-born women was not statistically significant.

English speaking proficiency, however, was estimated to have a positive association with women's labor force participation. Compared to the base group—women with mid-level English speaking proficiency (those who spoke English "well")—women with the best English-speaking proficiency (those who spoke English "very well") are 5 percentage points more likely to be in the labor force. Regression analysis found no statistical difference in the likelihood of labor force participation between women with a low level of English speaking skills (those who spoke English "not well" or "not at all") and women who spoke English "well" (the base group).

Sensory/Learning Disabilities and School Enrollment Status

Women with sensory/learning disabilities were 6.6 percentage points less likely to participate in the labor force. There was no statistically significant difference in the likelihood of labor force participation between women enrolled in school and their nonenrolled counterparts.

Marital/Cohabitation Status and Parental Status by Age of Youngest Child

Regression findings indicate that in comparison to women in the base group (single women without any children), married/cohabiting women with young (under 6) children were 12 percentage points less likely to be in the labor force. Even after all the regression controls, married women with young children had a much lower likelihood of participating in the labor force. There was no statistically significant difference between the likelihood of labor force participation between the base group and the remaining five groups of women based on their marital/cohabitation status and parental status by age of youngest child. For women, marital/cohabitation status and the presence of school aged children do not appear to influence the likelihood of participation in the labor market.

Table 10: Regression-Based Estimates of Expected Percentage Point Change in the Likelihood of Labor Force Participation Rate of 16- to 74-Year-Old Women in the United States, PIAAC 2012/2014

VARIABLE	EXPECTED PERCENTAGE POINT CHANGE	
	LITERACY (REG. 1)	NUMERACY (REG. 2)
One standard deviation ¹ change in literacy score (Model 1)	3.3***	—
One standard deviation ² change in literacy score (Model 2)	—	4.2***
Educational attainment level (base group is high school graduates or GED)		
Less than high school	-8.5***	-8.2***
Some college	3.2	2.9
Certificate below Associate Degree	9.5***	9.3***
Associate's degree	6.4**	6.2**
Bachelor's degree	9.6***	8.8***
Master's or higher degree	16.1***	15.2***
Age (base group is 16- to 24-year-olds)		
25-54	5.5	5.3
55-74	-18.5***	-18.6***
Race/ethnicity (base group is White)		
Black	3.9	5.3**
Hispanic	3.3	3.9
Asian/PI	-2.2	-2.1
Other races	-1.7	-1.3
Nativity status (base group is native-born)		
Foreign-born	3.6	3.2
English speaking proficiency (base group is Speak English "well")		
Very well	5.2***	5.4**
Not well or not at all	-1.3	-1.4
Sensory/learning disability status (base group is without disabilities)		
With sensory/learning disabilities	-6.6***	-6.5***
School enrollment status (base group is not enrolled in school)		
Enrolled	-4.0	-4.3
Marital/cohabitation & parental status by age of youngest child (base group is single with no children)		
Married/cohabiting with youngest child under 6	-12.1***	-12.2***
Married/cohabiting with youngest 6-17	-1.4	-1.4
Married/cohabiting with no children	0.9	0.6
Single with youngest child under 6 years	1.1	1.3
Single with youngest child 6-17	7.9	7.9
Single or married/cohabiting with adult children (18+)	-2.1	-2.1
Region of residence (base group is South region)		
Northeast	3.8	3.8
Midwest	5.3**	5.2**
West	6.8***	6.7***
N = 4,535		

¹ One standard deviation of the literacy score of all 16- to 74-year-old persons = 50.81

² One standard deviation of the numeracy score of all 16- to 74-year-old persons = 55.98

— Not applicable.

Statistical significance: *** sig. at .01 level, ** sig at .05 level.

SOURCE: Organisation for Economic Co-operation and Development (OECD), Programme for the International Assessment of Adult Competencies (PIAAC), 2012/2014

Region of Residence

Women residing in the West or Midwest regions of the country were more likely to be in the labor force than those who reside in the South region (the base group). Women residing in the West were expected to have a nearly 7-percentage-point greater likelihood of labor force participation compared to women in the South. Women residing in the Midwest also were expected to have a higher likelihood of labor force participation (5 percentage points) than those in the South. The regression found no statistically significant difference between the likelihood of labor force participation among women residing in the Northeast and South regions.

In summary, women's participation in the labor force is closely related to their human capital traits. Even after regression controls, women with higher levels of skills and educational attainment are considerably more likely to participate in the workforce. Unlike men, whose labor force participation increased steadily by age, reached a peak and declined thereafter, women's prime working-age period is characterized by an uneven pattern of participation—increasing between ages 25 and 34, declining between ages 35 and 44, and increasing again between ages 45 and 54. As a result, prime working-age women had a small participation advantage compared to 16- to 24-year-olds. The regression analysis found no statistically significant difference in the likelihood of participating in the labor force between prime-age women and young women (16 to 24 years old) and a lower likelihood of participation among older women compared to their younger (16–24) counterparts.

The regression analysis found no statistical difference between the likelihood of labor force participation of women across race/ethnicity groups except for a higher likelihood of labor force participation of Black women over their White counterparts in the numeracy regression (Regression 2). Likewise, there was no statistically significant difference between the likelihood of labor force participation between foreign- and native-born women. Women with the best English-speaking skills were more likely to be in the workforce than the base group—women with mid-level English speaking skills—and there was no regression-adjusted difference in the likelihood of workforce participation between women with poor and mid-level English speaking skills.

Women with sensory/learning disabilities were less likely to participate in the labor force than their counterparts without these disabilities. Compared to single women without any children, married/cohabiting women with young children were considerably less likely to be in the labor force. All other women (single mothers of young children, married/cohabiting mothers of school-age children, married/cohabiting women without any children, and all women with adult children) were expected to be as likely as single women without any children to be in the labor force. The regression analysis found differences in labor force

participation of women by their region of residence: women living in the Midwest or West regions were more likely to be in the labor force than those living in the South. The likelihood of women living in the Northeast being in the labor force was the same as women living in the South.

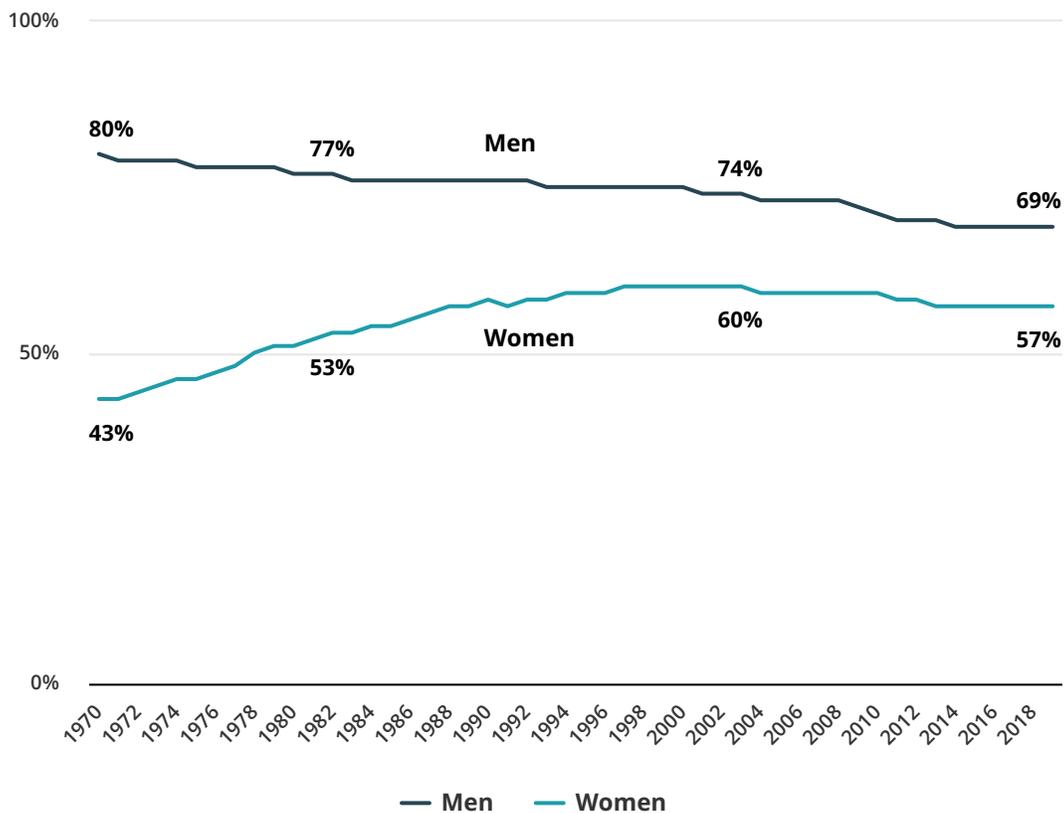
Some Implications of the Findings

Raising Labor Force Participation to Bolster Long-Term Economic Growth

The ability of a state, region, or nation to prosper is inextricably connected to the size and skills of its labor force. Increases in the number of working-age persons who are willing and able to work and raise the productive capacity of an economy are critical for economic growth and prosperity. Improvements in the human capital, especially the cognitive abilities of these workers, when employed effectively in the labor market, account for much of the rise in living standards in the United States and around the world.⁵⁵ In the United States, the current and projected slowdown in the growth of the nation's labor force means that the nation can expect a slowdown in the pace of long-term economic growth.

