Economic Quarterly—Volume 100, Number 2—Second Quarter 2014—Pages 87–111

Flows To and From Working Part Time for Economic Reasons and the Labor Market Aggregates During and After the 2007–09 Recession

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While the unemployment rate is one of the most cited economic indicators, economists and policymakers also examine a wide array of other indicators to gauge the health of the U.S. labor market. One such indicator is the U-6 index, an extended measure of the unemployment rate published by the Bureau of Labor Statistics (BLS). In addition to unemployed workers, the U-6 index includes individuals who are working part time for economic reasons and individuals who are out of the labor force but are marginally attached to the labor market. Individuals are classified as working part time for economic reasons (henceforth, PTER) if they work fewer than 35 hours per week, want to work full time, and cite "slack business conditions"[1]

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[1] This is the term ("slack work/business conditions") used in the CPS questionnaire as opposed to the term "slack" used in recent policy discussions that typically describes a degree of labor utilization below a level of full resource utilization.

or an inability to find a full-time job as a reason for not working full time. On average, from 1994–2014, 2.4 percent of the civilian noninstitutionalized population 16 years and older are classified as PTER. In 2009, this share reached 3.8 percent.[2]

Part-time employment for economic reasons has become a concern since the 2007–09 recession because, even though the numbers of unemployed and marginally attached individuals have been decreasing since 2009, the number of individuals who are working part time for economic reasons has remained elevated.[3] During the 2014 Economic Symposium in Jackson Hole, Wyo., Fed Chair Janet Yellen noted that the elevated number of workers who are employed part time but desire full-time work might imply that the degree of resource underutilization in the labor market is greater than what is captured by the standard unemployment rate (Yellen 2014).

In this article, we first use cross-sectional data to evaluate whether part-time employment for economic reasons differs from full-time employment or part-time employment for noneconomic reasons such as childcare or other family reasons (henceforth, PTNER) along dimensions other than hours (i.e., observable characteristics of workers and wages). We then examine whether the changes in the labor market flows in and out of PTER during and in the aftermath of the 2007–09 recession can account for any of the changes in unemployment.

We find that PTER workers are typically less educated than full-time or other part-time workers and are typically employed in middle- or low-skill occupations. On average, PTER workers earn 19 percent less than full-time workers and 9 percent less (per hour) than PTNER workers, even after controlling for sociodemographic and occupational characteristics. The differences persist if we compare wages of PTER to wages of other workers within broad occupational categories. More research, however, is needed to understand whether PTER workers are workers who cannot find full-time jobs because of bad luck or because of structural reasons.

We now turn to the question of PTER and unemployment. Note that the number of PTER workers at any point in time (i.e., stock) is affected by the number of workers who worked PTER in the previous period and continue to do so, as well as the number of workers who transition (i.e., flow) into PTER from full-time employment, other part-time employment, unemployment, and out-of-the-labor-force (OLF)

[2] The data in this paragraph are from HAVER.

[3] See, for example, Kearns and Smialek (2014) for a summary of policy discussions about individuals working PTER. For research on working PTER, see Valetta and Bengali (2013) and Cajner et al. (2014). For alternative measures of resource utilization in the labor market that incorporate PTER, see Hornstein, Kudlyak, and Lange (2014).

and the number of workers who transition from PTER into these other labor market statuses. Similarly, the flows into and out of PTER impact other labor market aggregates—full- and part-time employment, unemployment, and OLF. In this article, we decompose the changes in stocks of full-time employed, PTNER, unemployed, and OLF due to the changes in the flows of workers to and from PTER in the aftermath of the 2007–09 recession. Of course, the flows are in turn determined by fundamental factors affecting households' and firms' behavior. Nevertheless, it can be instructive to look at such decomposition. To this end, we perform a counterfactual exercise by fixing the transition probabilities between PTER and other labor force statuses at their respective sample means, and constructing the counterfactual time series of the labor market aggregates. The exercise is similar in spirit to the exercise presented by Shimer (2012) for the contribution of different labor market flows to changes in the unemployment rate.

The accounting exercise shows that changes in the transition probabilities to and from PTER after 2009 were associated with changes in stocks of full-time employed, PTER, and PTNER, but had almost no impact on the changes in stocks of unemployed or OLF. In the counterfactual exercise, the main drivers of the changes in the stocks of full-time employed, PTER, and PTNER were transition probabilities between PTER and full-time work and between PTER and PTNER. If the transition probabilities to PTER from either full-time or PTNER had remained at their sample means throughout 1994–2014, the population share of PTER in 2014 would have been 0.47 percentage points (pp) lower at the expense of full-time work and PTNER. If the transition probabilities from PTER to full-time work and to PTNER had remained at their sample means throughout 1994–2014, the population share of PTER in 2014 would have been 0.43 pp lower at the expense of full-time work and, to a lesser extent, of PTNER. In contrast, this same exercise yields counterfactual unemployment that is essentially identical to the one actually observed.

Thus, our results show that changes in the transition probabilities to and from PTER in the aftermath of the 2007–09 recession mainly impact the composition of employment (full versus part time, and the reasons for working part time) instead of the distribution of individuals between employment and non-employment. Consequently, policymakers' attention to PTER potentially implies a broader definition of resource underutilization in the labor market than the one captured by the standard unemployment rate. In particular, in addition to working fewer-than-desired hours, underutilization in the labor market can take the form of workers being overqualified for their jobs. For example, Abel, Deitz, and Su (2014) provide evidence of an upward trend

in underemployment of recent college graduates whereby the graduates are employed in jobs that do not require a college degree. Importantly, the challenge for policymakers lies in determining how much of such changes in the quality of employment represent structural changes in the economy.

Finally, regarding the future of PTER, an examination of the series of PTER over time reveals that the ratio of the number of PTER workers to the number of unemployed workers typically increases during economic recoveries. The increase is fueled by PTER workers who cite an inability to find full-time work as a reason for part-time employment (the number of PTER workers who cite "slack work" declines during economic recoveries). PTER workers' share is highest in nonroutine manual (typically low-wage) occupations. Given the recent work on job polarization (Autor [2010], among others), which shows that medium-wage jobs are disappearing but jobs on the high- and low-end of the wage distribution are growing, it thus becomes a challenging task to disentangle cyclical versus structural factors behind an increased number of PTER workers after the 2007–09 recession. Thus, the following questions might represent fertile ground for future research: (1) To what extent is PTER an important mechanism of labor market adjustment during recoveries from recessions? (2) What is the impact of trend-related developments like job polarization on such an adjustment, especially after deep recessions? (3) To what extent does the burden of adjustment fall more on certain demographic and socioeconomic groups than on the others?

The rest of the article is structured as follows. Section 1 describes the construction of the PTER series in the CPS data. Section 2 presents basic facts about PTER. Section 3 presents the main results. Finally, section 4 concludes.

