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IZA DP No. 11826

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ABSTRACT

The Ins and Outs of Involuntary Part-Time Employment*

We develop an adjustment procedure to construct U.S. monthly time series of involuntary part-time employment stocks and flows from 1976 until today. Armed with these new data, we provide a comprehensive account of the dynamics of involuntary part-time work. Transitions from full-time to involuntary part-time employment dominate this dynamics, spiking up at recessions' onsets and persisting well into recovery periods. On the other hand, weaknesses in job creation contribute little to these fluctuations. Our data and findings are relevant to inform a broader assessment of labor market performance and to develop models of cyclical labor adjustment.

JEL Classification: E24, E32, J21

Keywords: involuntary part-time employment, unemployment, labor market flows, business cycles

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1 Introduction

At the trough of the Great Recession involuntary part-time work (or part-time for economic reasons) reached nearly 5 percent of the labor force, receiving considerable attention and scrutiny from scholars and policymakers.[1] More generally, as Figure 1 illustrates, involuntary part-time employment exhibits a stable pattern of large countercyclical variation around recessions. While nothing indicates that these fluctuations have limited information, they play a minor role in our understanding of labor market dynamics. Indeed, most of our knowledge in this area remains based on the behavior of the unemployment rate (Rogerson and Shimer [2011]), which is also the headline statistic to assess the strengths and weaknesses of the labor market. One explanation for this state of affairs is the very strong co-movement between involuntary part-time employment and unemployment (contemporaneous correlation in levels of 79%), which could suggest there is little additional data in involuntary part-time work fluctuations. In this paper, we argue that this conclusion is premature. We show that worker flows in and out of involuntary part-time work carry important information for diagnosing the health of the labor market and for advancing our knowledge on cyclical labor adjustment.

Our conclusions build on two insights. First, conceptually, involuntary part-time work constitutes a distinct labor market state with respect to both unemployment and other employment states. Like unemployment, individuals' desired labor supply is constrained, giving individuals additional incentives to search for better employment opportunities. Unlike unemployment, individuals maintain an ongoing relationship with their employer. This distinctiveness has the potential to inform us about different dimensions of labor dynamics which, in turn, can teach us something new about the mechanisms governing labor adjustment.[2] Second, we know from a long literature that analyzes unemployment fluctuations based on workers flows, that a similar behavior of worker stocks can mask large differences in the levels and cyclicality of the underlying worker flows (see e.g. Darby et al. [1986], Blanchard and Diamond [1990] and Blanchard and Portugal [2001]). Therefore, to compare involuntary part-time work and unemployment we need to go beyond Figure 1 and analyze their worker flows.

We measure and analyze transition probabilities between involuntary part-time employment, employment and non-employment states over the past four decades. Our investigation is organized around two sets of questions. We start by asking descriptive questions on the patterns of involuntary part-time employment turnover. What are the levels of transition probabilities between involuntary part-time work and other labor market states? How do they behave over the business cycle? How have these relationships evolved over the past forty years? The second set of questions is substantive. We ask: what is the additional information conveyed by fluctuations in the ins and outs of involuntary part-time employment? What does it tell us about

[1] See Blanchflower and Levin [2015] and Daly et al. [2016] for evidence on the negative impact on wage growth during the aftermath of the Great Recession; Even and Macpherson [2018] and Valletta et al. [2018] for results showing a shift of the U.S. labor market towards more intensive use of part-time employment; and Yellen [2014] for concerns expressed by the Federal Reserve.

[2] Consistent with our insights, recent research suggests that, descriptively, fluctuations in part-time employment are important to understand the cyclical behavior of the aggregate wage (Daly and Hobijn [2016] and Kurmann and McEntarfer [2017]) and hours per worker (Borowczyk-Martins and Lalé [2019]).

the state of the economy and the mechanisms underlying labor adjustment?

Our answer to the first set of questions can be summarized in three main findings. First, there are substantial differences in the average behavior of involuntary part-time work flows compared to those of unemployment. Involuntary part-time employment spells are shorter than unemployment, and workers in that state move primarily in and out of other employment states, whereas unemployment interacts mainly with full-time employment and non-participation. Second, we document very large cyclical variation in transitions between involuntary part-time employment and full-time employment, with patterns that are stable across recessions and similar to those of unemployment. Recessions are characterized by a jump upwards in inflows from full-time employment, followed by a prolonged decline in outflows to full-time employment. Third, while turnover between employment and unemployment exhibits a pronounced secular decline, no apparent trend is visible in its involuntary part-time employment counterpart.

In answering the second set of questions, we draw one main conclusion, with several implications. Contrary to a common view in the literature, we find that the high levels of involuntary part-time work during and after recessions are unlikely to reflect weak job creation (i.e. the lack of new full-time employment opportunities). In contrast, our analysis points to continued fragility of ongoing employment relationships, and which is the reflection of a different adjustment channel compared to job creation/destruction. Reallocation to part-time employment affects workers who are strongly attached to the labor market and it persists well into recessions' recoveries. This is especially important to understand the aftermath of the Great Recession, when employed workers faced a persistently elevated probability to move to involuntary part-time work. In terms of the long-run evolution of the U.S. labor market, the decline in the probability faced by full-time workers of becoming unemployed is not matched by a decrease in the probability to move to involuntary part-time work. This points to a change in the composition of labor market risk, away from unemployment and towards involuntary part-time employment, implying that employment spells may last longer but also have a more unstable work schedule.

Our findings are based on time series data of monthly stocks and flows of involuntary part-time employment from 1976 until today, which we assembled through a new methodology. Current knowledge of U.S. involuntary part-time employment dynamics is limited to the two latest recessions. The reason behind this limitation is the redesign of the Current Population Survey (CPS) in 1994, which introduced substantial changes to the measurement of involuntary part-time work.[3] We propose a novel adjustment protocol that allows us to extend the time series of involuntary part-time employment stocks and flows back to 1976, thereby increasing the number of recessions that can be analyzed from two to five. We are making our data publicly available so that others can verify our results and extend them in the direction taken by their own research. In addition to this methodological contribution, our paper contributes to the literature on labor market dynamics by extending the analyses of involuntary part-time employment during the Great Recession and its aftermath by Cajner et al. [2014], Canon et al.

[3] Borowczyk-Martins and Lalé [2019] use CPS data from the Earner Study questions collected in the Merged Outgoing Rotation Groups files of the CPS to construct series of part-time employment flows from 1976 to 2017. While those data provide one way around the break introduced by the CPS redesign, they cannot be used to estimate stocks of involuntary part-time work.