Our analysis in this paper revealed very different patterns of labor force attachment for American men and women over the past 50 years. Female labor force participation increased considerably during the three decades between 1970 and 2000, fueled largely by gains among married mothers with children under age 18. This rise in female labor market attachment expanded the productive capacity of the nation and spurred economic growth. The labor force attachment of women peaked in 2000 when 60 percent of women were actively participating in the labor force; after the peak it remained essentially unchanged until the Great Recession in 2008. In 2019, the female labor force participation rate stood at 57 percent.

Figure 6: Trends in Mean Annual Labor Force Participation Rates of Men and Women in the United States, 1970 to 2019



Source: Current Population Survey, U.S. Bureau of Labor Statistics, data extraction tool <https://www.bls.gov/cps/>

In sharp contrast, male labor force attachment has declined considerably over the past 50 years. During 1970, 80 percent of all men were active participants in the labor force. In 2019, the male labor force participation rate had dropped to 69.2 percent. A particularly troublesome element of this decline has been the decline in labor force participation among prime-age men. As observed earlier, the labor force participation rate of prime-age men fell from 96 percent in 1970 to 89 percent by 2019. Fewer men (or women) engaged in the job market means reduced productive potential for the economy and slower growth in output, employment, and income.

Findings from the descriptive as well as regression analysis suggest that while the association between human capital and labor force participation is positive for women and men, it is much stronger among women. Literacy and numeracy skills and educational attainment are strongly related to labor force participation among women. Indeed, some observers have argued that as women changed their expectations of labor force

participation more than a half century ago, they began to invest much more heavily in their stock of human capital, both through educational attainment and work experience, to capture the rising earnings advantage to human capital in the U.S. labor market.⁵⁶

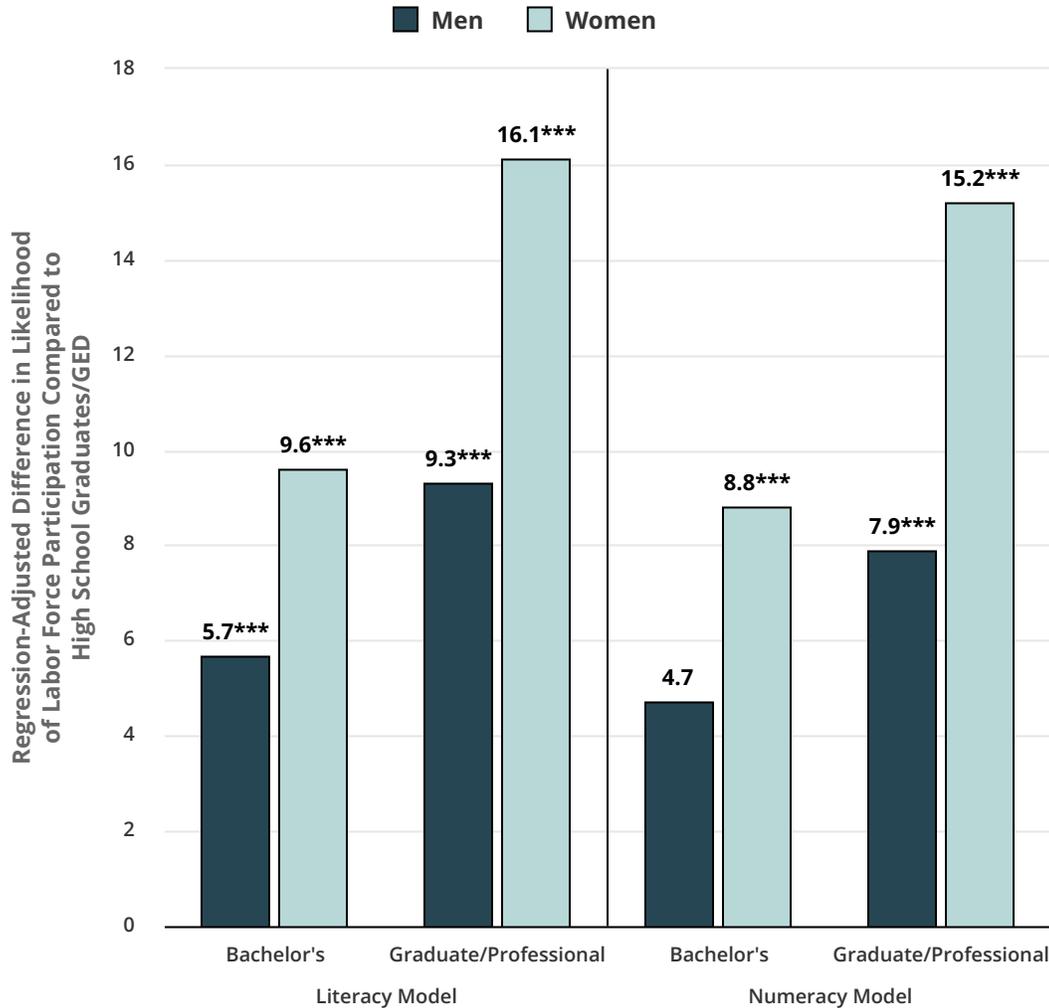
Labor force participation rates of both males and females increase with higher literacy and numeracy proficiencies; however, the marginal increase in labor market attachment associated with increased skills is substantially greater for women. This suggests that the impact of strategies to bolster cognitive skills on increasing labor force attachment may be greater for women than for men.

The effect of educational attainment on labor force participation was found to be somewhat different for men than for women. Earning a bachelor's and graduate/professional degree for both men and women is positively connected to labor participation attachment. However, the regression models found substantially larger gains in the likelihood of labor force participation for women. Women with a bachelor's degree are expected to be 8.8 percentage points more likely to participate in the labor force than those with just a high school diploma, after controlling for numeracy skills (numeracy model) and 9.6 percentage points after controlling for literacy skills (literacy model).

In contrast, the gain to earning a bachelor's degree was much more modest for men. Indeed, the numeracy model found no significant advantage in labor force attachment for men who had a bachelor's (but no higher) degree compared to their high school graduate counterparts. The literacy model found a gain of 5.7 percentage points in the likelihood of labor force participation, equal to about 59 percent of the 9.6 percentage point expected gain observed for women.

The regression-adjusted gain in labor force participation from holding a graduate or professional degree was also much greater for women than for men. The labor force participation rate of women with an advanced degree is expected to be between 15.2 and 16.1 percentage points higher than that of women with a high school diploma; considerably higher than the 7.9- and 9.3-percentage-point labor force participation advantage for men with advanced degrees relative to their high school graduate counterparts.

Figure 7: Regression-Adjusted Differences between Labor Force Participation Rates of 16- to 74-Year-Old Individuals with a Bachelor's or a Graduate/Professional Degree compared to those with just a High School Diploma, by Gender, United States, 2012/2014



Statistical significance: *** sig. at .01 level, ** sig at .05 level

Part of the explanation for the much stronger association between degree attainment and labor force participation among women is that the labor force participation rate for men remains substantially higher than that of women, leaving less room for gains as the participation rate rises toward its maximum. The lower overall rate of labor force participation among women means that the potential to create additional gains associated with earning a college degree is greater. Rising educational attainment of women and commensurate increase in their labor force participation suggest that the gender gap in labor force participation is likely to narrow in the future.

In recent years, there has been a growing concern about the decoupling of academic awards and the development of skills and abilities. Eric Hanushek has argued that national economic growth is not closely related to educational attainment per se but rather to improvements in cognitive abilities of the population. Attainment without skills gains contributes little to long-term economic growth.⁵⁷ Earlier analysis of the PIAAC findings for the United States has shown that at the bachelor's and higher levels, a substantial share of college graduates have literacy and numeracy skills that are below levels considered necessary for success in the American labor market.⁵⁸ The value of a college degree is diminished in the U.S. labor market if it is not accompanied by the acquisition of a commensurate level of skills. Problems of mal employment among college graduates are but one of several important manifestations of the negative impact of skill deficits among college graduates.⁵⁹

Below the bachelor's degree level, the connection between more schooling, academic credential awards and labor force attachment is more mixed. An unexpected finding for women was the large positive association between labor force participation and earning a certificate below the associate degree level. Regression analysis for women found that earning a certificate below the associate level was associated with a 9-percentage-point increase in the likelihood of labor force participation. In contrast, the regression for men found no statistically significant relationship between a certificate award and increased labor force participation.

Analysis of the 2012/2014 PIAAC data reveal that women were more likely to earn a certificate than men; there were 121 women holding a postsecondary certificate per 100 men. However, we find very large differences between men and women in the fields of study in which their certificate was awarded. Out of 10.2 million women with certificates, 4.5 million or 44 percent had a certificate award in a health field, including health technicians and health care support occupations. In contrast, just 6 percent of men earned a certificate in a health field. The ratio of female to male certificate holders in health fields was more than 9 to 1.