1. MEASUREMENT OF PTER IN THE CPS

The data in the analysis are from the Current Population Survey (CPS) monthly microdata files from January 1994 to August 2014. The survey features a rotating panel structure in which households are surveyed for four months, taken out of the sample for eight months, and then surveyed for another four months to complete their participation. The CPS allows us to classify each individual into one of five labor force statuses: employed full time, employed part time for economic

reasons, employed part time for noneconomic reasons, unemployed, and OLF.[4]

The survey asks respondents about their hours worked during the reference week, their desire and availability for full-time work if they work part time, and their reason for working part time. The individuals who work fewer than 35 hours per week are considered part-time workers.[5] For the part-time work to be classified as "for economic reasons," the worker must desire full-time work and cite an economic reason as the primary reason for not working full time. Such economic reasons are "slack work or business conditions," "could only find part-time work," and seasonal work. Noneconomic reasons are child care problems, other family/personal obligations, health/medical limitations, school/training, retired/Social Security limit on earnings, full-time workweek is less than 35 hours, weather affected job, military/civic duty, labor dispute, holiday, own illness, vacations, and other (unspecified) reasons.

The 1994 CPS redesign affected the PTER series. Prior to 1994, the CPS did not specifically ask whether part-time workers wanted to or were available to work full time.[6] Additionally, the survey did not distinguish between respondents who usually worked full time and those who usually worked part time; it only asked about actual hours worked. The effect of the CPS redesign on the PTER series after 1994 is therefore twofold: (1) it decreased the number of part-time workers classified as PTER because it excludes those who do not want to work full time; and (2) it may have increased the total number of part-time workers because it includes those who usually, but not actually in the reference week, work fewer than 35 hours per week.[7] Consequently, caution needs to be exercised while constructing a longer

[4] We restrict the analysis to the civilian noninstitutionalized population 16 years and older (henceforth, population).

[5] We use actual hours worked in the reference week to differentiate full-time and part-time workers. We count those workers who are absent from work (and thus whose actual hours are not available in the survey) as full-time workers if they report that they usually work full-time hours. Workers who are absent from work and report that they usually work part-time hours are excluded from our analysis (for example, 0.62 percent of the population in 2013) because they are not asked to provide a reason for why they work part time.

[6] That is, after the 1994 redesign, if the respondents do not desire full-time work, they are asked to choose from only noneconomic reasons. If the respondents desire full-time work, they are asked for the primary reason for working part time, with the option to provide an economic or noneconomic reason. Therefore, in order to be considered working part time for economic reasons after 1994, workers must desire full-time work in addition to citing economic reasons. Prior to 1994, the survey does not separate those who do and those who do not want full-time jobs.

[7] See Polivka and Rothgeb (1993) for a thorough treatment of the effect of the redesign on part-time work calculations and for an explanation of how to adjust the series to be consistent over time.

Table 1 Average Weekly Hours and Real Hourly Wages, Full- and Part-Time Employment, 1994–2014

	Full Time	PTER	PTNER
Weekly hours	44.49	23.31	21.80
Hourly wage, $2013	17.02	11.81	13.66

Notes: The table shows mean of annual averages, 1994–2014. For 2014, the average is taken over the first eight months for which the data are available at the time of publication. To calculate hourly wage, we use hourly wages for hourly workers and compute hourly wages for salaried workers by dividing usual weekly earnings by usual weekly hours. Zero wages are dropped. All calculations employ the CPS outgoing rotation group sampling weights. Hourly wages are in 2013 dollars. Calculations are based on the CPS microdata basic files.

series of PTER that begins prior to 1994. Another change the redesign introduced was "seasonal work" as an economic reason for working part time.[8] Prior to 1994, only slack work, not being able to find a full-time job, and a job starting or ending during the reference week were considered economic reasons for working part time. Therefore, our analysis focuses on the 20-year period following the 1994 CPS redesign so that we can use the BLS U-6 definition of PTER.

2. BASIC FACTS ABOUT WORKING PART TIME FOR ECONOMIC REASONS

Wages, Hours, and Occupations

Table 1 shows average weekly hours and real hourly wages over the 1994–2014 period for three different groups of the employed: full-time, PTER, and PTNER workers.[9] During 1994–2014, a full-time worker's average real hourly wage is $17.02 (in 2013 U.S. dollars), while it is $13.66 for a PTNER worker and $11.81 for a PTER worker.

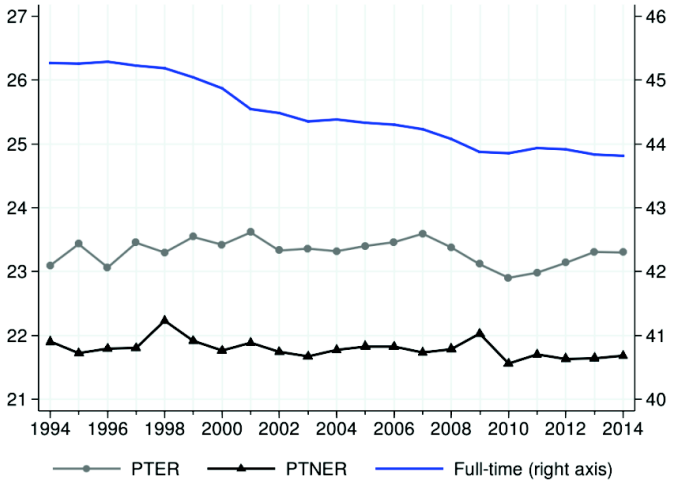
PTER workers report working 23 hours per week on average as compared to 45 hours reported by those working full time.[10] They also

[8] Seasonal work, however, does not constitute a large portion of PTER.

[9] To construct hourly wages, we use hourly earnings (if they are reported) or construct the wage by dividing weekly earnings by usual weekly hours. The reported wage statistics are based on non-imputed data. We also calculated the statistics incorporating imputed data and the results do not differ significantly. In the calculations we use outgoing rotation group weights.

[10] We take the mean of each year's average actual hours worked at all jobs in the reference week from 1994 to 2014. Usual hours, which are used to construct hourly earnings for non-hourly workers, are lower for full-time workers and higher for both voluntary and involuntary part-time workers.

Figure 1 Average Hours Worked per Week, Full- and Part-Time Employment



Notes: The figure shows yearly averages of monthly series. The data are from the basic monthly CPS files, all employed with nonnegative wages. The hours are total hours actually worked on all jobs in the reference week. The spikes in the working part time for noneconomic reasons series in 1998 and 2009 are due to Labor Day falling in the reference week, leading to a significantly higher than average number of workers working fewer than 35 hours for a noneconomic reason (specifically, most of them work 32 hours, increasing the average). No other reference weeks in the CPS contain national holidays. Authors' calculations using the CPS microdata.

work on average 1.5 hours more per week than PTNER workers. As can be seen from Figure 1, these gaps persist throughout 1994–2014.

