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Job Polarization and the Natural Rate of Unemployment in the United States

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Abstract

I present a new estimate of the natural rate of unemployment in the United States that accounts for changes in the age, sex, and skill composition of the labor force. Using micro-level data from the Current Population Survey for the period 1994-2017, I find that the natural rate of unemployment declined by 0.5 percentage point since 1994 and currently stands at 4.5 percent. My projections show that ongoing demographic and technological changes could lower the trend rate further to 4.4 percent by the end of 2022.

Keywords: natural rate of unemployment, job polarization, labor demand, skills, aging
JEL Classification: E24, J21, J23, J24

1 Introduction

The unemployment rate currently stands at 4.1 percent, the lowest rate since 2000. The low unemployment rate has increased interest in new estimates of the natural or trend rate of unemployment. While the unemployment rate is an important indicator of the health of the labor market, where it stands in relation to the trend unemployment rate is more informative for policymakers.

There have been important changes in the age and skill composition of the labor force over the past two decades, and these changes may have lowered the trend rate of unemployment. First, the share of older individuals in the labor force increased as baby boomers have grown older. The unemployment rate declines with age; therefore, an aging labor force would contribute to a lower natural rate.

Second, the composition of jobs and skills demanded by employers changed dramatically due to technological advancements. More specifically, job opportunities shifted away from middle-skill occupations and toward high- and low-skill occupations, a phenomenon named "job polarization" (Autor et al., 2006; Autor, 2010; Acemoglu and Autor, 2011; Tüzemen

and Willis, 2013). Job polarization would contribute to a lower natural rate, because workers suitable for high-skill occupations have lower unemployment rates compared with workers suitable for middle-skill occupations.

In this article, I present a new estimate of the natural rate of unemployment that accounts for changes in the age, sex, and skill composition of the labor force. In constructing this estimate, I build on Aaronson et al. (2015), who account for changes in the age, sex, and educational composition of the labor force. However, educational attainment is up to the decision and ability of a worker, creating a selection problem (Shimer, 1998). Given the criticism, I focus on the changes in the skills demanded by employers instead of the educational attainment of workers, noting also that education levels do not map one-to-one with skills and occupations.

Based on my new estimate, the natural rate of unemployment currently stands at 4.5 percent, 0.5 percentage point lower than in 1994. My projections show that ongoing demographic and technological changes may lower the trend rate further to 4.4 percent by the end of 2022.

2 Ongoing Trends in the Labor Market

2.1 Data

I use data from the Current Population Survey (CPS) and restrict the sample to individuals who are 16 and older, and are not employed in the military or agricultural occupations. In calculations related to job polarization, I also exclude self-employed individuals (and those who work without pay) to focus on the changes in employers' demand for workers' skills.

Groups	Labor force shares (percent)		Employment shares (percent)		Unemployment rates (percent)	
	1994	2017	1994	2017	1994	2017
Age						
Young	17.8	14.3	16.7	13.5	12.4	9.3
Prime	71.8	64.5	72.8	65.0	5.2	3.9
Older	10.3	21.2	10.5	21.5	4.8	3.5
Sex						
Men	51.9	51.6	51.8	51.6	6.6	4.7
Women	48.1	48.4	48.2	48.4	6.3	4.5
Skill						
Low	15.1	18.1	14.7	17.7	9.3	6.4
Middle	55.5	43.6	54.9	43.1	7.5	5.6
High	29.4	38.3	30.4	39.2	3.0	2.5

Table 1: Labor Force Shares, Employment Shares, and Unemployment Rates by Age, Sex, and Skill Groups

Note: Reported shares and rates correspond to monthly averages for each year.
Sources: CPS and author's calculations.

2.2 Aging of the Population

Table 1 compares the labor force shares, employment shares, and unemployment rates by age, sex, and skill groups in 1994 and 2017. The share of older individuals (age 55 and up) in the labor force significantly increased in the past two decades. Older individuals made up 10.3 percent of the labor force in 1994, but their share more than doubled to 21.2 percent by 2017. At the same time, the shares of prime-age (age 25 to 54) and young individuals (age 16 to 24) in the labor force declined.

The unemployment rate was the lowest for older individuals at 3.5 percent in 2017. Prime-age and young workers had unemployment rates of 3.9 percent and 9.3 percent, respectively. Since the unemployment rate is lower for older workers, an aging labor force would lead to a decline in the natural rate of unemployment.