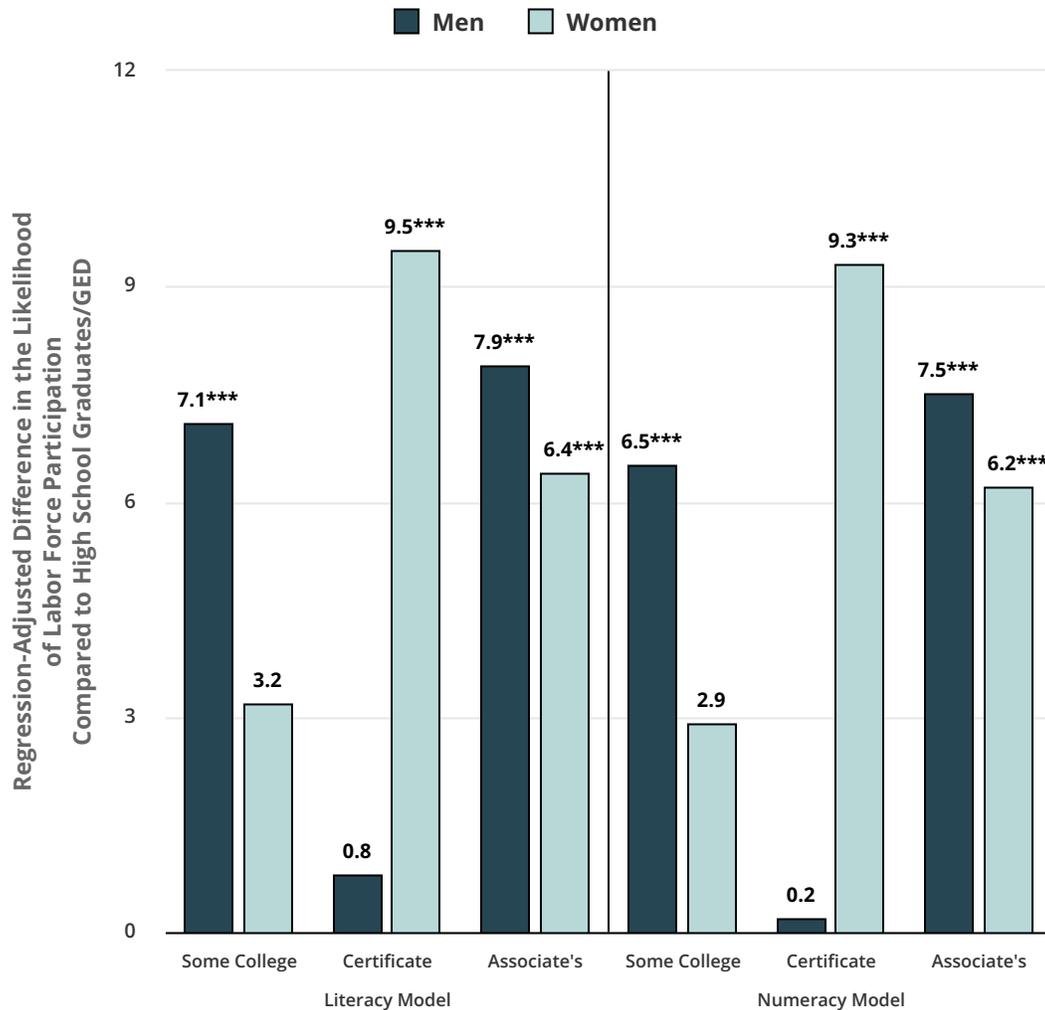
We suspect that part of the reason for the labor force participation premium observed for women with postsecondary certificates (but not for men) is associated with their very heavy concentration in health fields and elevated labor force attachment among women with healthcare certificates. The labor force attachment of women with a certificate in a health field was substantially higher than for women in other fields. The PIAAC survey found that women who opted to earn a certificate in a health field had a labor force participation rate of 82.5 percent, while their counterparts in all other fields combined had a labor force participation rate of 74.5 percent; a difference of 8 percentage points in favor of women with postsecondary certificates in health fields. Women's attraction to healthcare and their

elevated labor force attachment in the field may be related to the high degree of temporal flexibility generally found in healthcare occupations without the part-time wage penalty that is typically associated with such flexibility.⁶⁰

The level of demand for workers with certifications in health fields has been among the most rapidly rising in the American economy. Work in these occupational areas is likely to be more attractive to women, who are more likely to place a high value on flexibility in work schedules. Healthcare support technicians and healthcare support occupations are expected to be among the most rapidly growing in the U.S. labor market.⁶¹ According to the BLS, employment in these occupations is projected to rise by almost 663,000 by 2029, accounting for 10 percent of the total projected increase in employment in the nation over the decade.⁶² The pace of growth in these fields is expected to be 2.7 times that of the overall rate of total national employment growth. Efforts to increase male participation in postsecondary certificate programs in order to increase their labor force participation need to focus on fields with the best employment prospects. And, for the foreseeable future, the best employment opportunities are projected to be in healthcare support occupations.

Although certificate awards are not related to increased labor force attachment among men, the regressions found that men who attended college or trade school after high school completion without earning an academic award were considerably more likely to participate in the labor force compared to their high school graduate counterparts; 7.1 and 6.5 percentage points in the literacy and numeracy regression models, respectively. In sharp contrast, regression models for women found no statistically significant difference between the labor force participation of those who completed some postsecondary education without an award and those who only completed high school.

Figure 8: Regression-Adjusted Differences between Labor Force Participation Rates of 16- to 74-Year-Old Individuals with Postsecondary Education Below Bachelor's Degree and those with just a High School Diploma, by Gender, United States, 2012/2014



Statistical significance: *** sig. at .01 level, ** sig at .05 level

This finding is puzzling. It is unclear why only men (and not women) with some college and no academic award experience such elevated probabilities of labor force participation compared to their counterparts with just a high school education. Part of the explanation may be the difference between men and women in their postsecondary experiences. The "some college, no degree" attainment category is a large catchall classification that includes individuals ranging from those who were enrolled in trade schools that do not offer academic credentials to those who had enrolled in four-year universities, but never earned an academic award.

The trade school educational experience can range from software coding to truckdriver training to beautician and hair stylist programs. Such training programs sometimes lead to occupational licenses that require contact hours but no degree award. There might be differences between men and women with this level of education (some college education and no academic award) in the kinds of educational programs in which they participate and perhaps their connections to occupational licensing outcomes. And these differences likely have some bearing on why just men (and not women) with some college and no academic award enjoy a large labor force participation advantage over their counterparts with just a high school diploma. Further research on labor market outcomes of individuals with education below the bachelor's degree is warranted using an enhanced sample when an additional round of the PIAAC survey becomes available as well as other data sources.

Marriage/cohabitation and, to a lesser extent, parental status, were found to play a much more important role than human capital in the labor force participation of men. Single men with no children were substantially less likely to participate in the labor market compared to married men with or without children. Married men with children under the age of 18 had labor force participation rates between 93 and 97 percent. Married men with no children had a similarly high participation rate of 92 percent. In contrast, just 75 percent of single men without children were actively engaged in the labor force. Single fathers, however, had higher rates of labor market engagement than single men without children. About 90 percent of single fathers with a child under age 6 and 86 percent of single fathers with a school aged child (6–17) were active labor force participants.

The regression analysis of male labor force participation found that even after accounting for human capital and other factors, there was a strong association between marital/cohabitating status and labor force attachment of men. Married/cohabiting fathers of young children under the age of 6 had a 20-percentage-point higher likelihood of labor force participation than single men with no children. Similarly, married/cohabiting fathers with children aged 6 to 17 had a 10-percentage-point higher likelihood of labor force participation than single men without children. Even married/cohabiting men with no children had an expected job market participation advantage of 12 percentage points relative to single men without any children. The regression findings reveal that men with children (under 18) who are not married or cohabiting are no more likely to participate in the labor force than their counterparts without children, after differences in human capital and other traits are taken into account.

The regression analysis found no statistically significant association between the parental status of single men and their labor force participation. Findings from male regressions revealed that after regression controls for human capital and other social and demographic

traits, there was no statistically significant difference in the likelihood of labor force participation between single men without children and single men with children of any age: under 6 years old, 6–17 years old, and 18-plus years old.

The influence of marriage/cohabitation and parental status for women was much different than that observed for men. While married/cohabiting men with preschool-age children had the highest labor force attachment compared to other men, the rate of labor force participation among married/cohabiting women with preschoolers was among the lowest compared to other women. Regression analysis of female labor force participation found that compared to single women with no children, married/cohabiting women with preschool-age children were 12 percentage points less likely to participate in the labor market. The likelihood of participating in the labor force among other women (married/cohabiting women with school-age children or no children, single women with preschool-age children, and single women with school-aged children) was not statistically different from that of single women without children.