Table 2 presents demographic characteristics of the three groups of employed workers, shedding some light on the difference in hourly wages between PTER workers and other employed persons. For example, full-time workers are more likely to have finished high school or college than part-time workers; among part-time workers, PTNER workers tend to be more highly educated than PTER workers (41.4 percent of full-time workers, 33.0 percent of PTNER workers, and 22.0 percent of PTER workers have a college degree or higher). PTER workers tend to be younger, with a comparatively large share of 20–24 year olds.

To further understand the differences between wages of PTER workers and the rest of the employed population, we tabulate the shares

Table 2 Education and Demographic Characteristics of Full- and Part-Time Employment, 1994–2014

		Group's Share In	
Group	**Full Time**	**PTER**	**PTNER**
Female	40.24	49.84	63.21
High school degree	91.71	79.88	85.14
Associate's, Bachelor's or higher degree	41.44	21.95	33.01
Master's, professional, or Doctorate degree	10.91	4.06	8.11
Average age	40.82	36.62	39.12
Under 20 y.o.	1.54	8.05	13.82
20–24 y.o.	8.18	17.52	13.26
25–34 y.o.	24.19	23.32	16.90
35–44 y.o.	26.80	21.15	18.54
45–54 y.o.	24.26	17.69	16.39
Over 55 y.o.	15.03	12.28	21.08

Notes: The table shows mean of annual averages, 1994–2014. For 2014, the average is taken over the first eight months for which the data are available at the time of publication. Authors' calculations using the CPS microdata basic files.

of different types of workers across different occupations. Following Jaimovich and Siu (2012) (see also Autor, Levy, and Murnane [2003] and Acemoglu and Autor [2011]), we classify the occupations into four different groups: non-routine cognitive, routine cognitive, routine manual, and non-routine manual occupations.[11] Routine occupations are typically middle-skill occupations.[12] As discussed in Autor (2010) and Jaimovich and Siu (2012), the U.S. labor market is experiencing a job polarization phenomenon where employment in routine occupations is shrinking while employment in non-routine cognitive and non-routine manual occupations is growing.

Table 3 shows the distribution of full-time, PTER, and PTNER work across four broad occupational groups with cognitive-manual and routine/non-routine classifications. Part-time workers represent a

[11] Non-routine cognitive occupations include management, business, and financial occupations and professional related. Routine cognitive occupations include sales and office occupations and office and administrative support occupations. Routine manual occupations include construction and extraction; installation, maintenance, and repair; production; and transportation and moving material occupations. Non-routine manual occupations include service occupations.

[12] Following Autor (2010), high-skill occupations include managers, professionals, and technicians. Middle-skill occupations include sales; office and administration; production, craft, and repair; and operators, fabricators, and laborers. Finally, low-skill occupations include protective services; food preparation; building and grounds cleaning; and personal care and personal services.

Table 3 Full-Time and Part-Time Employment Shares, by Occupation 1994–2014

	Non-routine cognitive			Routine cognitive			Routine manual			Non-routine manual		
Year	Full time	PTNER	PTER	Full time	PTNER	PTER	Full time	PTNER	PTER	Full time	PTNER	PTER
1994	0.781	0.196	0.024	0.713	0.251	0.036	0.811	0.142	0.047	0.606	0.321	0.073
1995	0.787	0.190	0.023	0.717	0.248	0.035	0.812	0.142	0.046	0.616	0.316	0.068
1996	0.786	0.192	0.022	0.715	0.251	0.033	0.814	0.145	0.042	0.624	0.311	0.065
1997	0.794	0.187	0.020	0.723	0.247	0.030	0.824	0.137	0.039	0.629	0.309	0.062
1998	0.775	0.207	0.018	0.706	0.267	0.027	0.806	0.159	0.036	0.628	0.318	0.054
1999	0.796	0.188	0.016	0.728	0.248	0.024	0.828	0.139	0.033	0.643	0.309	0.048
2000	0.811	0.175	0.014	0.742	0.236	0.022	0.840	0.129	0.032	0.654	0.300	0.045
2001	0.797	0.187	0.016	0.733	0.241	0.025	0.825	0.137	0.038	0.644	0.305	0.051
2002	0.802	0.180	0.018	0.735	0.236	0.029	0.827	0.130	0.042	0.641	0.301	0.057
2003	0.807	0.176	0.017	0.724	0.243	0.033	0.830	0.122	0.047	0.624	0.307	0.068
2004	0.805	0.179	0.017	0.719	0.249	0.032	0.834	0.121	0.045	0.625	0.308	0.067
2005	0.808	0.176	0.016	0.723	0.246	0.031	0.838	0.121	0.041	0.632	0.305	0.063
2006	0.809	0.176	0.015	0.727	0.245	0.028	0.839	0.120	0.040	0.642	0.301	0.057
2007	0.815	0.170	0.015	0.730	0.241	0.030	0.840	0.118	0.042	0.638	0.303	0.058
2008	0.815	0.167	0.019	0.726	0.235	0.040	0.820	0.119	0.061	0.631	0.294	0.075
2009	0.782	0.187	0.031	0.689	0.247	0.064	0.765	0.136	0.099	0.593	0.293	0.114
2010	0.799	0.169	0.031	0.701	0.229	0.070	0.793	0.119	0.088	0.600	0.280	0.119
2011	0.803	0.168	0.030	0.703	0.229	0.068	0.798	0.121	0.081	0.600	0.281	0.118
2012	0.809	0.162	0.029	0.707	0.228	0.065	0.814	0.117	0.069	0.606	0.280	0.114
2013	0.817	0.155	0.028	0.715	0.221	0.064	0.822	0.115	0.064	0.609	0.279	0.112
2014	0.814	0.160	0.025	0.710	0.230	0.061	0.824	0.118	0.058	0.607	0.288	0.106

Notes: The table shows shares of FT, PTER, and PTNER in each of the four occupational groups, annual averages of monthly series. Non-routine cognitive occupations include management, business, and financial occupations and professional related. Routine cognitive occupations include sales and office occupations and office and administrative support occupations. Routine manual occupations include construction and extraction; installation, maintenance, and repair; production; and transportation and moving material occupations. Non-routine manual occupations include service occupations. Authors' calculations using the CPS microdata basic files.

significantly higher fraction of low-skill and medium-skill occupations than of high-skill occupations. Interestingly, among the highest skill occupations, classified as non-routine cognitive, the share of PTER workers is only 0.03 while the share of PTNER workers is 0.16. The share of PTER workers is highest among non-routine manual occupations (0.11), which are typically low-skill occupations.

