Part-Time Employment During the Great Recession and the Ensuing “Hour-less Recovery”

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April 4, 2014

Abstract

This study measures flows into and out of part-time employment and uses a stationary distribution to measure the impact of individual transition rates on the level of part-time employment in the economy with the intended goal of understanding part-time employment dynamics during the Great Recession. Previous studies have primarily used a gross flows analysis to examine changes in labor force state; however, I argue that this method does not provide a complete analysis of labor force dynamics. By estimating transition probabilities and decomposing the effects of each individual rate on the level of part-time employment, I construct a more rigorous and thorough examination of the ever changing labor force. I find that the rise of the part-time employment rate during the recession is due primarily to the increased full-time to part-time transition rate; however, the elevated level of part-time employment years after the recession is due to a stagnant part-time to full-time transition rate.

*I would like to extend a special thank you to Professor Michael Pries for his support throughout this entire endeavor.*
Introduction

In November 2007 the part-time employment rate in the United States was at 15.6%. The next month was the beginning of what has been called the Great Recession. This economic downturn lasted until June 2009 and was a period of great uncertainty for many Americans. All aspects of the economy were significantly affected during the Great Recession. The S&P 500 fell 57% from a high of 1,565 in October 2007 to a low of 676 in March 2009.\(^1\) Real GDP contracted in the third quarter of 2008 and would not return to positive growth until the third quarter of 2009.\(^2\) By the time that the recession had been declared officially over in June 2009, the part-time employment rate stood at 18.0% representing a 15.4% increase since November 2007. Now almost five years after the recession has been declared officially over, the part-time employment rate has still not returned to its pre-recession level. In fact, the lowest monthly part-time rate post-recession was 16.9% -- still 1.3 percentage points higher than pre-recession levels.\(^3\)

During a recession, many employers are faced with a decision of how best to proceed during such a period of economic uncertainty. Depressed household consumption during this period means that businesses will be selling fewer goods; therefore, oftentimes fewer workers are needed to produce these goods. The employer must determine the best course of action for his or her business: should the employer layoff workers in order to cut costs amongst the changing market conditions or would shifting workers to part-time employment opportunities represent a profit-maximizing solution? Although individual employers must decide how best to proceed,

\(^3\) Many recessions from trough to peak do not have a 1.3 percentage point increase in the part-time employment rate. Only the second part of the “double dip” recession in the 1980s had a larger trough to peak increase (1.5 percentage points).
on aggregate one thing is for certain: both unemployment and part-time employment rise during a recession. The part-time employment rate trend is shown in Figure 1 below. Each shaded area of the graph represents a period in time when the US economy was officially in a recession according to the National Bureau of Economic Research (NBER) Business Cycle Dating Committee.

![Figure 1: Part-time employment rate since January 1976. The part-time employment rate data was calculated using Bureau of Labor Statistics (BLS) estimates regarding the labor force. The highlighted regions represent periods when the US economy was experiencing a recession.](image)

As seen in the graph above, the part-time employment rate invariably rises during a recession. However, note that following each period of economic contraction even though the rate of part-time employment is persistent -- the rate remains higher than pre-recession levels for a length of time -- ultimately the rate returns to pre-recession levels. Although it took almost four years, ultimately the part-time employment rate returned to pre-recession levels after the second part of the double dip recession in the 1980s. Even after the 1991 recession there was a
period of almost five years in which the part-time employment rate was higher than pre-recession levels; however, pre-recession levels of part-time employment were ultimately achieved. It should be noted that the 1991 recession was ultimately followed by the dot-com bubble era for the US economy, and that the falling part-time employment rate beginning in late 1996 was due to the largest expansion the U.S. had experienced since the Vietnam War.

Compared to previous recessions, during the Great Recession there has been a significantly larger increase in the part-time employment rate when comparing pre- and post-recession levels. From trough to peak during the Great Recession there was a 2.5 percentage point increase in the part-time employment rate amongst US workers. However, in the recessions of the early 1980s, 1990s, and 2000s the largest change from peak to trough was only 1.5 percentage points and this occurred during the second part of a “double-dip” recession in the 1980s. Not only is the magnitude of the change in the part-time employment rate troubling for the Great Recession, but the part-time employment rate has remained considerably higher than normal post-recession. The most recent recession left the US economy with a part-time employment rate 1.75 percentage points higher than pre-recession levels. As a comparison to previous recessions, this 1.75 percentage point difference in the level of part-time employment represents an even larger difference than any peak to trough measurement of the part-time employment rate during the recessions of the previous thirty-five years.