The "marriage effect" on male labor force participation is strong and positive. However, long-term trends in the United States suggest that while many young people desire marriage, the likelihood of marriage has continued to decline. Commenting on this secular decline in the share of adults who are married, economist Isabel Sawhill remarked, "It will be hard to put the toothpaste back in the tube."⁶³ She and other observers suggest that the decline in marriage in the United States is a result of changes in social values. Sawhill remains hopeful of an emerging "marriage lite" in the form of increased cohabitation, although evidence suggests that such relationships in the United States are less stable than a marriage.⁶⁴

Since the labor force participation of men is closely associated with their marital/cohabitation status, it seems inextricably bound to a social institution in decline. It is likely that the decline in male labor force attachment over the past half century could partially be the product of declining marriage rates among men. This association (between marital status and labor force participation among men) has led to some efforts to develop programs and policies to bolster marriage rates; however, these efforts to bolster marriage rates do not seem to have met with much success.⁶⁵

Regarding human capital, our findings show that although human capital traits (education and skills) are associated with the likelihood of male labor market participation, they have a substantially greater association with the likelihood of women's participation in the labor market. Therefore, policies targeted to bolster the human capital abilities of the working-age population to increase their labor force participation are likely to be more effective among women than among men.

Connecting Immigration Policy with Literacy and Numeracy Skills

Rapid increase in foreign immigration has been an important source of growth in the size of the U.S. labor force over the past two decades. A sharp rise in the number of foreign-born adults in the nation's labor force accounted for 43 percent of the total increase in the labor force that occurred between 2002 and 2019. As noted above, data from BLS show that in 2018 the labor force participation rate of foreign-born individuals (65.7%) was higher than that of their native-born counterparts (62.3%). The entire immigrant labor force participation advantage is attributable to the higher labor force attachment of immigrant men. Foreign-born men were 10 percentage points more likely to participate in the labor force than native-born men (77.9% versus 67.3%) whereas the 2018 labor force participation rate among foreign-born women was 3 percentage points lower than native-born women (54.3% versus 57.6%).⁶⁶ The higher rate of participation among foreign-born men has often been attributed to traits such as strong earnings motivation and aspirations for economic improvement; the same traits that motivate them to migrate might also motivate immigrant men to participate more intensively in the labor force.⁶⁷ And, the lower labor force participation among immigrant women compared to native-born women in the United States is often attributed to gender roles in their native country that frequently prioritize traditional family-based roles for women rather than participation in the labor market. Over time, however, as immigrant women assimilate, their labor force behavior begins to resemble that of native-born women.⁶⁸

The human capital traits of foreign-born residents differ in important ways from their native-born counterparts; notably lower literacy and numeracy skills and greater dispersion in their level of educational attainment.⁶⁹ The distribution of foreign-born residents by their educational attainment is characterized by heavier concentrations at both ends. About 16 percent foreign-born adult residents have a master's, doctorate, or professional degree, compared to just 10 percent of the native-born adult population. The share of foreign-born and native-born adult residents reporting a bachelor's degree as their highest level of attainment was similar for both groups. Overall, about 28 percent of native-born and 32 percent of foreign-born residents of the U.S. report they had earned a bachelor's degree or higher. At the other end of the educational attainment distribution, foreign-born adults are much more likely to report that they never completed high school. Nearly 21 percent of the foreign-born resident adult population report that they never earned a secondary school credential; this share is just 12 percent among native-born residents.

The foundational skills of foreign-born residents of the United States are sharply lower than those of their native-born counterparts. The mean literacy score of adult foreign-born residents is about 0.8 standard deviation below the mean score of the native-born resident population. The numeracy skill deficit of foreign-born adults is also quite large: 0.5 standard

deviation. Yet, even after accounting for the level of educational attainment, very large literacy and numeracy gaps are found between native-born and foreign-born residents: among adults with just a high school diploma, the mean literacy score of foreign-born adults was 0.6 standard deviation below that of native-born adults. Among those with a bachelor's degree, the literacy score deficit of foreign-born adults relative to native-born adults was also about 0.6 standard deviation.

It is important to distinguish between resident foreign-born graduates with awards from U.S. institutions of higher learning and those who earned their highest academic awards overseas. Foreign-born residents with a U.S. bachelor's degree had mean literacy skills that were about 0.25 standard deviation below their native-born counterparts; however, there were no statistically significant differences in numeracy skills between the two groups. In sharp contrast, foreign-born residents with a bachelor's degree from overseas had mean literacy skills that were 1 standard deviation below those of their native-born counterparts and their numeracy skill scores were about 0.8 standard deviation below that of native-born bachelor's degree recipients.

At the advanced degree level, the literacy skills of foreign-born graduates of U.S. institutions were about 0.2 standard deviation below those of their native-born counterparts. Foreign-born residents with advanced degrees from overseas colleges and universities had mean literacy scores that were about 0.66 standard deviation below those of their native-born counterparts. The numeracy skills of foreign-born residents with advanced degree awards from U.S. institutions were not significantly different from native born graduates. However, the mean numeracy scores of foreign-born residents with advanced degrees from overseas colleges and universities were 0.66 standard deviation below their native-born counterparts.

The employment and earnings experiences of resident foreign-born college graduates with degrees from U.S. colleges were very similar to those of native-born graduates. In contrast, those with degrees from overseas institutions had hourly wages that were sharply below those with a U.S. college degree based on analysis of the U.S. Bureau of the Census, National Survey of College Graduates.⁷⁰ This analysis suggests that degrees from overseas colleges and universities were valued less in the U.S. labor market than degrees earned from U.S. institutions, regardless of nativity status.⁷¹

Analysis of PIAAC data files reveals similar results. Foreign-born graduates who earned their highest degree from a U.S. institution had employment and earnings outcomes that were quite similar to their native-born counterparts. In contrast, foreign-born U.S. residents

with a college degree awarded by an institution outside the United States had much poorer labor market experiences than their U.S.-educated counterparts:

1. The earnings of foreign-born college graduates with U.S. degrees were significantly greater those of their native-born counterparts, but those foreign-born residents that earned their highest college award from an institution located outside the United States had earnings that were sharply below the earnings of their counterparts with a U.S. degree.
2. The employment rate (the share of the population with a job at a point in time) of native-born and foreign-born residents with U.S. degrees was about the same, but the employment rate of foreign-born resident college graduates with their highest award from a foreign institution was substantially below that of U.S. college graduates.
3. When employed, foreign born residents with degrees from overseas colleges were much more likely to work in occupations that did not utilize the knowledge, skills, and abilities associated with a college degree than their counterparts with U.S. college degrees.
4. The labor force participation rate of the foreign-born college graduates with a degree from an American college is about the same as that of their native-born counterparts. However, among foreign-born residents, those with overseas degree awards were substantially less likely to be engaged in the labor force than those with a U.S. degree.

The number of degrees awarded to students admitted to the United States on a temporary basis to study at a U.S. four-year college or university has increased dramatically in recent years. Between academic years 2009–10 and 2018–19 awards to nonresident aliens increased from 146,900 to 263,800, representing a 40 percent increase.⁷² More than 60 percent of awards to nonresident aliens were at the advanced degree level, although the pace of increase in bachelor's degree awards to these temporarily admitted international students has been extraordinarily rapid over the last decade.⁷³

Degree awards to nonresident aliens were heavily concentrated in the physical sciences, engineering, mathematics, and information technology fields; areas of expertise where employers often complain about labor supply constraints and clamor for more temporary worker visas under admissions programs like the H-1B temporary worker admission program.

The gains to human capital investment in the U.S. labor market are quite substantial, especially for those with a bachelor's or advanced degree from an American institution. A recent Pew study found that between 2004 and 2016 about 1.5 million graduates of U.S. colleges obtained temporary authorizations to work in the U.S. under the Optional Practical

Training (OPT) program and participants in the program can have up to three years of employment after graduation before the temporary work visa expires.⁷⁴ These degree awards of international students are frequently in very sophisticated technical fields characterized by strong labor demand and substantial earnings premiums in U.S. labor markets. Many of these students use the Optional Practical Training (OPT) program and to a lesser extent the H-1B visa program to extend their stay. However, their path to permanent resident status is uncertain because U.S. immigration policy does not allot many green cards on the basis of human capital attributes and the requirements of the labor market. The OPT and H-1B visas are simply an extension of the temporary visa status of the graduate and offer no clear pathway to permanent resident status.

The strong literacy and numeracy skills of foreign-born college graduates with U.S. degrees, their high levels of educational attainment, and their English language proficiency suggest that these individuals would contribute substantially to the productive potential of the American economy. Yet current immigration policy and programming offer a very uncertain pathway to permanent resident status for these graduates. During 2019, only 13.5 percent of green cards were awarded to applicants on the basis of economic or labor market criteria.⁷⁵ This immigration approach seems oddly out of step with the slow labor force and productivity growth challenges that confront the U.S. economy, in addition to an all-time high federal debt burden, as the nation enters a period of expected sustained slow economic growth.