To understand whether the differences in wages between full-time, PTNER, and PTER workers can be explained by the differences in their sociodemographic characteristics and/or their occupations, we estimate a linear regression of the logarithm of the real hourly wage on educational level, occupation, race, gender, year, and employment type dummy variables. The omitted category for employment type is PTER. The coefficients for the type of employment show the difference in the (log of the) real hourly wage between PTER and working full time or PTNER, after controlling for sociodemographic and occupational characteristics. The results of this regression are presented in Table 4.[13] On average, full-time workers earn 19 percent more and PTNER workers earn 9 percent more (per hour) than PTER workers, taking into account education, age, and broadly defined occupational categories.

To further understand the wage differences, instead of occupational and employment dummy variables, we include a full set of interactions between seven occupational categories and the three types of employment (full time, PTER, and PTNER). If, for example, better workers (either employed full or part time) are employed in higher-paying occupations, then one should compare the wages of full- and part-time workers in these occupations in order to estimate the differences in earnings between full- and part-time workers. Table 5 contains the results of the regression with the interaction terms.[14] We then perform

[13] In Table 4, the dependent variable is the log of real hourly wage as described in the note to Table 1. The explanatory variables are type of employment dummies, occupation, education, age, race, gender, and a set of annual time dummies. The omitted categories are working part time for economic reasons, less than high school education, service occupations, male, and white. *** denotes statistical significance at the 1 percent level for a two-sided test. All data are from 1994 to August 2014 and include employed working age persons in months four and eight of the CPS sample except for those in the armed forces or farming, fishing, and forestry occupations. The regression is estimated by OLS with heteroscedasticity robust standard errors, with the CPS outgoing rotation group sampling weights. See footnote 14 for the details about the occupational classification.

[14] In Table 5, the dependent variable is the log of real hourly wage as described in the note to Table 1. The explanatory variables are type of employment interacted with occupation, education, age, race, gender, and a set of annual time dummies. The omitted categories are working part time for economic reasons interacted with service occupations, less than high school education, male, and white. See footnote 13. The occupational classification used in the regression is as follows (accounting for the change in coding in 2002): (1) Healthcare support occupations; protective service; food

Table 4 Hourly Wage, Demographic and Socioeconomic Characteristics, 1994–2014

Variable	Coefficient	Variable	Coefficient
Full time	.1915106***	Dummy_1996	-.0123845***
	(.000)		(.000)
Part time (PTNER)	.0914258***	Dummy_1997	-.0019732
	(.000)		(.348)
Construction/transportation	.2215752***	Dummy_1998	.0278192***
	(.000)		(.000)
Production and repair	.3131558***	Dummy_1999	.0382212***
	(.000)		(.000)
Sales and related	.0678285***	Dummy_2000	.0424516***
	(.000)		(.000)
Office/administrative	.2269783***	Dummy_2001	.0544279***
support	(.000)		(.000)
Professional specialty	.4906422***	Dummy_2002	.0624557***
	(.000)		(.000)
Management/executive	.3944512***	Dummy_2003	.0585759***
	(.000)		(.000)
High school	.1300564***	Dummy_2004	.0471874***
	(.000)		(.000)
Some college	.1753108***	Dummy_2005	.0319903***
	(.000)		(.000)
College	.3062498***	Dummy_2006	.0284528***
	(.000)		(.000)
Graduate degree	.2087941***	Dummy_2007	.0293244***
	(.000)		(.000)
Age	.0413028***	Dummy_2008	.0228746***
	(.000)		(.000)
Age^2	-.0004105***	Dummy_2009	.0470142***
	(.000)		(.000)
Black	-.057996***	Dummy_2010	.0310914***
	(.000)		(.000)
American Indian/Alaskan	-.0468621***	Dummy_2011	.0099154***
Native	(.000)		(.000)
Asian	-.0150465***	Dummy_2012	-.0020422
	(.000)		(.372)
Other race	-.0095699***	Dummy_2013	-.0093538***
	(.003)		(.000)
Female	-.1564769***	Dummy_2014	-.0136535***
	(.000)		(.000)
Dummy_1995	-.0093544***	Constant	1.260337***
	(.000)		(.000)
Mean(log real wages)	2.630377		
N	1,483,262		
R^2	.4109		

Notes: See footnote 13.

preparation and serving related; building and grounds cleaning and maintenance; personal care and service occupations (post-2002) and service occupations (pre-2002); (2) Construction trades, extraction workers; transportation and material moving occupations (post-2002); and operators, fabricators, and laborers (pre-2002); (3) Installation, maintenance, and repair workers and production occupations (post-2002) and production occupations (pre-2002); (4) Sales and related occupations (post-2002) and sales occupations (pre-2002); (5) Office and administrative support occupations (post-2002) and administrative support occupations, including clerical (pre-2002); (6) Computer and mathematical; architecture and engineering; life, physical, and social science; community and social services; legal occupations; education, training, and library; arts, design, entertainment, sports, and media; healthcare practitioners and technical occupations (post-2002);

Table 5 Hourly Wage, Demographic and Socioeconomic Characteristics with Occupation-Employment Type Interactions, 1994–2014

Variable	Coefficient	Variable	Coefficient
Full time X Service	.1823325***	Black	-.0578995***
	(.000)		(.003)
Full time X	.398573***	American	-.046481***
Construction/transportation	(.000)	Indian/Alaskan Native	(.000)
Full time X Production and	.4920935***	Asian	-.01469***
repair	(.000)		(.000)
Full time X Sales and related	.2403244***	Other race	-.0098147***
	(.000)		(.000)
Full time X	.410917***	Female	-.1569275***
Office/administrative support	(.000)		(.000)
Full time X Professional	.6591924***	Dummy_1995	-.0092787***
specialty	(.000)		(.000)
Full time X	.5672558***	Dummy_1996	-.0123659***
Management/executive	(.000)		(.000)
Part time non-economic	.0716929***	Dummy_1997	-.0019273
(PTNER) X Service	(.000)		(.359)
PTNER X	.2472299***	Dummy_1998	.0279902***
Construction/transportation	(.000)		(.000)
PTNER X Production and	.4085932***	Dummy_1999	.0381384***
repair	(.000)		(.000)
PTNER X Sales and related	.1543721***	Dummy_2000	.0425298***
	(.000)		(.000)
PTNER X	.3011755***	Dummy_2001	.0545344***
Office/administrative support	(.000)		(.000)
PTNER X Professional	.5966031***	Dummy_2002	.0623247***
specialty	(.000)		(.000)
PTNER X	.5108225***	Dummy_2003	.0584042***
Management/executive	(.000)		(.000)
PTER X	.2226177***	Dummy_2004	.0470143***
Construction/transportation	(.000)		(.000)
PTER X Production and repair	.2740908***	Dummy_2005	.0318157***
	(.000)		(.000)
PTER X Sales and related	.060803***	Dummy_2006	.028199***
	(.000)		(.000)
PTER X Office/administrative	.1890605***	Dummy_2007	.0291946***
support	(.000)		(.000)
PTER X Professional	.4600883***	Dummy_2008	.0227143***
specialty	(.000)		(.000)
PTER X	.3030132***	Dummy_2009	.0469685***
Management/executive	(.000)		(.000)
High school	.1296502***	Dummy_2010	.0310504***
	(.000)		(.000)
Some college	.1751928***	Dummy_2011	.009801***
	(.000)		(.000)
College	.3063701***	Dummy_2012	-.0020417
	(.000)		(.371)
Graduate degree	.2079177***	Dummy_2013	-.0093253***
	(.000)		(.000)
Age	.0409877***	Dummy_2014	-.0135823***
	(.000)		(.000)
Age^2	-.0004068***	Constant	1.278611***
	(.000)		(.000)
Mean(log real wages)	2.630377		
N	1,483,262		
R^2	.4115		