[2014], Warren [2015], Lariau [2017] and Farber [2017], and by complementing recent analyses of unemployment fluctuations (see Fujita and Ramey [2009], Elsby et al. [2009], Shimer [2012] and Elsby et al. [2015]).[4]

The paper is organized as follows. Section 2 introduces data and measurement issues. Section 3 sets out our adjustment protocol to address these issues and presents our empirical framework. Sections 4 and 5 describe our main findings and their interpretation. Section 6 concludes. An online appendix (OA) with supplementary results accompanies the paper.

2 Data and Measurement

CPS data. Our main source of data is the CPS. The CPS, administered by the U.S. Bureau of Labor Statistics (BLS), has informed the majority of studies on worker flows in the U.S. labor market. Each basic monthly (BM) file of the CPS contains individual information on about 60,000 households, including employment, hours worked and workers' reasons for working part-time. Its rotational design can be used to measure workers' flows across up to four consecutive months. In addition to the monthly survey, the CPS records information on individuals' labor market situation over the past calendar year in the Annual Social and Economic Supplement (ASEC), also known as the March files. Our adjustment procedure (Section 3) relies on the combination of the BM and ASEC files.[5]

Definitions. We adopt the BLS definition of part-time employment: we count as part-time workers individuals who *usually* work (strictly) less than 35 hours per week.[6] It is worth stressing that the notion of usual hours is different from that of actual hours, which refers to hours worked during the survey's reference week. As we explain momentarily, this distinction matters for deriving certain aggregate measures from the CPS.

Our definition of involuntary part-time employment is based on the following question posed to respondents who report less than 35 hours of weekly work (see U.S. Bureau of the Census [2017]):

> *Some people work part time because they cannot find full time work or because business is poor. Others work part time because of family obligations or other personal reasons. What is (name's/your) MAIN reason for working part time?*

The first sentence of the question above singles out individuals who are counted as involuntary part-time workers.

The ASEC uses similar concepts of part-time and involuntary part-time employment, but measures them at an annual frequency. Accordingly, individuals are classified as working part-

[4] In addition to studying a longer time period, we address different research questions and we comprehensively quantify the contribution of worker flows to the dynamics of involuntary part-time employment. We complement research on unemployment dynamics by characterizing those fluctuations based on a richer model, featuring three employment and two non-employment states.

[5] We use all BM files that are publicly available, i.e. since January 1976. Unfortunately, the BM files prior to this date used to construct the BLS series plotted in Figure 1 are not publicly available.

[6] The threshold of 35 hours is the most commonly used in U.S. labor market statistics. We show in Section E of the OA that our results are robust to using a different cutoff to define part-time employment.

time in the past calendar year if they report working less than 35 hours in most (i.e. more than 50 percent) of their working weeks over the preceding year. They are considered involuntary part-timers if the main reason for working part-time for at least one week was either because they could not find full-time work or due to poor business conditions.

The 1994 redesign. In January 1994, the monthly CPS underwent a complete overhaul (Cohany et al. [1994], Polivka [1996]). Among the various changes introduced in the revised version, two directly affect the measurement of part-time and involuntary part-time employment.[7] First, it started recording usual hours for all employed individuals from all rotation groups, irrespective of actual hours worked during the survey's reference week. Prior to the redesign, information on usual hours worked and reasons for working part-time were only collected for individuals who reported working less than 35 actual hours per week.[8] Second, the concept of involuntary part-time work was made more precise, by explicitly including the predicate that the individual wants and is available to work full-time. To the extent that this requirement captures a constraint on desired labor supply, it aligns the notion of involuntary part-time work with that of unemployment.

While the changes introduced in the redesigned CPS make it the most accurate source of data for our purposes, they pose a significant challenge to study the evolution of involuntary part-time employment over a long time period. On the one hand, the increased scope of the question on usual hours worked is likely to lead to an increase in the count of part-time workers after 1994. On the other, the more stringent definition of involuntary part-time work is likely to cause a decrease in the count of involuntary part-time workers after 1994. Consistent with these predictions, and as we illustrate below, the series of stocks of overall part-time and involuntary part-time workers computed from the basic monthly survey show a prominent break in 1994.[9] Therefore, some protocol must be devised to make the series derived from old CPS consistent with those based on the post-1994 definitions.

3 Empirical Approach

Before presenting our adjustment protocol for the 1994 break, we introduce the framework used to study the dynamics of involuntary part-time employment.

3.1 Framework

To uncover the sources of cyclical variation in involuntary part-time employment (I), we relate it to two states of non-employment, unemployment (U) and non-participation (N), and two employment states, full-time employment (F) and voluntary part-time employment (V). It is

[7] See Section A of the OA for the relevant parts of the old and revised CPS questionnaires.

[8] The revised survey also introduced questions to distinguish hours worked at all jobs from hours worked at the primary job for individuals who work multiple jobs. In the OA, we use data from the revised survey to show that multiple jobholding does not drive our conclusions.

[9] The effects on labor market stocks are compounded in the series of worker flows, but the direction of changes is more difficult to predict.

useful to distinguish V from F, as its dynamic interaction with involuntary part-time employment is fundamentally different. Formally, we condense the description of the labor market in period t in the vector

$$\boldsymbol{s}_t = \begin{bmatrix} F & V & I & U & N \end{bmatrix}_t'. \tag{1}$$

Each element of $\boldsymbol{s}_t$ denotes the stock (or count) of workers in each labor market state. Accordingly, the involuntary part-time employment rate, i_t, plotted in Figure 1, is given by:

$$i_t = \frac{I_t}{F_t + V_t + I_t + U_t}. \tag{2}$$

To decompose fluctuations in the stocks that compose i_t, we link their behaviors to the evolution of transition probabilities. We assume that $\boldsymbol{s}_t$ follows a first-order Markov chain:

$$\boldsymbol{s}_t = \boldsymbol{M}_t \boldsymbol{s}_{t-1}, \tag{3}$$

where $\boldsymbol{M}_t$ is the matrix of transition probabilities $p\,(j \to k)$ across states j and k.

3.2 Our adjustment protocol

In Section 2 we described the source of bias that affects the measurements of most labor market stocks and flows prior to 1994. We propose a two-step adjustment protocol to overcome this issue and estimate the model described in the previous subsection.

Step 1: Adjusting stocks. To illustrate the problem and the proposed solution, Figure 2 shows alternative series of stocks of voluntary (Plot 2a) and involuntary (Plot 2b) part-time employment. In each plot, the step function (dotted line) denotes data based on the ASEC and the solid line data from the BM files. The CPS redesign entails a discontinuity in the solid lines in January 1994, and shifts the stocks in the expected directions (cf. Section 2). In contrast, the annual series do not show any noticeable break at 1994, as the ASEC was not subject to any substantial changes. The basic principle of our adjustment protocol is to require that the *discrepancy* between the ASEC-based and BM-based time series remains constant across the 1994 break. The dashed lines in Figure 2 are the outcome of implementing this requirement. The levels of the series are well aligned with the 1994 ones, and mere visual inspection suggests their volatility is also similar.