A more sensible policy (that would cost little to implement) would create an unambiguous pathway to a permanent resident status for nonresident foreign students who earn a bachelor's degree or graduate/professional degree from an accredited U.S. college or university. Such a policy might permit international students who are temporarily admitted to the United States and have earned a bachelor's or graduate degree to become eligible for a green card, perhaps after completing 12 to 18 months of postgraduation work experience under the OPT program to demonstrate their abilities in the U.S. labor market. Such a policy has the potential to bolster the overall pace of increase in labor force growth in the United States, given the high level of labor force participation among U.S.-educated foreign-born college graduates. Moreover, these college graduates have among the nation's strongest literacy and numeracy skills and are considerably more likely to be educated in labor supply-constrained scientific and technical fields, human capital traits highly valued in the American labor market.

The costs of such a program would be minimal. Rather than adopt a complex point system similar to those in Canada, Japan, South Korea, and the United Kingdom to identify potential immigrants with desired human capital traits, eligibility for a green card after a period of postgraduate work experience would create a pathway to permanent resident status for those who have demonstrated that they possess the skills, abilities, and

determination required to earn a college degree in the U.S. higher education system. Potentially, more than a quarter million of the best educated, human-capital-rich people in the world would be able to permanently join American economic, social, and civic life each year and, by doing so, enrich the economic well-being and social and civic life of all Americans. As John Sviolka observes "(T)he much more important leverage point for our economy is easily fixed, and for relatively little money and few policy changes. We need to keep the flow of the very best and brightest people coming to this country—and staying here."⁷⁶

Appendix A: Cut Scores and Task Descriptions of PIAAC Literacy and Numeracy Proficiency Levels

The Programme for the International Assessment of Adult Competencies (PIAAC) survey of adults was organized by the Organization for Economic Cooperation and Development to develop measures of the foundational cognitive skills that could be compared across nations.⁷⁷ The PIAAC data collection was conducted over three survey rounds completed in 2012, 2014 and 2017. In the United States, the three rounds of the survey include a nationally representative sample of more than 12,000 adults between ages of 16 to 74. Data collection was conducted by personal visit where a comprehensive background questionnaire was administered and followed by a direct assessment of literacy and numeracy collected in paper and by computer. The skills assessment employs an adaptive design that begins with a set of short easy literacy and numeracy items. Based on these core scores and some background traits respondents are directed to easier or more difficult questions.

The literacy domain of the PIAAC study measures the ability to understand and evaluate written text in the context of societal participation. PIAAC items include continuous texts such as sentences and paragraphs, as well as document texts such as schedules, graphs, and maps. The literacy measure is estimated on a scale of 0 to 500. The chart below provides a general description of the literacy skills associated with a score at each of the 6 levels. Due to sample size limitations, below level 1 and level 1 measures are combined into "level 1 and below" and level 4 and level 5 are combined into "level 4/5."

Table A-1: PIAAC Literacy Proficiency Levels and Cut Scores and Task Descriptions for Each Literacy Proficiency Level

LITERACY PROFICIENCY LEVELS AND CUT SCORES	LITERACY TASK DESCRIPTIONS
Level 5 (376 - 500)	At this level, tasks may require the respondent to search for and integrate information across multiple, dense texts; construct syntheses of similar and contrasting ideas or points of view; or evaluate evidence-based arguments. Application and evaluation of logical and conceptual models of ideas may be required to accomplish tasks. Evaluating reliability of evidentiary sources and selecting key information is frequently a requirement. Tasks often require respondents to be aware of subtle, rhetorical cues and to make high-level inferences or use specialized background knowledge.
Level 4 (326 - 375)	Tasks at this level often require respondents to perform multiple-step operations to integrate, interpret, or synthesize information from complex or lengthy continuous, non-continuous, mixed, or multiple type texts. Complex inferences and application of background knowledge may be needed to perform the task successfully. Many tasks require identifying and understanding one or more specific, non-central idea(s) in the text in order to interpret or evaluate subtle evidence-claim or persuasive discourse relationships. Conditional information is frequently present in tasks at this level and must be taken into consideration by the respondent. Competing information is present and sometimes seemingly as prominent as correct information.
Level 3 (276 - 325)	Texts at this level are often dense or lengthy, and include continuous, non-continuous, mixed, or multiple pages of text. Understanding text and rhetorical structures become more central to successfully completing tasks, especially navigating complex digital texts. Tasks require the respondent to identify, interpret, or evaluate one or more pieces of information, and often require varying levels of inference. Many tasks require the respondent to construct meaning across larger chunks of text or perform multi-step operations in order to identify and formulate responses. Often tasks also demand that the respondent disregard irrelevant or inappropriate content to answer accurately. Competing information is often present, but it is not more prominent than the correct information.
Level 2 (226 - 275)	At this level, the medium of texts may be digital or printed, and texts may comprise continuous, non-continuous, or mixed types. Tasks at this level require respondents to make matches between the text and information and may require paraphrasing or low-level inferences. Some competing pieces of information may be present. Some tasks require the respondent to cycle through or integrate two or more pieces of information based on criteria; compare and contrast or reason about information requested in the question; navigate within digital texts to access and identify information from various parts of a document.
Level 1 (176 - 225)	Most of the tasks at this level require the respondent to read relatively short digital or print continuous, non-continuous, or mixed texts to locate a single piece of information that is identical to or synonymous with the information given in the question or directive. Some tasks, such as those involving non-continuous texts, may require the respondent to enter personal information onto a document. Little, if any, competing information is present. Some tasks may require simple cycling through more than one piece of information. Knowledge and skill in recognizing basic vocabulary, determining the meaning of sentences, and reading paragraphs of text is expected.
Below Level 1 (0 - 175)	The tasks at this level require the respondent to read brief texts on familiar topics to locate a single piece of specific information. There is seldom any competing information in the text and the requested information is identical in form to information in the question or directive. The respondent may be required to locate information in short continuous texts. However, in this case, the information can be located as if the text were non-continuous in format. Only basic vocabulary knowledge is required, and the reader is not required to understand the structure of sentences or paragraphs or make use of other text features. Tasks below level 1 do not make use of any features specific to digital texts.

SOURCE: U.S. Department of Education National Center for Educational Statistics, Institute of Education Sciences, Skills of U.S. Unemployed, Young, and Older Adults in Sharper Focus: Results from the Program for the International Assessment of Adult Competencies (PIAAC) 2012/2014, First Look, March 2016, Exhibit B-1, Page B-3 (<https://nces.ed.gov/pubs2016/2016039rev.pdf>).

Table A-2: PIAAC Numeracy Proficiency Levels and Cut Scores and Task Descriptions for Each Numeracy Proficiency Level

NUMERACY PROFICIENCY LEVELS AND CUT SCORES	NUMERACY TASK DESCRIPTIONS
Level 5 (376 - 500)	Tasks at this level require the respondent to understand complex representations and abstract and formal mathematical and statistical ideas, possibly embedded in complex texts. Respondents may have to integrate multiple types of mathematical information where considerable translation or interpretation is required; draw inferences; develop or work with mathematical arguments or models; and justify, evaluate and critically reflect upon solutions or choices.
Level 4 (326 - 375)	Tasks at this level require the respondent to understand a broad range of mathematical information that may be complex, abstract or embedded in unfamiliar contexts. These tasks involve undertaking multiple steps and choosing relevant problem-solving strategies and processes. Tasks tend to require analysis and more complex reasoning about quantities and data; statistics and chance; spatial relationships; and change, proportions and formulas. Tasks at this level may also require understanding arguments or communicating well-reasoned explanations for answers or choices.
Level 3 (276 - 325)	Tasks at this level require the respondent to understand mathematical information that may be less explicit, embedded in contexts that are not always familiar and represented in more complex ways. Tasks require several steps and may involve the choice of problem-solving strategies and relevant processes. Tasks tend to require the application of number sense and spatial sense; recognizing and working with mathematical relationships, patterns, and proportions expressed in verbal or numerical form; and interpretation and basic analysis of data and statistics in texts, tables and graphs.
Level 2 (226 - 275)	Tasks at this level require the respondent to identify and act on mathematical information and ideas embedded in a range of common contexts where the mathematical content is fairly explicit or visual with relatively few distractors. Tasks tend to require the application of two or more steps or processes involving calculation with whole numbers and common decimals, percentages and fractions; simple measurement and spatial representation; estimation; and interpretation of relatively simple data and statistics in texts, tables and graphs.
Level 1 (176 - 225)	Tasks at this level require the respondent to carry out basic mathematical processes in common, concrete contexts where the mathematical content is explicit with little text and minimal distractors. Tasks usually require one-step or simple processes involving counting, sorting, performing basic arithmetic operations, understanding simple percentages such as 50%, and locating and identifying elements of simple or common graphical or spatial representations.
Below Level 1 (0 - 175)	Tasks at this level require the respondents to carry out simple processes such as counting, sorting, performing basic arithmetic operations with whole numbers or money, or recognizing common spatial representations in concrete, familiar contexts where the mathematical content is explicit with little or no text or distractors.