2.3 Job Polarization

The demand for workers' skills also changed significantly over time, as job polarization shifted demand away from workers suitable for middle-skill occupations and toward workers suitable for high- and low-skill occupations. Workers in middle-skill occupations typically perform tasks that are procedural and rule-based. These occupations in sales, office and administrative services, production, construction, installation, maintenance, and transportation are classified as "routine" occupations. With advancements in technology, computers and machines became cost-effective substitutes for workers in middle-skill jobs. The employment share of middle-skill occupations dropped from 54.9 percent in 1994 to 43.1 percent in 2017.

In contrast, tasks performed in high-skill occupations are harder to automate. New technologies have increased the relative productivities of workers in high-skill jobs, complementing their skill sets. Workers suitable for these positions perform tasks requiring analytical ability, problem solving, and creativity. They work at managerial, professional, and technical occupations. The employment share of high-skill occupations rose from 30.4 percent in 1994 to 39.2 percent in 2017.

Similarly, tasks in low-skill occupations are harder to automate as these jobs are physically demanding and require human interaction. The employment share of low-skill occupations rose from 14.7 percent in 1994 to 17.7 percent in 2017. Many of these occupations are service oriented, such as food preparation, cleaning, and security and protective services.

Job polarization would lead to a lower natural rate of unemployment, because workers suitable for high-skill occupations have a lower unemployment rate than workers suitable for middle-skill occupations. For example, the unemployment rate for workers in high-skill occupations was 2.5 percent in 2017, much lower than the unemployment rate of 5.6 percent for workers in middle-skill occupations.

3 A New Estimate of the Natural Rate of Unemployment

3.1 Method

To construct a new estimate of the natural rate of unemployment that accounts for these compositional changes in the labor force, I divide the population into 18 distinct groups that combine three age groups, two sex groups, and three skill groups. While the sex composition

of the labor force did not change much since 1994, job polarization had different effects on men and women, as well as on workers in different age groups (Tüzemen and Willis, 2013). Consequently, I consider separate age-sex-skill groups.

In determining the skill groups, I use major occupation codes reported in the CPS. Occupation information is missing for some unemployed individuals, but taking these individuals out of the sample would be problematic. Therefore, I assign a skill type (if not self-reported) based on the shares of age-sex groups within skill groups among the unemployed who reported occupation information.

In calculating the new natural rate, I hold the unemployment rates for age-sex-skill groups fixed at their average levels in 2005:H2. However, group shares vary over time as indicated by the data. Following Aaronson et al. (2015), I use 2005:H2 as the base time period, because it was the last time prior to the Great Recession that the actual unemployment rate was equal to the CBO's estimate of the natural rate of unemployment. Therefore, the calculation assumes the unemployment rates for groups were at their trend rates in 2005:H2 and changes in the composition of groups determined changes in the trend unemployment rate. The natural rate of unemployment corresponds to the average of the unemployment rates weighted with the labor force shares for each group. My calculation differs from Aaronson et al. (2015), because I use actual, rather than trend, estimates of the group-specific labor force shares, and I do not make any ad-hoc adjustment to the natural rate estimate for factors specific to the Great Recession.
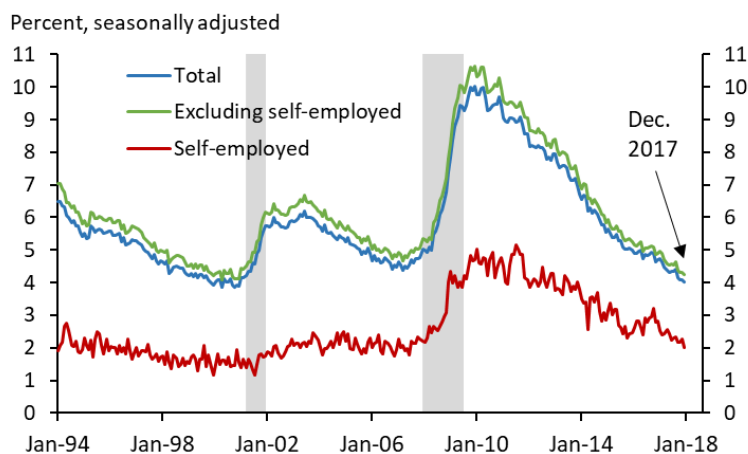

Figure 1: Unemployment Rates for Different Groups

Note: Gray bars denote NBER-defined recessions.
Sources: CPS, NBER (Haver Analytics), and author's calculations.