We now formalize this approach. Let $s^{\text{BM}}_{y,m}$ denote the series calculated from the BM files, where $s \in \{V, I\}$ and y and m refer, respectively, to calendar years and months. Likewise, denote by s^{ASEC}_{y} the series calculated from the ASEC. We observe s^{ASEC}_{y} throughout the whole period, but prior to 1994 we have a biased measurement of $s^{\text{BM}}_{y,m}$, which we denote by a breve superscript $\breve{s}^{\text{BM}}_{y,m}$. To obtain an estimate of $s^{\text{BM}}_{y,m}$ prior to 1994, we first compute the predicted yearly average of $s^{\text{BM}}_{y,m}$ before the CPS redesign, $\widehat{\breve{s}}^{\text{BM}}_{y}$. We construct it by running a regression

of $s^{\text{BM}}_{y,m}$ against s^{ASEC}_{y} using data from the post-revision period:[10]

$$s^{\text{BM}}_{y,m} = \vartheta_0 + \vartheta_1 s^{\text{ASEC}}_{y} + \varepsilon_{y,m}, \quad y = 1994, \ldots, 2007, \ m = 1, \ldots, 12. \tag{4}$$

The next step involves using $\widehat{\overline{s}}^{\text{BM}}_{y}$ to derive $\widehat{s}^{\text{BM}}_{y,m}$, an estimate of $s^{\text{BM}}_{y,m}$ prior to 1994. We focus on linear specifications, i.e. we posit the following relationship: $\widehat{s}^{\text{BM}}_{y,m} = \phi_{0,y} + \phi_{1,y}\breve{s}^{\text{BM}}_{y,m}$. Though simple, this relationship allows the coefficients $\phi_{0,y}$ and $\phi_{1,y}$ to vary across years. To find $\phi_{0,y}$ and $\phi_{1,y}$, we minimize the distance between the predicted yearly average and the yearly average of the adjusted time series, i.e. we solve

$$\min_{\phi_{0,y},\phi_{1,y}} \sum_{y=1976}^{1993} \left(\widehat{\overline{s}}^{\text{BM}}_{y} - \frac{1}{12} \sum_{m=1}^{12} \left(\phi_{0,y} + \phi_{1,y} s^{\text{BM}}_{y,m} \right) \right)^2. \tag{5}$$

At this level of generality, the minimization problem has too many degrees of freedom. Therefore, we explore two alternative sets of restrictions: (i) using multiplicative coefficients only (i.e., $\phi_{0,y} = 0$ for all y) and (ii) using additive coefficients only (i.e., $\phi_{1,y} = 1$ for all y). Our preferred model involves using multiplicative factors.[11] Solving the problem above under restriction (i), we get $\phi_{1,y} = {}^{\widehat{\overline{s}}^{\text{BM}}_{y}}\!/_{\frac{1}{12}\sum_{m=1}^{12} \breve{s}^{\text{BM}}_{y,m}}$.

After adjusting V_t and I_t in the manner just described, we recover F_t by using the accounting identity $E_t = F_t + V_t + I_t$ and the fact that total employment (E_t) is correctly measured in the BM files prior to 1994. Before moving on to step 2, we verify the robustness of our approach through internal and external validity checks presented in Section B of the OA.

Step 2: Adjusting flows. Having obtained consistent monthly time series of labor market stocks, we use them to correct the series of flows. We are able to do so because, put together, the series of corrected stocks and properties of our markovian framework (viz. equation (3)) impose sufficient restrictions to correct the transition probabilities without any additional data or assumptions. In practice, we implement a margin-error adjustment (see Elsby et al. [2015], and Section C of the OA for details). In standard applications, this adjustment is used to make transition probabilities computed from longitudinally-linked data, which are affected by rotational sample attrition, consistent with changes in stocks computed from cross-sectional data. The insight from applying it in this specific context is that, by targeting changes in the corrected stocks from step 1, it addresses in addition the mismeasurement in worker flows prior to the CPS redesign.[12]

[10] We experimented with different time windows to run this regression. Our favorite specification excludes data after 2007, when the Great Recession hits the labor market and the correlation between the BM-based and ASEC-based time series becomes less stable.

[11] The vast majority of research based on CPS data either assumes multiplicative adjustment factors or uses the multiplicative factors tabulated by Polivka and Miller [1998] for certain aggregate measures. We discuss relationships between these approaches and our adjustment protocol in Section B of the OA. In that section, we also compare additive and multiplicative coefficients. Multiplicative coefficients have some appealing properties. They rescale not only the mean but also the variance of the time series, and by construction they cannot predict negative values when a time series is scaled down. The latter is an important advantage in practice, since the stock of involuntary part-time workers is a small number.

[12] We implement margin-error adjustment for all periods covered by our data: prior to 1994, it addresses both the biases induced by the old CPS and rotational sample attrition, while after 1994 it deals only with the

3.3 Other adjustments

In addition to our proposed solution to the 1994 break, we adjust the series of stocks and flows to deal with other measurement problems. Since the procedures to address those issues were developed in previous work, we describe them succinctly in the main text, leaving the details for Section C of the OA. First, prior to implementing the 1994 adjustment correction, we seasonally-adjust the time series. Second, we also adjust them for potential misclassification in workers' reported labor market status, using Elsby et al. [2015]'s procedure to reclassify potentially spurious transitions between voluntary and involuntary part-time employment, and between unemployment and non-participation. Third, after the 1994 adjustment correction we control for time-aggregation bias using Shimer [2012]'s method.

4 Main Findings

4.1 Average behavior

To get a first sense of the dynamics of involuntary part-time employment, we describe the average behavior of its underlying transition probabilities and compare it to those of unemployment. Inspection of the bottom row of Panel (a) in Table 1 shows that, with two-thirds of the stock entering in the previous month (66.2 percent) and an almost similarly large share leaving in the following one (59.5 percent), involuntary part-time employment exhibits much faster dynamics compared to unemployment (cf. bottom row, columns 3 and 4 of Panel (a)). Put differently, spells of involuntary part-time employment are, on average, about 35 percent shorter than those of unemployment. Moving on to the interaction with specific labor market states, there is a very close interaction between involuntary part-time work and full-time employment. On average, 28.7 percent of all involuntary part-timers were employed full-time in the previous month, and a similar fraction (28.9 percent) will enter full-time employment next month. Transition probabilities between involuntary and voluntary part-time work are smaller (though still more than half as large as those with full-time employment) followed by slightly lower levels of turnover with unemployment.[13] Flows between involuntary part-time employment and non-participation are very small. By comparison, unemployment displays a smaller but nonetheless strong interaction with full-time employment, and the flows to and from non-participation are much greater (at least as high as those with full-time employment). Last, the interaction between unemployment and both forms of part-time employment is very limited.