As shown in Figure 1, post-recession the part-time employment rate can be persistently higher than pre-recession levels. However, without fail the rate has ultimately returned to pre-recession levels following every period of economic contraction except the Great Recession. This fact begs an interesting question regarding part-time employment and the Great Recession: Why has the part-time employment rate risen so much and remained so persistently high without
any reversion back to pre-recession levels? Ultimately this fact must be able to be understood in terms of transitions into and out of part-time employment. Are full-time workers switching to part-time employment at higher rates? Do part-time workers have a difficult time returning to the full-time opportunities they were in before the recession? Could it be a combination of both? Determining an answer to this question will allow policy makers to understand more about the labor market dynamics of the most recent recession. Given that the Great Recession has been so different than any other regarding the effects on part-time employment, understanding which transition has lead to the persistence of the part-time employment rate could allow lawmakers to focus on new policy that would counteract the specific transition and ultimately return part-time employment to its pre-recession levels. For example, if the elevated part-time rate is attributable to full-time workers transitioning to part-time work at faster rates, it is natural to explore further whether this could be attributed to features of the Affordable Care Act that give firms incentives to reduce the number of full-time employees.

In order to more fully understand the dynamics of the part-time employment rate, I use CPS data to construct measurements of transition rates between employment states. I first extract individual respondent information and match these respondents across consecutive months. After matching, I calculate gross flows as an intermediate step to calculating transition rate probabilities. These gross flows measures represent the number of people who transition between two different employment states (i.e. full-time, part-time, unemployed, and not in labor force) in any given month. From these gross flows measures I am able to then calculate monthly transition rate probabilities between each employment state. In order to decompose the effects of individual transitions on the level of part-time employment in the economy, I allow one transition rate to vary at a time while holding all others constant at their average values. My
evidence reveals that the transition rate from full-time to part-time employment is the largest contributor to the rising part-time employment rate during a recession. The increase in the full-time to part-time transition rate is a bigger contributor to the rising part-time employment rate than a decrease in the corresponding part-time to full-time transition rate or any other changes in the transition rates estimated. Although a recession leads to large numbers of full-timers joining the part-time ranks ultimately the part-time employment rate returns close to pre-recession levels. Following every recession except the most recent one it is the subsequent part-time to full-time transition rate increase that helps restore the part-time employment rate closer to its pre-recession level. However, with regard to the most recent recession I find that the elevated level of part-time employment years after the recession is due primarily to part-time workers being unable to reenter the full-time labor force because of a stagnant part-time to full-time transition rate. In combination, during the Great Recession there has been the largest increase in part-time employment in thirty-five years, and the rate of people working part-time has remained elevated because of the stagnant rate at which part-time workers begin to move back into full-time employment opportunities. This finding is consistent with a labor market that continues to suffer from generally slack conditions.

This paper is divided into five parts. I begin with a literature review of gross flows measurements from three prominent authors in the field. Secondly, I describe the data set used in this paper before moving to the empirical strategy employed to decompose the effects of individual transition rates on the level of part-time employment in the current economy. The fourth section focuses on the results from the decomposition. Finally, I conclude with a brief discussion of the results and any implications they may have.
**Literature Review**

Business cycles have long interested economists. Recessions are typically defined as a period consisting of two consecutive quarters with declining real GDP. The NBER has a different definition that is not quite as precise as two consecutive quarters with a fall in real GDP. The NBER defines a recession as “a period between an [economic] peak and a trough.”\(^4\) Regardless of which definition for a recession is used, it is clear that recessions represent periods of economic contraction rather than economic expansion.

Recessions are typically understood to have wide ranging effects on the economy. During this period of economic contraction stock prices fall, unemployment rises, and businesses begin to restructure employment along with myriad other effects. However, as modern economic theory has taught us, this period of economic contraction represents but one period in a cycle of expansions followed by contractions: fluctuations about an upward trend in economic growth. The cyclical nature of key economic variables is often of interest to many economists. Robert Shimer (2012) writes “many previous authors have measured the cyclicality of the job finding and employment exit probabilities;”\(^5\) however, not all of them consider the full story.

One of the most often used methods to study the cyclicality of employment states is a gross flows analysis. Olivier Blanchard and Peter Diamond (1990), Shimer (2012), and Donald Williams (1995) employ different methods of gross flows analysis to study the cyclicality and trends in employment status. Blanchard and Diamond (1990) use CPS data from 1968-1986 in order to construct a measurement of gross worker flows. The authors find “the amplitude of

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fluctuations in the flow out of employment is larger than that of the flow into employment and ultimately argue that this flow out of employment is what primarily contributes to elevated unemployment rates during a recession. The fluctuating unemployment rates are caused largely by job destruction rather than job creation. While Shimer (2012) notes that he follows a similar approach to Blanchard and Diamond (1990), their work focuses mainly on gross flows estimates and not transition rates. The authors do compute hazard rates, transition probabilities between two states, however, they do not explore these hazard rates in much detail. Shimer (2012), as do I, considers these hazard rates to be key in understanding labor force dynamics and we choose to model our analysis by isolating the effects of individual transition rates on different employment states. Therefore, while Blanchard and Diamond (1990) pioneer a useful gross flows method, Shimer (2012) takes the analysis one step further to construct a more rigorous and thorough examination of the ever changing labor force.