Notes: See footnote 14.

and professional specialty and technicians and related support occupations (pre-2002);

a series of pairwise t-tests comparing the coefficient for the interaction term of full-time work (and similarly PTNER) to the coefficient for the interaction term of PTER with each of the seven occupational categories. In each of the seven occupational categories, we find that PTER workers receive lower wages than full-time or PTNER workers. For example, on average, PTER workers in service occupations are paid 18 percent less than full-time workers and 7 percent less than PTNER workers in service occupations.[15]

The regression results in Tables 4 and 5 also show that the year dummies are positive during the 2008–11 recession years and turn negative in the post-recession years, 2012–14, which points to a somewhat lagged response of wages during the 2007–09 recession.[16]

Working Part Time for Economic Reasons Over the Years

Figure 2 shows the population shares of full-time, PTNER, and PTER workers. As can be seen, there is a notable drop in the share of full-time workers and an increase in PTER workers during the 2007–09 recession. Figure 3 shows a close-up of the PTER series. The PTER population share was higher in the 2007–09 recession than in the 2001 recession. In 2009, the series reached 3.8 percent. In 2014, the PTER population share stands at 3.0 percent.[17]

Figure 4 examines PTER by reason: slack work, could only find part-time work, and "other," which includes a job starting/ending during the reference week (such that hours add up to less than 35) and seasonal work. The first two reasons account for the majority of the PTER workers. Notably, during the 2007–09 recession the share of workers who reported slack work/business conditions increased to a much higher level than during the previous recession. While the share of workers reporting "slack work" has declined substantially since 2009, the share of workers who are working part time because they could only

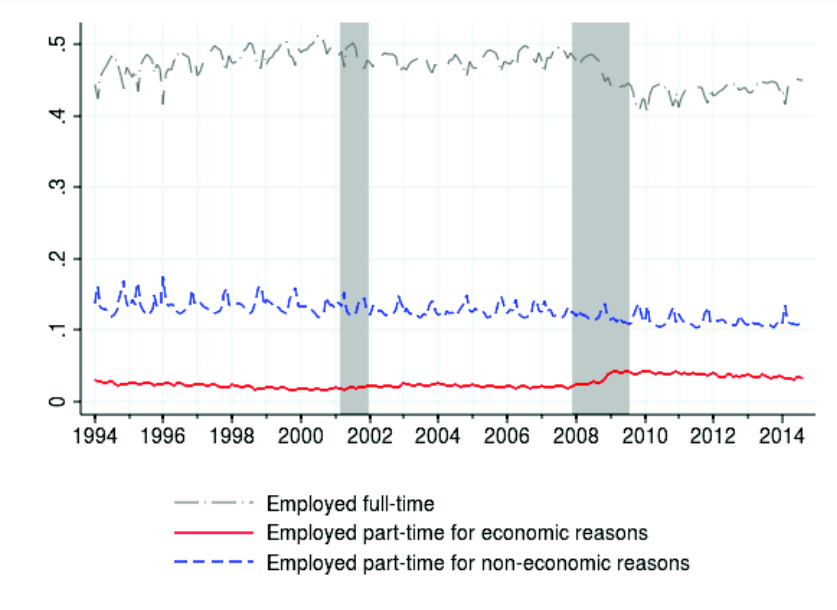
(7) Management; business and financial operations occupations (post-2002); and executive, administrative, and managerial occupations (pre-2002). Occupation 1 is non-routine manual; occupations 2–3 are routine manual; occupations 4–5 are routine cognitive; and occupations 6–7 are non-routine cognitive.

[15] However, more analysis is needed to examine how much of the wage difference can be attributed to worker fixed effect. Such analysis is beyond the scope of the article.

[16] See Elsby, Shin, and Solon (2014) for a detailed exploration of wage adjustment in the 2007–09 recession.

[17] This figure is calculated using January 1994–August 2014 data.

Figure 2 Full- and Part-Time Work, Population Shares, Monthly, NSA (Jan 1994–Aug 2014)



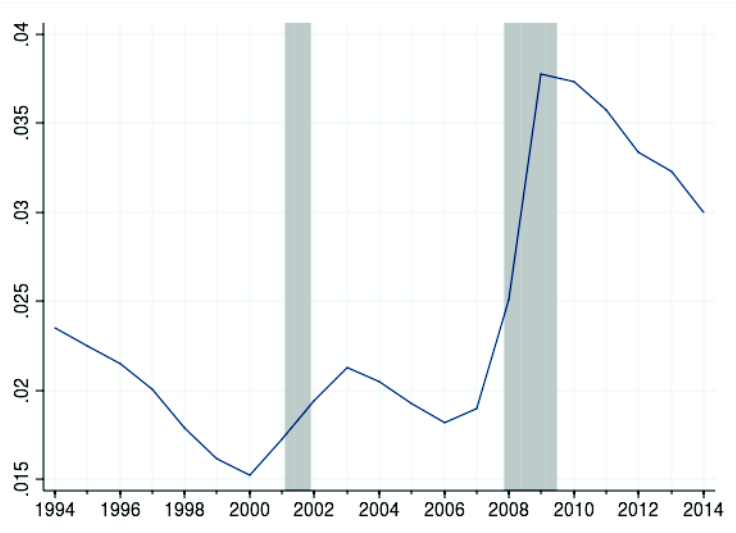
Notes: The figure shows the shares of the civilian noninstitutional working-age population. Workers who were absent from work in the reference week but usually work part time are excluded (see footnote 3 in the text for details). Authors' calculations using the CPS microdata.

find part-time work has remained elevated since 2009. A similar cyclical pattern is observed during previous downturns.[18]

Figure 5 shows the ratio of PTER workers to the number of unemployed workers in the economy. Interestingly, the ratio was about 10 percentage points higher at the trough of the 2007–09 recession than at the trough of the 2001 recession. The ratio appears procyclical, indicating that during recessions PTER grows at a slower rate than unemployment. The most recent growth started in 2010, increasing from 0.60 in 2010 to 0.74 in 2014.