4.2 Cyclical behavior

Figure 3 complements this static portrait by displaying the evolution of selected transition probabilities. In each plot the same transition is shown both for involuntary part-time work (solid

latter issue.

[13] Recall that the numbers reported in Table 1 have been adjusted to remove potentially spurious transitions between involuntary and voluntary part-time employment.

line) and unemployment (dashed line). The most salient feature in the six plots is the sizable variation of (most) transition probabilities around recessions. We first focus on the behavior of inflows, starting with the series of inflow transitions from full-time employment (Plot 3a). Similar to unemployment, the inflow probability to involuntary part-time employment spikes at recessions' onsets and returns to pre-crisis level during their aftermaths. However, its recovery is much slower. In the typical recession, a year after the trough the unemployment inflow is already recovering, while the involuntary part-time employment inflow is still well above its peak level. Inflows from voluntary part-time employment and non-participation bring to light differences in the cyclical dynamics across the two states (Plot 3c). While $p(V \to U)$ is surprisingly acyclical, the behavior of $p(V \to I)$ is very similar, if more persistent, than $p(F \to I)$. This picture is reversed for non-participation inflows displayed in Plot 3e. Though less pronounced, $p(N \to U)$ is clearly countercyclical, while $p(N \to I)$ is at best mildly countercyclical and only in the two most recent recessions. Next, we turn our attention to the evolution of outflows. The three plots on the right-hand side column of Figure 3 show a much more consistent picture of the dynamics of involuntary part-time employment and unemployment. With some differences in the magnitude of variation, all six transitions move in the same direction over the business cycle. They rise steadily in normal times and fall slowly starting around the beginning of each recession, lasting over several years after the recession's trough.

4.3 Decomposition of cyclical variation

So far we have identified very large cyclical variation in the ins and outs of involuntary part-time employment. We now quantify their relative importance for the cyclical dynamics of the labor market, by computing their contributions to the short-run variation of involuntary part-time employment and unemployment. Specifically, for involuntary part-time employment we calculate the following coefficients:

$$\beta(j \to k) = \frac{\mathbb{C}\text{ov}\left(\Delta i_t, \Delta \widetilde{i}_t^{jk}\right)}{\mathbb{V}\text{ar}(\Delta i_t)}. \tag{6}$$

$\Delta \widetilde{i}_t^{jk}$ denotes changes in the counterfactual involuntary part-time employment rate whose evolution is based on past and contemporaneous changes in the flow hazard λ^{jk}.[14] The results are reported in Panel (b) of Table 1.

The beta coefficients offer a precise and distinctive picture of involuntary part-time employment and unemployment dynamics.[15] The ins and outs of full-time employment are quantitatively very important for both states, but more so for involuntary part-time employment than unemployment. Adding up their contributions, flows to and from F explain $28.3 + 22.4 = 50.7$ percent of fluctuations in involuntary part-time employment. The corresponding figure for un-

[14] The statistical decomposition is based on flow hazards λ^{jk}, which map one-to-one to transition probabilities $p(j \to k)$ via the identity $p(j \to k) = 1 - e^{-\lambda^{jk}}$.

[15] The bottom row displays the sum of beta coefficients. In both instances the sum is very close to 100 percent, meaning that each $\beta(j \to k)$ can be interpreted as the relative contribution of flow hazard λ^{jk} to the cyclical variations under study.

employment is 42.6 percent. These numbers suggest focusing on understanding the behavior of $p(F \to I)$ and $p(I \to F)$, as we do in the next subsections. If we add contributions from flows in and out of voluntary part-time employment, transitions from employment states explain 76.5 percent of the variation in i_t. On the other hand, non-participation plays an important role in explaining unemployment fluctuations (33.2 percent), in line with Elsby et al. [2015]'s analysis. This suggests that involuntary part-timers and unemployed workers are quite different in terms of their distance to full-time employment. Consistent with this notion, turnover between involuntary part-time work and unemployment is low and its cyclical behavior plays a small role in the dynamics of involuntary part-time work and unemployment. In fact, changes in $p(U \to I)$ explains less than 5 percent of the cyclical variation in the unemployment rate, and under 10 percent of fluctuations in involuntary part-time employment.

4.4 Zooming in on recessions

While useful to summarize variation over a long time period, the beta coefficients ignore potential differences across recessions. Figure 4, which displays the monthly contributions of the most relevant flows for changes in i_t around each recession, uncovers very interesting patterns. First, all recessions are characterized by a jump upwards in $p(F \to I)$ at recessions' onsets, but its importance grows dramatically over time. Second, the sluggish recovery in $p(I \to F)$ dominates the behavior of i_t during recessions' aftermaths. In sum, $p(F \to I)$ plays a role akin to the 'jumpy' job destruction rate (but is more persistent and explains the large variance contributions of the ins), while $p(I \to F)$ is similar to the 'sluggish' job-finding rate driving the slow recovery of unemployment (Shimer [2012], Elsby et al. [2010]). A third interesting pattern concerns the interaction between unemployment and involuntary part-time work. While $p(I \to U)$ is consistently unimportant across the five recessions, the low levels of $p(U \to I)$ during the recovery period push the involuntary part-time employment rate downwards. This channel seems to become more relevant in the most recent recessionary episodes, which others have called jobless recoveries.

4.5 Secular behavior

Before closing this section, we explore the long-run perspective afforded by our dataset to study how the risks of involuntary part-time employment and unemployment have evolved over time. A question that has received considerable attention in the literature concerns evidence on dwindling U.S. business and employment dynamics (see e.g. Davis et al. [2010] and Hyatt and Spletzer [2013]). Consistent with the literature, Figure 3 shows that unemployment inflows describe a significant downward trend, whereas unemployment outflows show a less clear downward trend starting around the 2000s. In contrast, over the same period involuntary part-time employment inflows and outflows show no visible trend. This fact is quite surprising given the presence of pronounced upward trends in $p(F \to V)$ and $p(V \to F)$ and downward trends in $p(N \to V)$ and $p(V \to N)$ (Section D5 of the OA).[16] These findings indicate that, relative to

[16] In a previous draft of this paper, we highlighted that flows between full-time and overall part-time employment have increased secularly. The upward trends in the two directions tend to cancel one another, resulting

the risk of becoming unemployed, full-time employed workers in the U.S. face an increasing risk of working part-time and to do it involuntarily during recessions.