SOURCE: U.S. Department of Education National Center for Educational Statistics, Institute of Education Sciences, Skills of U.S. Unemployed, Young, and Older Adults in Sharper Focus: Results from the Program for the International Assessment of Adult Competencies (PIAAC) 2012/2014, First Look, March 2016, Exhibit B-3, Page B-7 (<https://nces.ed.gov/pubs2016/2016039rev.pdf>).

Appendix B: Definitions of Variables in Labor Force Participation Regressions

Table B-1: Definitions of the Dependent and Independent Variables Included in the Logistic Regression Models of the Labor Force Participation of 16- to 74-Year-Old Adults, PIAAC 2012/2014, United States

Dependent variable:

clf = a dichotomous labor force participation status variable
 = 1, if in labor force (employed + unemployed)
 = 0, if else

Independent variables:

INDIVIDUAL LITERACY AND NUMERACY SCORE

PVlit = continuous literacy proficiency score of 16 and older persons in PIAAC survey

PVnum = continuous numeracy proficiency score of 16 and older persons in PIAAC survey

EDUCATIONAL ATTAINMENT LEVELS

Base group is adults with a high school diploma

no_hsdiploa = a dichotomous educational attainment variable
 = 1, if 1-12 years of school, no high school diploma
 = 0, if else

somecollege = a dichotomous educational attainment variable
 = 1, if some years of college, but without certification or associate degree
 = 0, if else

certification = a dichotomous educational attainment variable
 = 1, if some type of certification
 = 0, if else

associatesdegree = a dichotomous educational attainment variable
 = 1, if an associate's degree
 = 0, if else

bachelorsdegree = a dichotomous educational attainment variable
 = 1, if Bachelor's degree
 = 0, if else

masters_plus = a dichotomous educational attainment variable
= 1, if Master's or higher degree
= 0, if else

AGE GROUP

Base group is 16-to-24-year-old

age_25_54 = a dichotomous age group variable
= 1, if 25-to-54-year-old
= 0, if else

age_55_74 = a dichotomous age group variable
= 1, if 55-to-74-year-old
= 0, if else

RACE/ETHNICITY

Base group is White

black = a dichotomous race/ethnicity variable
= 1, if Black
= 0, if else

hispanic = a dichotomous race/ethnicity variable
= 1, if Hispanic
= 0, if else

asian_pi = a dichotomous race/ethnicity variable
= 1, if Asian/Pacific Islanders
= 0, if else

other_race1 = a dichotomous race/ethnicity variable
= 1, if all "other" races
= 0, if else

NATIVITY STATUS

Base group is native-born

foreign_born = a dichotomous nativity status variable
= 1, if foreign-born
= 0, if native-born

ENGLISH SPEAKING PROFICIENCY

Base group is Speak English well

english_speaking_very_well = a dichotomous English-speaking proficiency variable
= 1, if speak English very well
= 0, if else

english_speaking_notwell = a dichotomous English-speaking proficiency variable
= 1, if speak English "not well" or "not at all"
= 0, if else

SENSORY/LEARNING DISABILITY STATUS

Base group is non-disabled

disabled = a dichotomous disability status variable
= 1, if with disabilities (difficulty seeing print, hearing conversation, or diagnosed with a learning disability)
= 0, if else

SCHOOL ENROLLMENT STATUS

Base group is not enrolled in school

enrolled = a dichotomous school enrollment variable
= 1, if enrolled in school
= 0, if not enrolled in school

MARITAL /COHABITATION AND PARENTAL STATUS BY AGE OF YOUNGEST CHILD

The base group is single with no children

livspouse_kids_u6 = a dichotomous marital/cohabitation/parental status variable
= 1, if married/cohabiting and youngest child under 6 years old
= 0, if else

livspouse_kids6_17 = a dichotomous marital/cohabitation/parental status variable
= 1, if married/cohabiting and youngest child 6-17 years old
= 0, if else

livspouse_no_kids = a dichotomous marital/cohabitation/parental status variable
= 1, if married/cohabiting and no children
= 0, if else

single_kids_u6 = a dichotomous marital/cohabitation/parental status variable
= 1, if single and youngest child under 6 years old
= 0, if else

single_kids_6_17 = a dichotomous marital/cohabitation/parental status variable
= 1, if single and youngest child 6-17 years old
= 0, if else

single_or_livspouse_adult_kids = a dichotomous marital/cohabitation/parental status variable
= 1, if single or married/cohabiting and youngest child 18 years or older
= 0, if else

REGION OF RESIDENCE

Base group is South region

northeast = a dichotomous region of residence variable
= 1, if region of residence was Northeast region
= 0, if else

midwest = a dichotomous region of residence variable
= 1, if region of residence was Midwest region
= 0, if else

west = a dichotomous region of residence variable
= 1, if region of residence was West region
= 0, if else

Appendix C: Estimated Regression Coefficients and Standard Errors of Each Regression Model

We have used logistic regression models for 16- to 74-year-old U.S. men and women separately to predict their labor force participation behavior. Regression coefficients (presented in Tables C-3, C-4, C-5, and C-6) are logit coefficients. The margins presented in these tables represent change in the probability of dependent variable from one-unit change in the independent variables ($P = \Delta y/\Delta x$).⁷⁸

Table C-1: Descriptive Statistics of 16- to 74-Year-Old Men Included in the Labor Forced Participation Regressions, PIAAC 2012/2014, United States

VARIABLE	MEAN	SD	MIN	MAX
hispanic	0.123	0.328	0	1
black	0.163	0.370	0	1
asian_pi	0.045	0.207	0	1
other_race1	0.032	0.176	0	1
age_25_54	0.515	0.500	0	1
age_55_74	0.223	0.417	0	1
no_hsdiploma	0.183	0.387	0	1
somecollege	0.119	0.324	0	1
certification	0.072	0.259	0	1
associatesdegree	0.068	0.253	0	1
bachelorsdegree	0.147	0.354	0	1
masters_plus	0.091	0.287	0	1
enrolled	0.211	0.408	0	1
native_born	0.879	0.326	0	1
english_speaking_very_well	0.846	0.361	0	1
english_speaking_notwell	0.026	0.160	0	1
livspouse_kids_u6	0.116	0.321	0	1
livspouse_kids_6_17	0.109	0.312	0	1
livspouse_no_kids	0.083	0.275	0	1
single_kids_u6	0.036	0.187	0	1
single_kids_6_17	0.049	0.216	0	1
single_or_livspouse_adult_kids	0.227	0.419	0	1
disabled	0.264	0.441	0	1
northeast	0.200	0.400	0	1
midwest	0.223	0.416	0	1
west	0.172	0.378	0	1

Table C-2: Descriptive Statistics of 16- to 74-Year-Old Women Included in the Labor Force Participation Regressions, United States, PIAAC, 2012/2014

VARIABLE	MEAN	SD	MIN	MAX
clf	0.733	0.442	0	1
hispanic	0.136	0.343	0	1
black	0.177	0.382	0	1
asian_pi	0.045	0.207	0	1
other_race1	0.032	0.175	0	1
age_25_54	0.555	0.497	0	1
age_55_74	0.231	0.421	0	1
no_hsdiploma	0.152	0.359	0	1
somecollege	0.123	0.329	0	1
certification	0.088	0.283	0	1
associatesdegree	0.080	0.271	0	1
bachelorsdegree	0.162	0.368	0	1
masters_plus	0.097	0.296	0	1
enrolled	0.215	0.411	0	1
foreign_born	0.129	0.335	0	1
english_speaking_very_well	0.873	0.334	0	1
english_speaking_notwell	0.039	0.195	0	1
livspouse_kids_u6	0.123	0.329	0	1
livspouse_kids_6_17	0.117	0.321	0	1
livspouse_no_kids	0.082	0.274	0	1
single_kids_u6	0.079	0.269	0	1
single_kids_6_17	0.068	0.252	0	1
single_or_livspouse_adult_kids	0.275	0.446	0	1
sensory/learning disability	0.229	0.420	0	1
northeast	0.202	0.401	0	1
midwest	0.215	0.411	0	1
west	0.162	0.369	0	1

Table C-3: Logit Coefficients and Estimated Margins from the Labor Force Participation Regression of 16- to 74-Year-Old Men in the United States, PIAAC 2012/2014 (Regression with Literacy Skills)