[18] However, due to the changes to the CPS described in section 1, most of these observed downturns are not strictly comparable.

Figure 3 Employed Part Time for Economic Reasons, Population Share



Notes: The figure shows the number of PTER workers as the share of the civilian noninstitutionalized working-age population, the annual averages of the monthly NSA series, 1994–2014. The series are from BLS/HAVER Analytics.

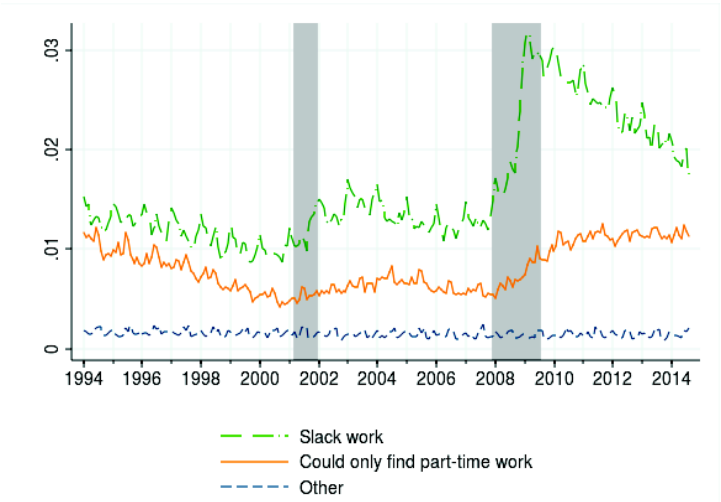
3. THE TRANSITION PROBABILITIES OF PTER FLOWS DURING 2007–09 AND EFFECTS ON EMPLOYMENT, UNEMPLOYMENT, AND OLF

In this section, we focus on the transition probabilities to and from the stock of PTER and other states of the labor market. We decompose changes in the stocks of the labor market aggregates—full- and part-time employment, unemployment, and out-of-the-labor-force (OLF)—into the changes in these transition probabilities during the 2007–09 recession. The counterfactual exercises show that these changes were not associated with the changes in the stocks of unemployment or OLF, but they were associated with the decrease of the stocks of full-time and PTNER employment.

Transition Probabilities to and from PTER

As mentioned above, each individual in the population can be classified into one of the following five labor force statuses: employed full time

Figure 4 Employed Part Time for Economic Reasons, by Reason, Monthly, NSA (Jan 1994–Aug 2014)



Notes: The figure shows PTER workers by reason as share of civilian noninstitutional working-age population, monthly NSA. The shaded areas show the NBER-dated recessions. "Other" includes job started/ended during the survey week, as well as seasonal work. Authors' calculations using the CPS microdata.

(FT), PTER, PTNER, unemployed (U), and OLF. The labor market is characterized by the flows of individuals among these statuses. The stocks and the transition probabilities among them are linked via the following equation

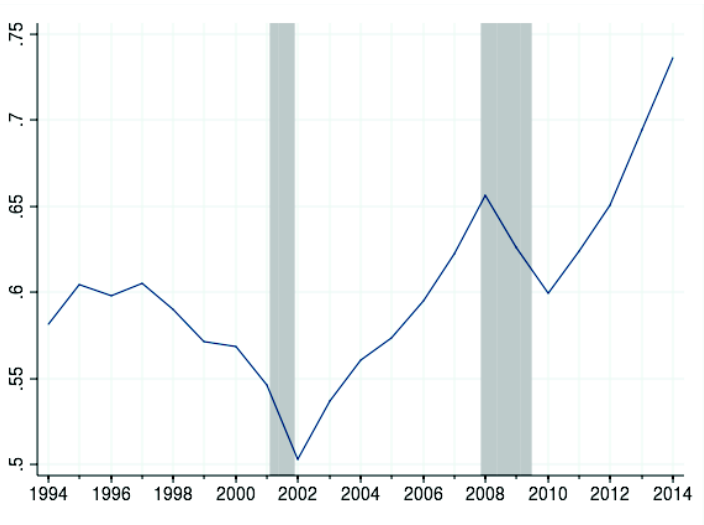
$$S(t) = P(t)S(t-1), \tag{1}$$

where $S(t)$ is the vector of stocks (expressed in population shares), and $P(t)$ is the matrix of discrete transition probabilities.[19]

The change in the stock of PTER can be decomposed into components representing changes in the probabilities of entering and exiting PTER as well as components representing changes in the transition probabilities between the remaining labor force statuses.

[19] In the analysis, we also include inflows and outflows into the population.

Figure 5 Ratio of Employed Part Time for Economic Reasons to Unemployed, Annual, (Jan 1994–Aug 2014)



Notes: The figure shows the ratio of workers employed part time for economic reasons to unemployed workers. All data points are the annual averages of the monthly NSA series. The shaded areas show the NBER-dated recessions. Authors' calculations using data from HAVER.

Likewise, changes in entry and exit to/from PTER are associated with the changes in the stocks of FT, PTNER, U, and OLF.

To construct the transition probabilities matrix we match individuals between consecutive months in the CPS following the matching procedure described in Shimer (2012). Because the unit of observation is the physical address, we use sex, age, and race in addition to the household identification number to produce matches. The transition probability from state i in month $t-1$ to state j in month t is the flow of individuals moving from state i to state j divided by the total number of individuals in state i in month $t-1$ (out of those that can be matched). We call this the "exit probability from" state i to state j, or the "entry probability to" state j from state i.

Table 6 shows the mean of annual average transition probabilities among the five labor market statuses during 1994–2014. A PTER worker has probability 0.31 of transitioning to full-time employment next month. This probability is 0.30 for a PTNER worker and 0.13 for an average unemployed worker. Thus, in their propensity to join

Table 6 Average Transition Probabilities, 1994–2014

	To PTER	To PTNER	To FT	To U	To OLF
From PTER	.3702	.2146	.3092	.0614	.0447
From PTNER	.0437	.5744	.2995	.0179	.0645
From FT	.0156	.0797	.8795	.0094	.0158
From U	.0482	.0705	.1263	.5185	.2364
From OLF	.0033	.0218	.0175	.0260	.9314

Notes: We take the mean of each yearly average, 1994–2014.

full-time work, PTER workers are closer to PTNER than to unemployed workers. The data reveal the substantial flows between PTER and PTNER. An unemployed worker and a PTNER worker have similar probabilities of transitioning into PTER, 0.048 and 0.044, respectively.