5 Interpretation and Discussion

We established that fluctuations between full-time and involuntary part-time work dominate the cyclical variation in the involuntary part-time employment rate, and that the cyclical behavior of those transitions is similar to that of transitions between full-time employment and unemployment. In our view, those fluctuations speak to different aspects of labor adjustment compared to their unemployment counterparts. Our interpretation is that, following a negative economic shock, full-time workers are "turned down" by their employers into working part-time with the understanding that they will be brought back into full-time employment when business conditions improve. In support of this hypothesis, we report in Section D1 of the OA that the majority of transitions captured by $p(F \to I)$, as well as their cyclical variation, reflect employment changes that occur at the same employer. Moreover, we find that the composition of these transitions shifts markedly towards full-time workers who report facing slack work conditions in their current job as the main reason for working part-time involuntarily (Section D2 of the OA). On the other hand, $p(F \to U)$ reflects the decision to terminate employment relationships – perhaps with the exception of temporary layoffs and recalls, as discussed below. These differences point to a form of job heterogeneity, which determines whether, facing adverse economic conditions, a full-time employment relationship is transformed into a part-time one (leading to an $F \to I$ transition) or is terminated ($F \to U$ transition). The distinction between mechanisms is even sharper when we consider movements in $p(I \to F)$ and $p(U \to F)$, as they reflect fundamentally different economic choices. On the one hand, changes in $p(U \to F)$ are driven primarily by shifts in job creation. On the other, we find that changes in $p(I \to F)$ entail, in the majority of cases, a return to a full-time work schedule (Section D1 of the OA). These facts dovetail well with those reported in Borowczyk-Martins and Lalé [2019], who show that part-time employment is an important margin of variable labor utilization.

In sum, our findings uncover a clear relationship between involuntary part-time work and the fragility of full-time employment relationships, with very pronounced and stable patterns over the business cycle. Therefore, fluctuations in involuntary part-time employment carry additional information on the impact of the business cycle on the labor market. This point is best illustrated in the large and persistent contribution of $p(F \to I)$ to elevated levels of involuntary part-time work during recessions and their aftermaths (Figure 4). Its greater persistence relative to $p(F \to U)$ shows that, long after job destruction rates have returned to pre-crisis levels (usually a few months after the recession's trough), a large fraction of full-time employment relationships remains unstable.[17] The episode of the Great Recession is elucidative (Plot 4d).

in a stable *share* of part-time work in total employment.

[17] In preliminary analyses based on SIPP data, we condition the transition probability $p(F \to I)$ on job tenure, and verify that full-time individuals at risk of working part-time involuntarily in recessions' aftermath are workers with a long-established relationship with their employer. This fact dovetails with the analysis of the dynamics of involuntary part-time work within subgroups of the population presented in Section D4 of the OA. During downturns, the composition of full-time employment and involuntary part-time employment

Thirty months after the recession's trough, the contributions of flows from F to I remained comparable to those of transitions in the reverse direction. This conclusion goes against a common view that high recessionary levels of involuntary part-time employment reflect "hidden unemployment". This view is enclosed in the BLS's U-6 measure, which adds up involuntary part-time employment to several categories of jobless workers, to obtain an extended measure of non-employment.[18] According to this metric, labor market slack means that too few jobs are being created (which is why unemployment remains elevated), and that, amongst newly-created jobs, too many positions are part-time instead of full-time (which is why involuntary part-time employment remains elevated). Figure 4 shows that high rates of involuntary part-time employment during recessions are not fueled by large inflows of unemployed workers.[19] The composition of involuntary part-time work inflows by reasons (Figure D2 of the OA), which is dominated by slack work conditions, reinforces this conclusion.

There is an interesting parallel to be drawn between our findings and recent facts uncovered by Fujita and Moscarini [2017]. The authors document that a significant share of unemployed workers face a high probability of being recalled by their previous employer, and that this probability is not as cyclical as the job-finding rate.[20] As they demonstrate, these facts are relevant to inform and extend macro-search models of the labor market.

6 Conclusion

This paper addresses methodological breaks in data collection on involuntary part-time employment to construct monthly time series of stocks and flows from 1976 until today. We use these new data to analyze the role of involuntary part-time work in U.S. labor market dynamics. We think we have made important strides forwards, but are also keenly aware that our analysis raises several questions. We hope future work will use our dataset to answer them.

shifts towards older and better educated workers, and these subgroups also experience higher relative increases (decreases) in their group-specific $p(F \to I)$ ($p(I \to F)$). However, these composition effects play a limited role in the cyclical behavior of $p(F \to I)$ and $p(I \to F)$.

[18] See https://www.bls.gov/lau/stalt.htm. The U-6 is the sum of total unemployment, all marginally attached workers, and all involuntary part-time workers, divided by the civilian labor force plus all marginally attached workers.

[19] In fact, we see that $p(U \to I)$ exerts a negative drag on the involuntary part-time employment rate during recessions. $p(U \to I)$ exhibits no clear cyclical pattern that could easily explain this result. To understand it, we undertake an analysis of the composition of involuntary part-time employment inflows (Section D2 of the OA). The share of workers entering involuntary part-time work for lack of full-time jobs has fallen secularly over time. Its main cyclical component is the inflow of unemployed workers. While this inflow rose sharply during the twin recessions of 1980-1982, it was only mildly countercyclical in the last two decades.

[20] Borowczyk-Martins and Lalé [2018] use an incomplete-markets model calibrated to U.S. labor market data and policies and find that involuntary part-time work generates lower individual welfare losses compared to unemployment, attributting that difference to the higher probability to return to full-time work.