VARIABLE	LOGIT COEFF.	STD. ERR.	Z	P>Z	MARGINS	ODDS RATIOS
pvlit	0.004	0.001	2.6	0.008	0.024	0.024
hispanic	0.462	0.245	1.9	0.059	0.057	0.057
black	0.069	0.158	0.4	0.665	0.008	0.008
asian_pi	-0.624	0.342	-1.8	0.068	-0.077	-0.077
other_race1	-0.106	0.307	-0.4	0.729	-0.013	-0.013
age_25_54	0.408	0.157	2.6	0.009	0.050	0.050
age_55_74	-1.392	0.172	-8.1	0.000	-0.172	-0.172
no_hsdiploma	-0.441	0.141	-3.1	0.002	-0.054	-0.054
somecollege	0.572	0.176	3.2	0.001	0.071	0.071
certification	0.068	0.197	0.4	0.728	0.008	0.008
associatesdegree	0.641	0.193	3.3	0.001	0.079	0.079
bachelorsdegree	0.465	0.203	2.3	0.022	0.057	0.057
masters_plus	0.749	0.211	3.5	0.000	0.093	0.093
enrolled	-0.898	0.188	-4.8	0.000	-0.111	-0.111
native_born	-0.439	0.227	-1.9	0.053	-0.054	-0.054
english_speaking_very_well	-0.049	0.199	-0.3	0.805	-0.006	-0.006
english_speaking_notwell	0.530	0.384	1.4	0.168	0.065	0.065
livspouse_kids_u6	1.615	0.312	5.2	0.000	0.199	0.199
livspouse_kids_6_17	0.859	0.239	3.6	0.000	0.106	0.106
livspouse_no_kids	1.040	0.237	4.4	0.000	0.128	0.128
single_kids_u6	0.699	0.441	1.6	0.114	0.086	0.086
single_kids_6_17	0.273	0.258	1.1	0.292	0.034	0.034
single_or_livspouse_adult_kids	0.237	0.160	1.5	0.138	0.029	0.029
disabled	-0.436	0.111	-3.9	0.000	-0.054	-0.054
northeast	0.118	0.171	0.7	0.491	0.015	0.015
midwest	0.442	0.159	2.8	0.005	0.055	0.055
west	0.191	0.166	1.2	0.250	0.024	0.024
cons	0.745	0.485	1.5	0.124	—	—
N = 3885						

— Not applicable.

Table C-4: Logit Coefficients and Estimated Margins from the Labor Force Participation Regression of 16- to 74-Year-Old Men in the United States, PIAAC 2012/2014 (Regression with Numeracy Skills)

VARIABLE	LOGIT COEFF.	STD. ERR.	Z	P>Z	MARGINS	ODDS RATIOS
pvnum	0.005	0.001	4.0	0.000	0.036	0.036
hispanic	0.509	0.247	2.1	0.040	0.063	0.063
black	0.197	0.168	1.2	0.240	0.024	0.024
asian_pi	-0.596	0.343	-1.7	0.082	-0.073	-0.073
other_race1	-0.065	0.304	-0.2	0.832	-0.008	-0.008
age_25_54	0.412	0.159	2.6	0.009	0.051	0.051
age_55_74	-1.393	0.173	-8.0	0.000	-0.171	-0.171
no_hsdiploma	-0.398	0.142	-2.8	0.005	-0.049	-0.049
somecollege	0.532	0.176	3.0	0.003	0.065	0.065
certification	0.020	0.203	0.1	0.920	0.002	0.002
associatesdegree	0.611	0.194	3.2	0.002	0.075	0.075
bachelorsdegree	0.382	0.205	1.9	0.063	0.047	0.047
masters_plus	0.641	0.222	2.9	0.004	0.079	0.079
enrolled	-0.933	0.191	-4.9	0.000	-0.115	-0.115
native_born	-0.423	0.232	-1.8	0.068	-0.052	-0.052
english_speaking_very_well	-0.045	0.197	-0.2	0.819	-0.006	-0.006
english_speaking_notwell	0.541	0.372	1.5	0.146	0.066	0.066
livspouse_kids_u6	1.595	0.311	5.1	0.000	0.196	0.196
livspouse_kids_6_17	0.861	0.237	3.6	0.000	0.106	0.106
livspouse_no_kids	1.011	0.238	4.3	0.000	0.124	0.124
single_kids_u6	0.713	0.444	1.6	0.109	0.088	0.088
single_kids_6_17	0.288	0.260	1.1	0.268	0.035	0.035
single_or_livspouse_adult_kids	0.223	0.160	1.4	0.164	0.027	0.027
disabled	-0.415	0.110	-3.8	0.000	-0.051	-0.051
northeast	0.110	0.172	0.6	0.523	0.014	0.014
midwest	0.444	0.160	2.8	0.006	0.055	0.055
west	0.191	0.165	1.2	0.246	0.024	0.024
cons	0.407	0.453	0.9	0.368	—	—
N = 3885						

— Not applicable.

Table C-5: Logit Coefficients and Estimated Margins from the Labor Force Participation Regression of 16- to 74-Year-Old Women in the United States, PIAAC 2012/2014 (Regression with Literacy Skills)

VARIABLE	LOGIT COEFF.	STD. ERR.	Z	P>Z	MARGINS	ODDS RATIOS
pvlit_	0.004	0.001	3.1	0.002	0.033	0.033
hispanic	0.193	0.167	1.2	0.246	0.033	0.033
black	0.229	0.144	1.6	0.112	0.039	0.039
asian_pi	-0.128	0.283	-0.5	0.651	-0.022	-0.022
other_race1	-0.097	0.316	-0.3	0.758	-0.017	-0.017
age_25_54	0.319	0.171	1.9	0.062	0.055	0.055
age_55_74	-1.078	0.171	-6.3	0.000	-0.185	-0.185
no_hsdiploma	-0.494	0.122	-4.1	0.000	-0.085	-0.085
somecollege	0.189	0.135	1.4	0.161	0.032	0.032
certification	0.551	0.157	3.5	0.000	0.095	0.095
associatesdegree	0.376	0.170	2.2	0.027	0.064	0.064
bachelorsdegree	0.562	0.116	4.9	0.000	0.096	0.096
masters_plus	0.940	0.180	5.2	0.000	0.161	0.161
enrolled	-0.235	0.136	-1.7	0.085	-0.040	-0.040
foreign_born	0.209	0.192	1.1	0.278	0.036	0.036
english_speaking_very_well	0.305	0.151	2.0	0.043	0.052	0.052
english_speaking_notwell	-0.074	0.236	-0.3	0.753	-0.013	-0.013
livspouse_kids_u6	-0.708	0.152	-4.7	0.000	-0.121	-0.121
livspouse_kids_6_17	-0.079	0.182	-0.4	0.664	-0.014	-0.014
livspouse_no_kids	0.053	0.186	0.3	0.776	0.009	0.009
single_kids_u6	0.061	0.201	0.3	0.760	0.011	0.011
single_kids_6_17	0.458	0.264	1.7	0.083	0.079	0.079
single_or_livspouse_adult_kids	-0.125	0.130	-1.0	0.336	-0.021	-0.021
sensory/learning disability	-0.385	0.102	-3.8	0.000	-0.066	-0.066
northeast	0.222	0.146	1.5	0.128	0.038	0.038
midwest	0.309	0.138	2.2	0.025	0.053	0.053
west	0.396	0.129	3.1	0.002	0.068	0.068
cons	-0.340	0.393	-0.9	0.387	—	—
N = 4535						

— Not applicable.

Table C-6: Logit Coefficients and Estimated Margins from the Labor Force Participation Regression of 16- to 74-Year-Old Women in the United States, PIAAC 2012/2014 (Regression with Numeracy Skills)

VARIABLE	LOGIT COEFF.	STD. ERR.	Z	P>Z	MARGINS	ODDS RATIOS
pvnum_	0.004	0.001	4.1	0.000	0.042	0.042
hispanic	0.227	0.169	1.3	0.179	0.039	0.039
black	0.312	0.145	2.2	0.031	0.053	0.053
asian_pi	-0.121	0.281	-0.4	0.665	-0.021	-0.021
other_race1	-0.073	0.314	-0.2	0.816	-0.013	-0.013
age_25_54	0.309	0.172	1.8	0.072	0.053	0.053
age_55_74	-1.090	0.173	-6.3	0.000	-0.186	-0.186
no_hsdiploma	-0.480	0.122	-3.9	0.000	-0.082	-0.082
somecollege	0.168	0.137	1.2	0.222	0.029	0.029
certification	0.544	0.158	3.4	0.001	0.093	0.093
associatesdegree	0.362	0.171	2.1	0.034	0.062	0.062
bachelorsdegree	0.515	0.117	4.4	0.000	0.088	0.088
masters_plus	0.889	0.181	4.9	0.000	0.152	0.152
enrolled	-0.250	0.135	-1.8	0.065	-0.043	-0.043
foreign_born	0.186	0.189	1.0	0.325	0.032	0.032
english_speaking_very_well	0.314	0.151	2.1	0.038	0.054	0.054
english_speaking_notwell	-0.083	0.239	-0.4	0.729	-0.014	-0.014
livspouse_kids_u6	-0.713	0.153	-4.7	0.000	-0.122	-0.122
livspouse_kids_6_17	-0.082	0.182	-0.5	0.652	-0.014	-0.014
livspouse_no_kids	0.034	0.187	0.2	0.856	0.006	0.006
single_kids_u6	0.075	0.203	0.4	0.713	0.013	0.013
single_kids_6_17	0.461	0.262	1.8	0.079	0.079	0.079
single_or_livspouse_adult_kids	-0.124	0.131	-1.0	0.341	-0.021	-0.021
sensory/learning disability	-0.378	0.101	-3.7	0.000	-0.065	-0.065
northeast	0.224	0.147	1.5	0.127	0.038	0.038
midwest	0.305	0.139	2.2	0.029	0.052	0.052
west	0.391	0.129	3.0	0.003	0.067	0.067
cons	-0.398	0.355	-1.1	0.262	—	—
N = 4535						

— Not applicable.