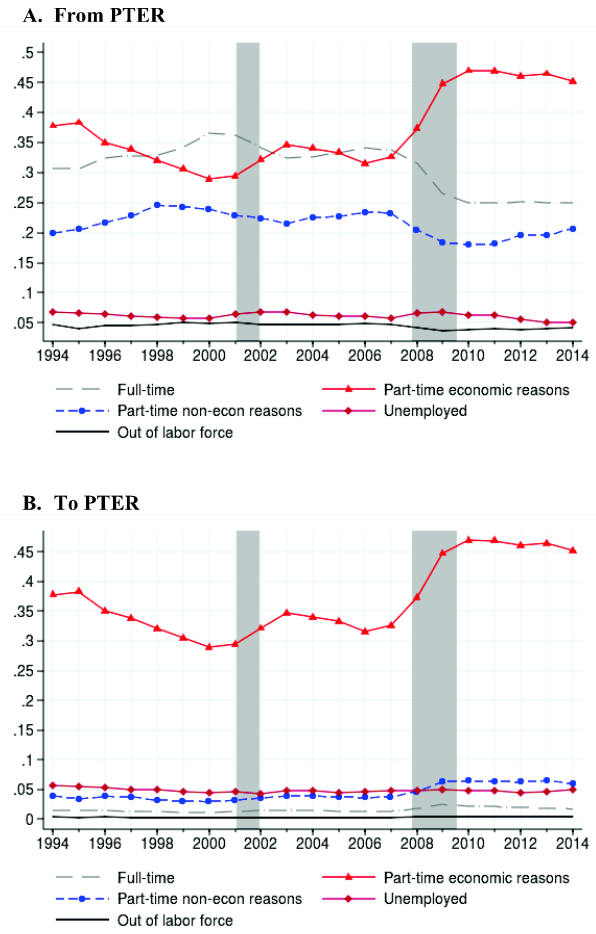
Panels A and B of Figure 6 show the transition probabilities from and to PTER, respectively, by labor force status. The observations from the figure can be summarized as follows. First, the transition probability from PTER to FT declined during 2007–09 and has remained low since then. Second, the transition probability from PTER to PTNER declined during 2007–09 and has only slightly increased since then. Third, the transition probability from FT to PTER increased during 2007–09 and has decreased since then. Fourth, the transition probability from PTNER to PTER increased during 2007–09 and has remained elevated since 2009.

Counterfactual Exercises with the Transition Probabilities to and from PTER

To separately examine the effects of exit and entry, we perform a series of counterfactual exercises using equation (1). The exercises are as follows:

1. fix all transition probabilities from PTER (to FT, to PTNER, to U, and to OLF);
2. fix transition probabilities from PTER to FT;
3. fix transition probabilities from PTER to PTNER;
4. fix transition probabilities from PTER to U;
5. fix transition probabilities from PTER to OLF;
6. fix all transition probabilities to PTER (from FT, from PTNER, from U, and from OLF);

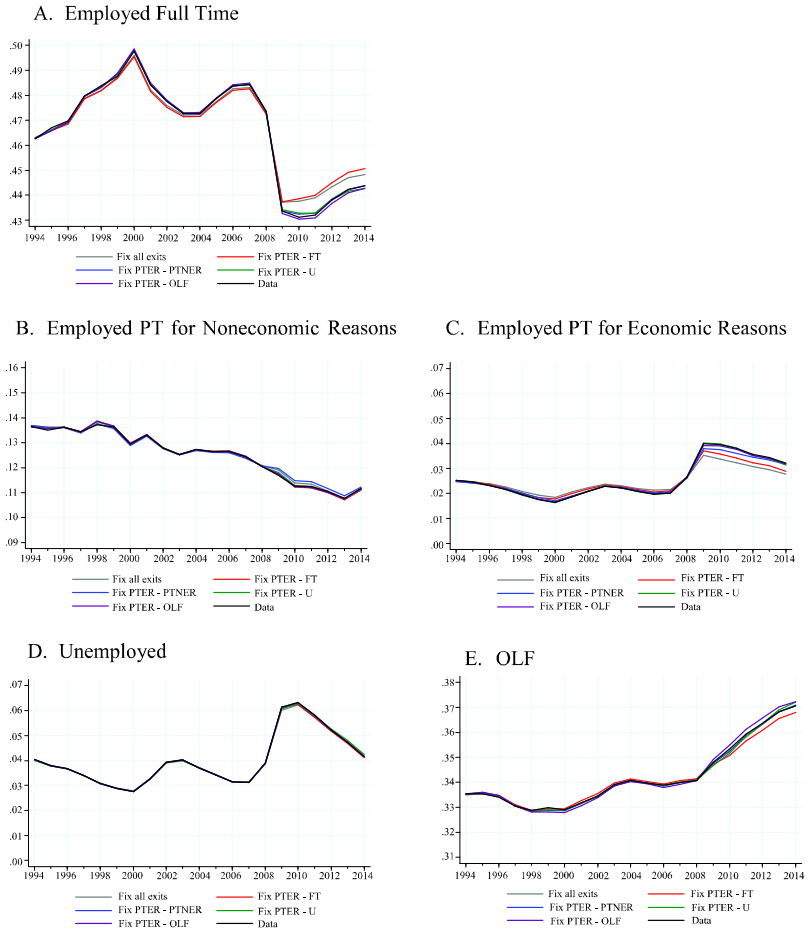
Figure 6 Transition Probabilities from Month t-1 to Month t



Notes: The figure shows annual averages of monthly series. Authors' calculations using the CPS microdata.

7. fix transition probability from FT to PTER;
8. fix transition probability from PTNER to PTER;
9. fix transition probability from U to PTER; and
10. fix transition probability from OLF to PTER.

Figure 7 Counterfactual Exercises with Exit Rates from PTER



Notes: The figure shows the stocks as shares of the civilian noninstitutionalized population (16+). The black solid lines (labeled "Data") show the actual series. The remaining five lines show the counterfactual series. The dashed gray line (labeled "Fix all exits") shows the counterfactual with the four exit rates fixed (except exit from PTER to PTER). In the counterfactuals, the exit rates are fixed at their respective 1994–2014 sample means.

To perform these exercises, we fix the respective probabilities at their 1994–2014 sample means and construct the monthly counterfactual time series of the fixed labor force status stocks using equation (1) recursively, setting $t_0 = 1994$.[20]

We start in 1994 because of the changes in the series after the 1994 CPS redesign (mainly PTNER and FT). In the exercises, the diagonal elements of the transition matrix (i.e., the probability of remaining in the same status) are adjusted accordingly so that the column elements add to 1. Figures 7 and 8 show the resulting counterfactuals using annual averages of monthly series.[21] Figure 7 shows the counterfactuals with fixed exit rates from PTER. All stocks are expressed as shares of the population. The effect of the counterfactual transition probabilities of exiting PTER on the aggregate stocks is as follows:

1. PTER (Figure 7, Panel C): If all exits from PTER are fixed at their sample means, the counterfactual share of PTER in 2014 is 0.43 pp lower than the actual share. PTER is primarily affected by exits from PTER to FT and from PTER to PTNER.