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7 Tables and Figures

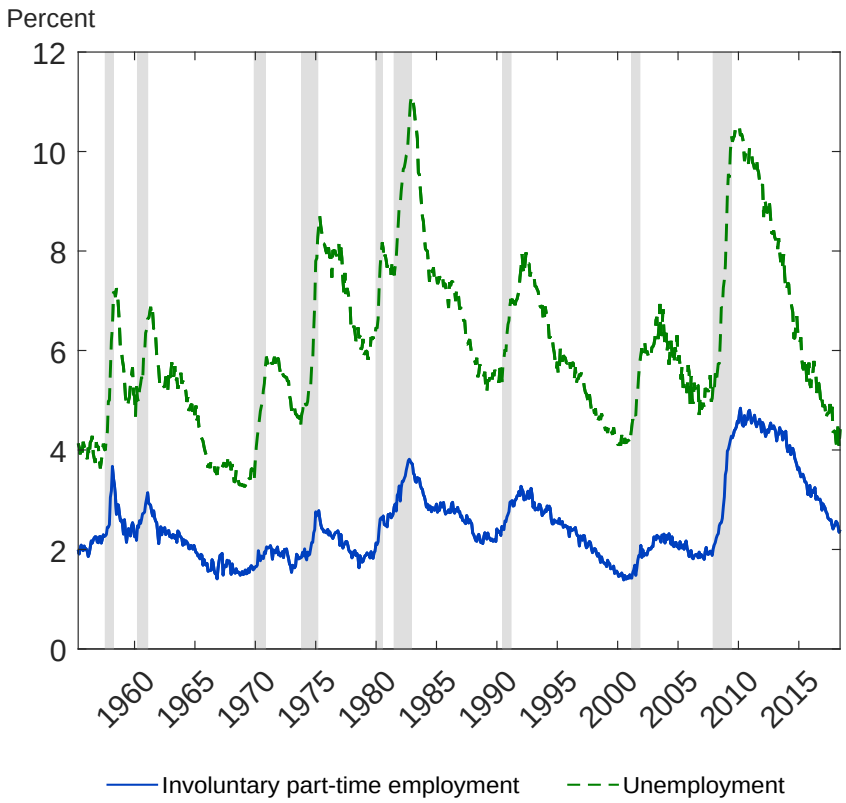
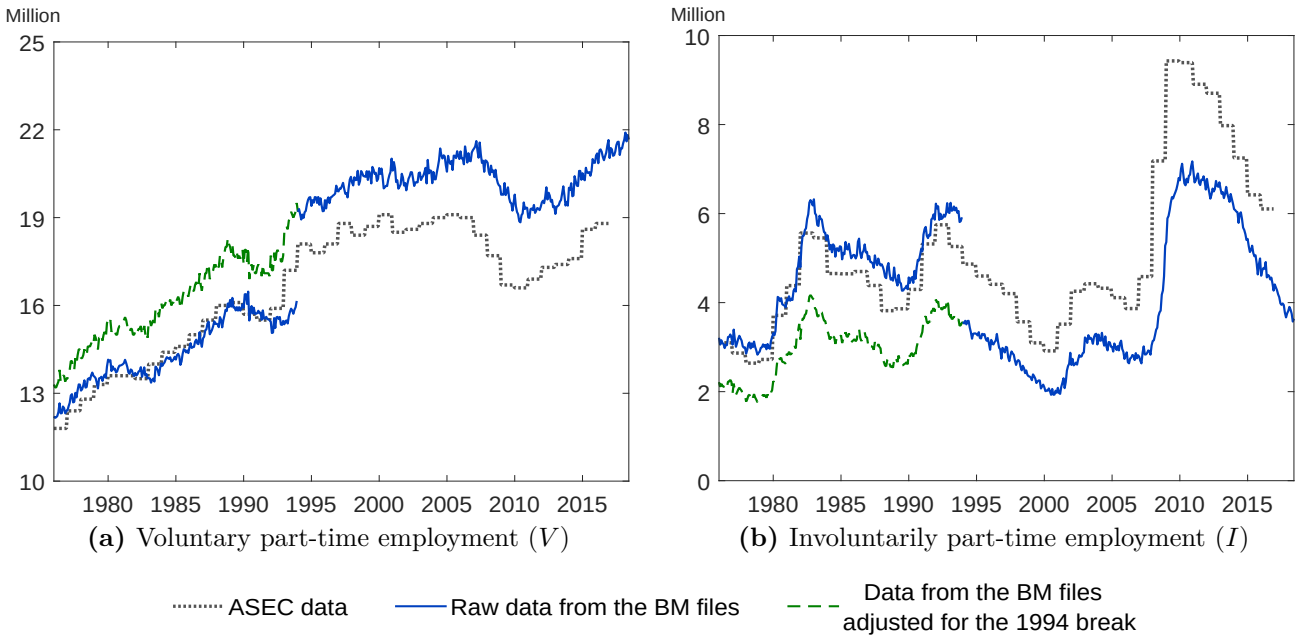


Figure 1: The involuntary part-time employment and unemployment rates

Notes: BLS data, 1955m05 – 1975m12 and CPS data, 1976m01 – 2018m06. The series show the percentage of involuntary part-time and unemployed workers divided by the civilian labor force. Data coming from the BLS are the series ID LNS11000000 (Civilian Labor Force Level), LNS12032194 (Employment Level - Part-Time for Economic Reasons) and LNS13000000 (Unemployment Level). The BLS data are aligned to post-1976 CPS data using multiplicative adjustment factors. The post-1976 CPS data on involuntary part-time work are corrected for the 1994 break. All series are adjusted for seasonality and smoothed by one-period, two-sided MA averaging. The gray-shaded areas indicate NBER recession periods.



(a) Voluntary part-time employment (V)

(b) Involuntarily part-time employment (I)

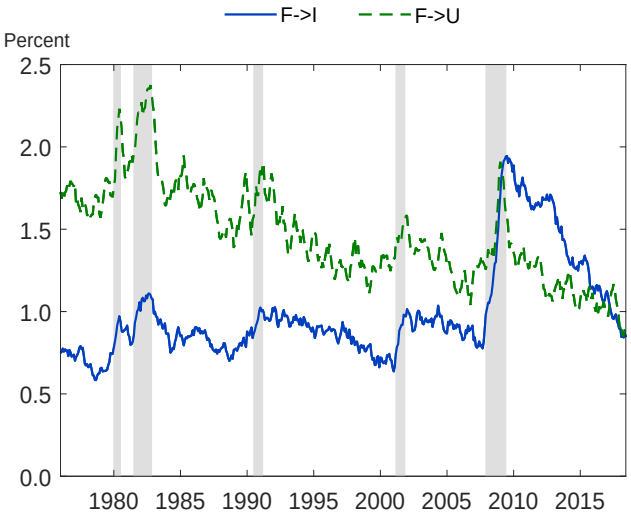
Figure 2: Labor market stocks derived from the ASEC and the BM files of the CPS

Notes: CPS Annual Social and Economic Supplement (ASEC) data, 1976 – 2017; CPS basic monthly (BM) data, 1976m01 – 2018m06. The ASEC data is annual. Data from the BM files (solid lines) is monthly and discontinued in January 1994 due to the redesign of the CPS. The dashed lines prior to 1994 show the time series obtained after implementing our adjustment protocol, which combines information contained in the ASEC and BM time series. Prior to making this adjustement, the time series based on the BM files are corrected for seasonality. The reported figures are in million workers.