Appendix D: PIAAC and CPS Labor Force Measures

The PIAAC sample survey for the United States finds a much higher level of labor market engagement than other household surveys conducted regularly by federal statistical agencies. Over the 2012 to 2014 period when the PIAAC survey was conducted, the labor force participation rate of non-elderly working-age adults (aged 16–65) was 80.6 on the PIAAC survey and 72.4 percent based on the monthly Current Population Survey (CPS) over the same time period; a gap of 7.1 percentage points. The gap was largest among teens and young adults (aged 16–24). The labor force participation rate of teens and young adults was 60.2 percent on the PIAAC survey versus 45.9 percent on the CPS survey; a difference of 14.3 percentage points.

Although labor force status concepts used in the PIAAC background questionnaire and the Current Population Survey are similar (but not identical), a key difference between the CPS and the PIAAC survey is the use of proxy respondents. The CPS survey relies quite heavily on proxy responses from householders to measure the labor force status of teens and young adults relative to other age groups. In contrast, the PIAAC survey does not rely on proxy responses including on measures of labor force status. We suspect that at least part of the large gap between CPS and PIAAC labor force measures are associated with the extensive use of proxy responses for the 16- to 24-year-old population in the CPS survey.

About the Authors



Neeta Fogg is an economist at Rhode Island College. She has led net impact studies of workforce development programs and school-to-work and school-to-college program initiatives. She has conducted longitudinal research of Philadelphia high school graduates and been deeply engaged in the analysis of the labor market impact of literacy and numeracy skills in the United States.



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Anita M. Sands is a lead policy researcher and author in the [ETS Center for Research on Human Capital & Education](#). Her published work covers education equity, economic opportunity, racial and economic segregation, concentrated poverty, research methodology, and program evaluations. Sands has coauthored numerous policy reports for the Center including most recently *Opportunity Across the States* (2021) and *Buttressing the Middle: A Case for Reskilling and Upskilling America's Middle-Skill Workers in the 21st Century* (2021). Prior to joining ETS, Sands taught in the Department of Sociology at Rider University and owned a consulting firm where she directed projects to address racial and economic segregation, poverty, and land-use policy inequities. Sands earned her MA and is ABD from the Department of Sociology PhD program at Temple University.

Endnotes

- 1 Mary Daly and Tali Regev, "Labor Force Participation and the Prospects for U.S. Growth," *FRBSF Economic Letter*, No. 2007-33, November 2, 2007, <https://www.frbsf.org/wp-content/uploads/sites/4/el2007-33.pdf>.
- 2 Claudia Goldin traced the emerging role of American women in the labor market in the 20th century over four phases. Goldin contends that the first three phases were evolutionary that slowly led to the fourth and last phase that was revolutionary; a revolution that she describes as "a 'quiet' one, and not the 'big-bang' type." The first phase extended between the late nineteenth century to the 1920s when women entered the labor market (instead of working in the household of family business), mostly young and unmarried and in low level jobs. The second phase that stretched from 1930s to 1950s was characterized by easing of constraints on work among married women. The third phase between 1950s and 1970s saw a continued expansion of labor force participation among older married women (45-54 years old) and a sharp rise in the participation of younger married women (25-34 and 35-44 years old); laying the groundwork for the fourth phase and the quiet revolution. This phase that started in the late 1970s is characterized by a sharp rise in the labor force participation of married women (20-44 years old) with a child under the age of one year (from 20% in 1973 to 62% in 2000) and other changes that present a logical progression including changes in social norms regarding women's family and career roles that began to change in the late 1960s and 1970s, increase in marriage age, college graduation, and college enrollment in professional fields that began around 1970; changes in occupations in the early 1970s, and the turning point in women's earnings relative to comparable men occurring around 1980. See: Claudia Goldin, *The Quiet Revolution That Transformed Women's Employment, Education, and Family*, Richard T. Ely Lecture, AEA Papers and Proceedings, May 2006, https://scholar.harvard.edu/files/goldin/files/the_quiet_revolution_that_transformed_womens_employment_education_and_family.pdf.
- 3 While the labor force represents the quantity of human resources, the quality of human resources is measured by the level of human capital of the labor force; primarily measured by the skills, educational attainment, and work experience of the labor force.
- 4 *The Budget and Economic Outlook: 2019 to 2029* (Washington, DC: Congressional Budget Office, January 2019), <https://www.cbo.gov/system/files/2019-03/54918-Outlook-3.pdf>.
- 5 The PIAAC background questionnaire does not ask respondents about their marital status. There is, however, a question that asks respondents whether they were living with a spouse or partner. In this paper we refer to respondents with an affirmative response to this question as "married/cohabiting" and have included footnotes at the bottom of tabulations and charts that clarify that the "married" category includes individuals who are officially married (living with a spouse) as well as those who are cohabiting (living with a partner).
- 6 All the analysis in this paper is based on data before the onset of COVID-19 pandemic and the changes that occurred in the way in which work was performed in response to it (remote work, increased flexibility, and the like). We believe that longer-term trends and the relationship between human capital and labor force participation (the primary focus of this paper) may not be affected by these pandemic-related changes in work. However, we do acknowledge that some of the trends described in the paper may be interrupted by the COVID-19 pandemic and analysis of data in the future can shed light on the longevity of these interruptions.
- 7 The PIAAC questionnaire does not have a comprehensive measure of disability. The questionnaire is designed to measure just sensory disabilities (sight and hearing) and learning disability. It does not measure other types of disability that are measured on other large scale surveys like the CPS or the ACS about whether their physical, mental, or emotional disability that has lasted for six months or more has limited their ability to go outside the home, to work at a job or business, or to perform basic self-care functions such as bathing, dressing, or getting around the home. Therefore, we have used the term sensory/learning disability status instead of disability status.
- 8 The overall labor force participation rate fell from a peak of 67.2 percent in June 2001 and declined to a bottom of 62.5 percent by September 2016, since then it rose to 63.4 percent in February 2020, just before the pandemic lockdown in March. See *Civilian Labor Force Participation Rate (Seasonally Adjusted)*, U.S. Bureau of Labor Statistics, <https://www.bls.gov/charts/employment-situation/civilian-labor-force-participation-rate.htm>. For a discussion on these developments see Council of Economic Advisers, *Economic Report of the President*, (Washington, DC: The White House, 2020), pp. 77–80, <https://www.govinfo.gov/content/pkg/ERP-2020/pdf/ERP-2020.pdf>.

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- 12 Harris Eppsteiner, Jason Furman, and Wilson Powell, III, "An Aging Population Explains Most—But Not All—of the Decline in the U.S. Labor Force Participation Rate Since 2007," *Realtime Economic Issues* (blog), Peterson Institute for International Economics, July 7, 2017, <https://www.piie.com/blogs/realtime-economic-issues-watch/aging-population-explains-most-not-all-decline-us-labor-force>.
- 13 Although retirement age for social security has moved up over time—66 years and 4 months for people born in 1956, 66 years and 6 months for those born in 1957, 66 years and 8 months for those born in 1958, 66 years and 10 months for those born in 1959, and 67 for people born in 1960 or later—age 65 continues to remain the age at which individuals become eligible for Medicare, which an important factor in many retirement decisions.
- 14 The impact of demographic change on labor force and economic growth was well anticipated with calls for action dating back the 1990s. Former Secretary of Labor John Dunlop led a state appointed commission in Massachusetts during the latter half of the 1990s about a long-term labor supply problem associated with an aging Baby Boomer generation. See: Boston University Office of Public Relations, "Older Workers Key to Massachusetts' Economic Growth," press release, April 19, 2020, <https://www.newswise.com/articles/older-workers-key-to-massachusetts-economic-growth>.
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- 17 Eppsteiner et al., "An Aging Population"; William R. Cline with Jared Nolan, *Demographic versus Cyclical Influences on US Labor Force Participation*, Working Paper WP 14-4 (Washington, DC: Peterson Institute for International Economics, July 2014), <https://dx.doi.org/10.2139/ssrn.2474723>; Andreas Hornstein, Marianna Kudlyak, and Annemarie Schweinert, "The Labor Force Participation Rate Trend and Its Projections," *FRBSF Economic Letter*, No. 2018-25, November 19, 2018, <https://www.frbsf.org/economic-research/files/el2018-25.pdf>; *The Labor Force Participation Rate Since 2007: Causes and Policy Implications* (Washington, DC: Executive Office of the President of the United States, 2014), https://obamawhitehouse.archives.gov/sites/default/files/docs/labor_force_participation_report.pdf.
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- 24 Retrieved from the data retrieval tool of the U.S. Bureau of Labor Statistics: Labor Force Statistics from the Current Population Survey, U.S. Bureau of Labor Statistics. .
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