2. FT (Figure 7, Panel A): If the exit from PTER to FT is fixed at its 1994–2014 sample mean, the population share of FT in 2014 increases by 0.69 pp (as compared to its 44.4 pp level in 2014). Other exits from PTER do not have a substantial impact on the share of FT workers.

3. PTNER, U, and OLF (Figure 7, Panels B, D, and E): The relative magnitudes of the effect of the fixed exits on PTNER, U, and OLF are much smaller than the effect of the counterfactual exits on the share of FT workers.

Figure 8 shows the counterfactuals with fixed transition probabilities to PTER. The effect of the counterfactual transition probabilities of entering PTER on the aggregate stocks is as follows:

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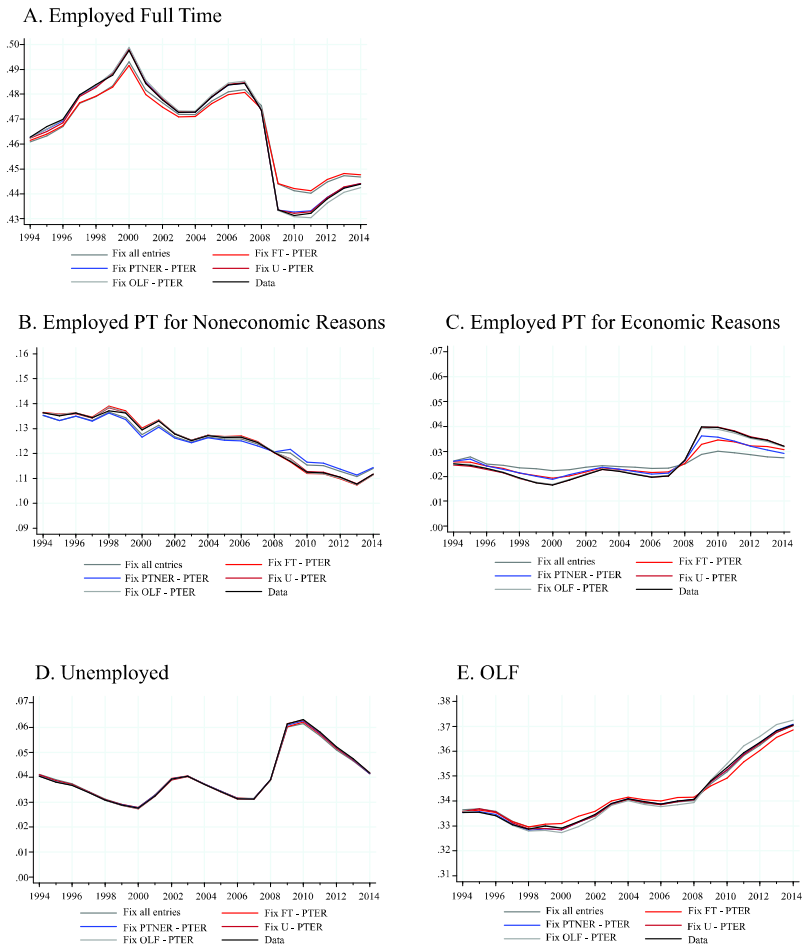
[20] Due to the rotating panel structure of the CPS, at most 75 percent of the observations may be matched to the following month when we exclude individuals in months four and eight in the survey, and thus the labor force stocks tabulation from unmatched monthly CPS data may differ from the labor force stocks tabulation from the matched month-to-month files (see, for example, Frazis et al. [2005]). We therefore employ a procedure that ensures that in every period the recursion delivers the distribution of the labor force stocks consistent with the one observed in the unmatched CPS monthly files.

[21] Additionally, we impute missing data in unmatchable months, i.e., we take the average of each stock and probability of the adjacent months for June–September 1995 and May 2004. We employ the same procedure for September 1998 and September 2009 for FT and PTNER to remove the effect of full-time workers being classified as part time for noneconomic reasons due to Labor Day—this is the only national holiday occurring in any reference week after 1994 and would constitute a significant spike in the series if not adjusted.

Figure 8 Counterfactual Exercises with Entry Rates to PTER



Notes: The figure shows the stocks as shares of the civilian noninstitutionalized population (16+). The black solid lines (labeled "Data") show the actual series. The remaining five lines show the counterfactual series. The dashed gray line (labeled "Fix all entries") shows the counterfactual with the four entry rates fixed (except entry from PTER to PTER). In the counterfactuals, the entry rates are fixed at their respective 1994–2014 sample means.

1. PTER (Figure 8, Panel C): We observe that if all transition probabilities to PTER are fixed at their sample means, PTER in 2014 is 0.47 pp lower than the actual population share observed.

As with the case of fixed exit rates, PTER is primarily affected by transition probabilities from FT and from PTNER.

2. FT (Figure 8, Panel A): If the transition probability from FT to PTER remains at its 1994–2014 sample mean, the population share of FT in 2014 increases by 0.39 pp (as compared to its 44.4 pp level in 2014). Other entries to PTER do not have a substantial impact on the share of FT workers.

3. PTNER (Figure 8, Panel B): If the transition probability from PTNER to PTER remains at its 1994–2014 sample mean, the population share of PTNER in 2014 is 0.27 pp higher than the actual share observed. Other entries to PTER do not have a substantial impact on the share of PTNER workers.

4. U and OLF (Figure 8, Panels D, and E): The fixed transition probabilities into PTER have essentially no effect on U or OLF.

As can be seen from Figures 7 and 8, the transition probabilities to PTER contribute substantially to the cyclical behavior of the share of PTER workers, while the exit rates do not drive much of the cyclical fluctuations.

4. CONCLUSIONS

The elevated number of PTER workers in the aftermath of the 2007–09 recession has raised a concern of whether the extent of resource underutilization in the labor market is greater than that captured by the standard unemployment rate.

In this article, we find that the changes in the transition probabilities to and from PTER in the aftermath of the 2007–09 recession have been mainly associated with the composition of employment (full versus part time, and part time for economic versus for noneconomic reasons) instead of with the distribution of individuals between employment and non-employment.

We also find that, in general, part-time workers represent a significantly higher fraction of low-skill and medium-skill occupations than of high-skill occupations. Among the highest skill occupations, classified as non-routine cognitive, the share of PTER workers is only 0.03 while the share of PTNER workers is 0.16. The share of PTER workers is highest among non-routine manual occupations, which are typically low-skill occupations. The educational achievement of PTER workers is typically lower than of those working full time or part time for noneconomic reasons. PTER workers typically earn less per hour than full-time or PTNER workers, even after controlling for age, education,

and broadly defined occupational groups. Given the recent work on job polarization (Autor 2010), it thus becomes a challenging exercise to disentangle the effect of cyclical versus structural factors on driving up the number of PTER following the deep recession of 2007–09.

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