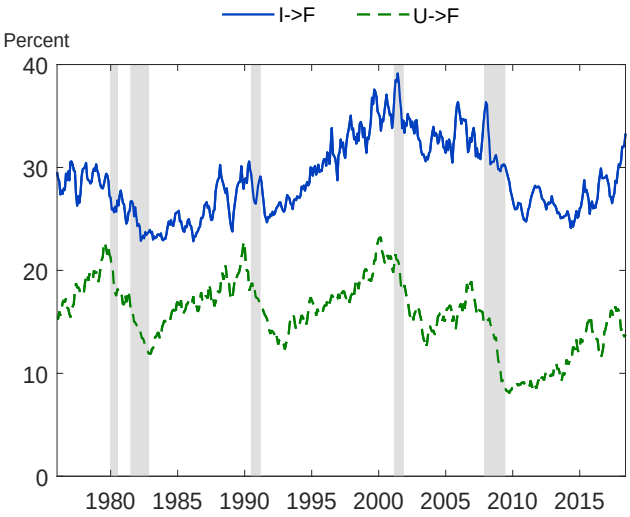
Table 1: Inflow and outflow transition probabilities

Involuntary part-time employment				**Unemployment**			
	Inflows (1)		Outflows (2)		Inflows (3)		Outflows (4)
(a) Sample averages							
$q\,(F \to I)$	28.7	$p\,(I \to F)$	28.9	$q\,(F \to U)$	17.5	$p\,(U \to F)$	15.7
$q\,(V \to I)$	16.2	$p\,(I \to V)$	15.1	$q\,(V \to U)$	6.66	$p\,(U \to V)$	7.66
$q\,(U \to I)$	16.1	$p\,(I \to U)$	11.2	$q\,(I \to U)$	4.43	$p\,(U \to I)$	6.30
$q\,(N \to I)$	5.28	$p\,(I \to N)$	4.36	$q\,(N \to U)$	15.7	$p\,(U \to N)$	12.4
$\sum_{j \neq I} q\,(j \to I)$	66.2	$\sum_{k \neq I} p\,(I \to k)$	59.5	$\sum_{j \neq U} q\,(j \to U)$	44.2	$\sum_{k \neq U} p\,(U \to k)$	42.1
(b) Variance contributions							
$\beta\,(F \to I)$	28.3	$\beta\,(I \to F)$	22.4	$\beta\,(F \to U)$	14.4	$\beta\,(U \to F)$	28.8
$\beta\,(V \to I)$	15.5	$\beta\,(I \to V)$	10.3	$\beta\,(V \to U)$	5.72	$\beta\,(U \to V)$	10.9
$\beta\,(U \to I)$	9.40	$\beta\,(I \to U)$	3.25	$\beta\,(I \to U)$	1.64	$\beta\,(U \to I)$	4.33
$\beta\,(N \to I)$	7.17	$\beta\,(I \to N)$	3.15	$\beta\,(N \to U)$	15.1	$\beta\,(U \to N)$	18.1
$\sum_{j \neq I} \beta\,(j \to I)$	60.4	$\sum_{k \neq I} \beta\,(I \to k)$	39.1	$\sum_{j \neq U} \beta\,(j \to U)$	36.9	$\sum_{k \neq U} \beta\,(U \to k)$	62.1
$\sum_{j \neq I} \beta\,(j \to I) + \sum_{k \neq I} \beta\,(I \to k) = 99.5$				$\sum_{j \neq U} \beta\,(j \to U) + \sum_{k \neq U} \beta\,(U \to k) = 98.9$			

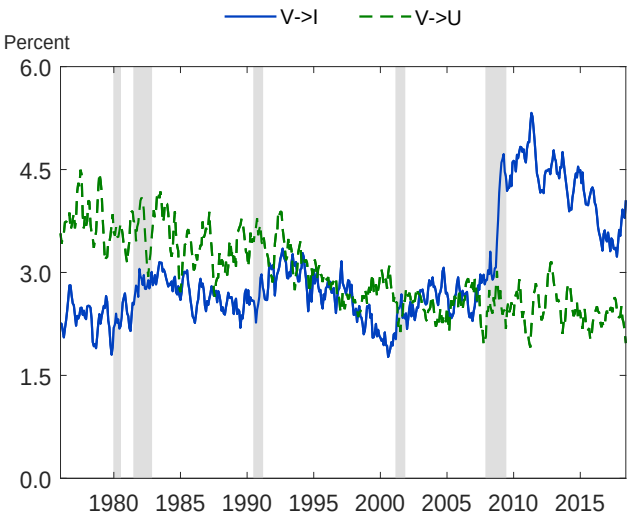
Notes: CPS data, 1976m01 – 2018m06. Transition probabilities are corrected for the 1994 break, and adjusted for misclassification, seasonality, margin error, and time aggregation. Panel (a) reports the averages of monthly transition probabilities over the sample period. The inflow transition from state j to k at time t, denoted $q\,(j \to k)$, is the ratio of the gross worker flow from j to k over the stock of workers in state k, i.e. $q\,(j \to k) = {}^{\#\{j \to k\}}/_{\#\{k\}}$ with $\#\,\{.\}$ indicating cardinality, and the numerator and denominator both measured at time t. The outflow transition probabilities are the elements of the Markov transition matrix. Panel (b) reports the variance contributions of flows hazard λ^{jk} to the dynamics of involuntary part-time employment and unemployment (see equation (6)). All table entries are expressed in percent.