Next, I adjust the calculated natural rate series to include self-employed individuals to get an estimate of the natural rate for the entire labor force. Figure 1 shows self-employed individuals have lower unemployment rates than the rest of the labor force. Since 1994, the labor force share of self-employed individuals averaged around 10 percent. In adjusting the natural rate to include the self-employed, I hold the unemployment rate for the self-employed fixed at its average level in 2005:H2, but allow the labor force share to vary with time. I obtain the new natural rate as the average of the unemployment rates of the self-employed

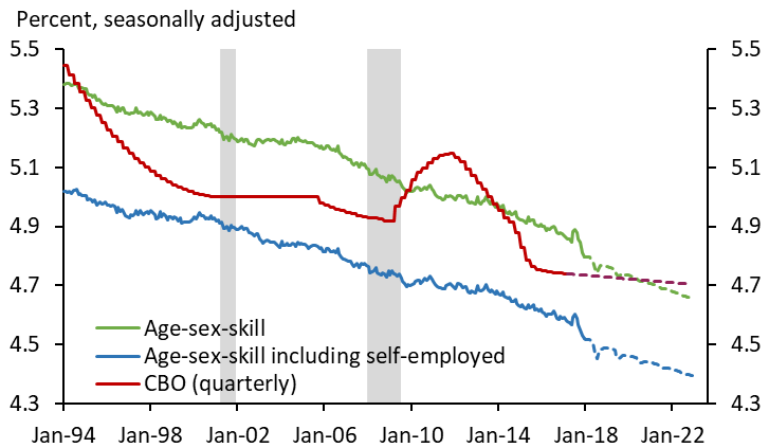and the rest of the sample weighted by their labor force shares.

Percent, seasonally adjusted

- Age-sex-skill
- Age-sex-skill including self-employed
- CBO (quarterly)

Figure 2: Calculated Natural Rate of Unemployment with Projections
Note: Gray bars denote NBER-defined recessions.
Sources: CPS, NBER (Haver Analytics), and author's calculations.

Based on this new estimate, the natural rate of unemployment declined by 0.5 percentage point since 1994 and is currently at 4.5 percent (Figure 2). This decline is partly due to ongoing demographic changes related to an aging workforce. But it also reflects longer-term changes in the composition of jobs and skills demanded by employers.

Rate	1994:Q1 (percent)	2017:Q4 (percent)	2020:Q4 (percent)	2022:Q4 (percent)
CBO's natural rate of unemployment (long-term) as of June 2017	5.44	4.74	4.72	4.71
Calculated natural rate of unemployment				
Age/sex/skill (baseline)	5.02	4.53	4.44	4.40
Age/sex	4.93	4.68	4.63	4.61

Table 2: Alternative Calculations of the Natural Rate of Unemployment with Projections

Note: Calculated rates correspond to monthly averages for each quarter.
Sources: CBO, CPS, and author's calculations.

How much of the decline does job polarization account for? When I repeat the natural rate calculations using only age-sex groups, the decline in the natural rate is 0.25 percentage point (Table 2). This suggests that around half of the decline in the trend rate is due to an aging labor force, while the rest is due to job polarization. But this is only a rough estimate since changes in the demand for skills also affected the age composition of the labor force. As Tüzemen and Willis (2013) discuss, increased demand for high-skill workers led some older workers to delay retirement, contributing to the aging of the labor force. Therefore, this share measure does not perfectly disentangle the effects of aging and job polarization on the natural rate of unemployment.

3.2 Projections

I use the same method to project the natural rate of unemployment through 2022. I assume changes in the labor force shares of each age-sex-skill group can be approximated linearly from 2005:H2 through 2017. The projected series imply the natural rate may decline to 4.4 percent by the end of 2022 (Table 2). My projection is in line with those in Aaronson et al. (2015), but lower than the CBO's projection of 4.7 percent in 2022.[1]

4 Conclusion

After accounting for changes in the age, sex, and skill composition of the labor force, I show that the natural rate of unemployment is currently at 4.5 percent, 0.5 percentage point lower than in 1994. Based on this estimate, the current unemployment rate is 0.4 percentage point below its trend rate. Moreover, ongoing demographic and technological changes could further lower the natural rate of unemployment to 4.4 percent by the end of 2022.

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[1] Aaronson et al. (2015) project the natural rate to decline to around 4.4 to 4.8 percent by 2020.