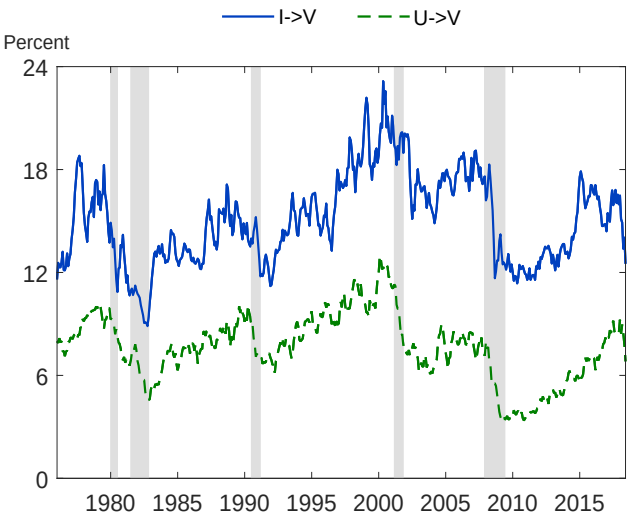
(a) Inflows from full-time employment



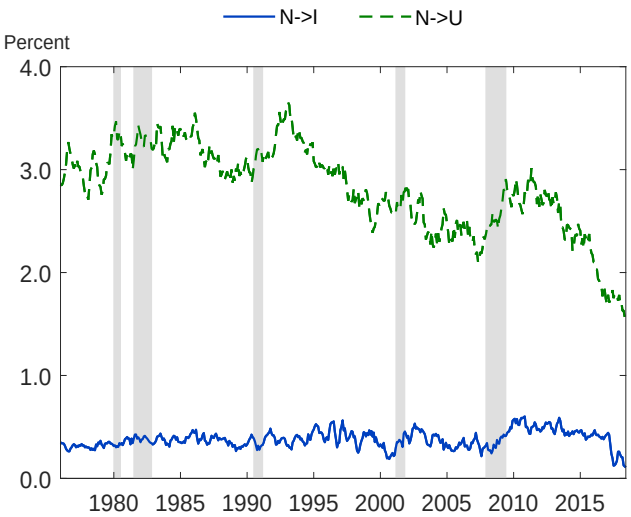
(b) Outflows to full-time employment



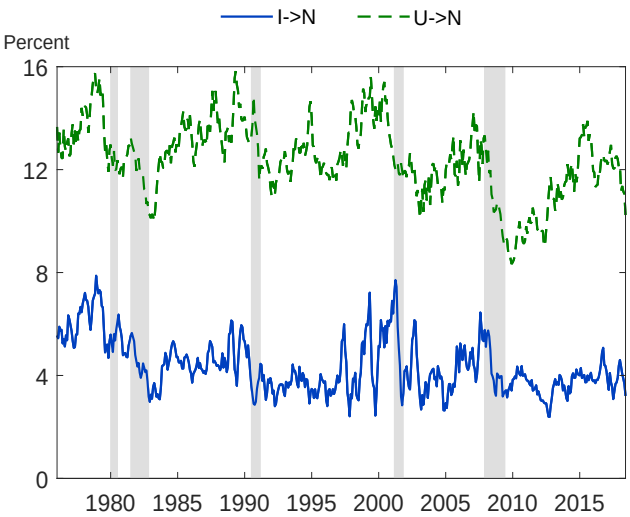
(c) Inflows from voluntary part-time employment



(d) Outflows to voluntary part-time employment



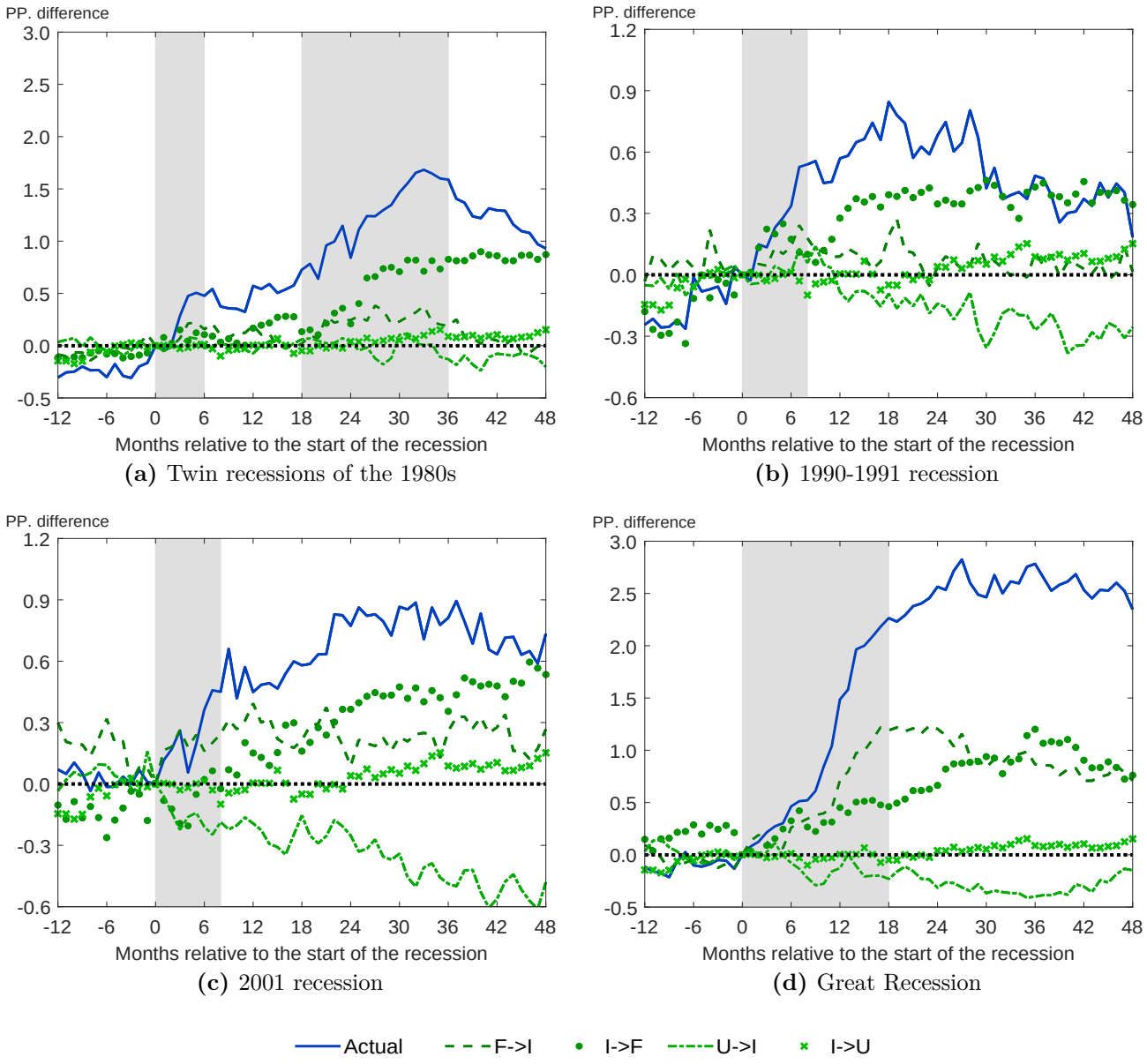
(e) Inflows from non-participation



(f) Outflows to non-participation

Figure 3: Evolution of transition probabilities

Notes: CPS data, 1976m01 – 2018m06. Transition probabilities are corrected for the 1994 break, and adjusted for misclassification, seasonality, margin error, and time aggregation. All series are smoothed by two-period, two-sided MA averaging. Gray-shaded areas indicate NBER recession periods.



(a) Twin recessions of the 1980s

(b) 1990-1991 recession

(c) 2001 recession

(d) Great Recession

Figure 4: Contributions to the recessionary increase in involuntary part-time employment

Notes: CPS data. Each solid line shows the change in the involuntary part-time employment rate from its value at time 0, the starting month of the corresponding recession. The other lines reports counterfactual changes in the involuntary part-time employment rate predicted by specific transitions probabilities, i.e. time series $\sum_{\tau=0}^{t} \Delta\widetilde{i}_{\tau}^{jk}$ where the $\Delta\widetilde{i}_{t}^{jk}$'s are as defined in equation (6). The scale on the vertical axis is different for the milder recessions (Plots 4b and 4c) and the large recessions (Plots 4a and 4d). Gray-shaded areas indicate NBER recession periods.