In order to construct transition probabilities, Shimer (2012) notes he “follow[s] an approach adopted by many previous authors, most prominently by Blanchard and Diamond.”\footnote{Olivier J. Blanchard, Peter Diamond, “The Cyclical Behavior of the Gross Flow of U.S. Workers,” \textit{Brookings Papers on Economic Activity} 2 (1990): 87.} After introducing a final step to calculate transition rates, Shimer (2012) finds “the job finding probability has accounted for three-quarters of the fluctuations in the unemployment rate in the United States and the employment exit probability for one-quarter. Fluctuations in the employment exit probability are quantitatively irrelevant during the last two decades.”\footnote{Shimer, 135.} His findings counter conventional economic theory since Blanchard and Diamond (1990).\footnote{Shimer, 127.} As \footnote{Note the finding by Shimer (2012) is in opposition to the finding by Blanchard and Diamond (1990). Shimer finds the unemployment rate is largely determined by the flows out of unemployment (the job finding probability) while Blanchard and Diamond argue the unemployment rate is determined primarily by flows out of employment (i.e. flows into unemployment).}
Shimer (2012) has a more nuanced approach that can offer a more sophisticated analysis of the effects of transition rates on the levels of employment states, his method of analysis serves as the basis for this paper.

Whereas Shimer’s focus was on understanding the cyclical movements in the unemployment rate, my interest is in understanding the cyclical movements in the part-time employment rate. In order to determine which transition rate has the largest effect on part-time employment, I simply adapt the method employed by Shimer (2012) to include “Full-Time” and “Part-Time” states as opposed to a single “Employed” labor force classification.

My interest in part-time employment flows is not unique however. In considering the cyclicality of job finding and employment exit probabilities, many authors neglect to address the fact that there are two possible employed states: Full-Time and Part-Time. Williams (1995) recognizes this distinction and uses a gross flows analysis to determine how women’s part-time employment has been affected by different transitions. Williams (1995) uses unpublished “Gross Change Tables” from the BLS to evaluate the number of transitions for women between four employment states: full-time, part-time, unemployed, and not in labor force. These “Gross Change Tables” provide monthly information about the employment status of the population organized by the employment status from the previous month. Williams (1995) “focuses on transitions, or flows, among the labor market states of full-time employment, part-time employment, unemployment, and nonparticipation,”10 and notes that “the part-time employment rate at a point in time is a function of these flows.”11 Williams’ analysis concludes that women’s part-time employment decreased during the 1980’s because of two transitions in particular. The

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11 Williams, 37.
first was a higher rate of women transitioning from part-time to full-time roles; however, the principle change in the women’s part-time employment rate was due to women becoming less likely over the decade to transition from a full-time role into a part-time role leading ultimately to decreased part-time employment for women. As Williams (1995) is concerned primarily with the trends involving the part-time employment rate of women, he does not focus much on the cyclicality of the rate. While not a prominent feature of his analysis, Williams (1995) does write “the rate of flow from full-time to part-time employment increases for both genders in an economic downturn.”\(^{12}\) As my analysis focuses on part-time employment during a recession, an economic downturn, Williams’ finding is important to consider when evaluating my own work.

While Williams (1995) does answer the question of which transitions affect the part-time employment rate most prominently, his method is unable to be applied today. According to the BLS, the unpublished “Gross Change Tables” were no longer constructed after the mid-1990’s. As such, a new method for understanding how different transitions affect the part-time employment rate must be considered. I adapt the method from Shimer (2012) in order to answer a similar question to Williams (1995) -- namely which transitions have the largest effect on the part-time employment rate in the current economy. Not only do I use publicly available data that is also available past the mid-1990’s, but I also broaden the scope of analysis from just focusing on women to the labor force as a whole.

*Data*

To construct a measurement of transition rates between two employment states and ultimately evaluate the impact of these individual transition rates on the level of part-time employment, I adapt an approach used by Shimer (2012) to account for a fourth employment

\(^{12}\) Williams, 41.
state. Namely I deconstruct his “Employed” state into two different states: “Full-Time” and “Part-Time.”

Following Shimer’s approach, I use publicly available data from the Current Population Survey (CPS) during the period from January 1976 to September 2013. The monthly survey microdata are published on the NBER website and contain results classified by each respondent. The addresses surveyed in a given month are part of a “4-8-4 rotation system.” Households selected for the survey “are interviewed for 4 consecutive months, leave the sample for 8 months, and then return to the sample for the same 4 months of the following year.” Since the CPS is constructed as a rotating panel of addresses, I use a modified version of Shimer’s technique to match records across months for individuals participating in the survey. In order to perform the matching across monthly data files, I first extract individual respondent information including household identifiers, line number, month in sample, age, sex, and race. Using these extracted variables, I am able to match the records of individual respondents across consecutive periods to create monthly cross-sectional data sets. Since respondents in the rotating CPS panel are surveyed in four consecutive months we would expect to match only ¾ of the records between any two months. This approximately ¾ matching probability for all respondents surveyed in a given month holds throughout the duration of the data. From the matched records,

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13 January 1976 is used as the start date as the raw CPS files available on the NBER website only go back to this date.
16 Line number represents the classification system for respondents within a household. Household identifiers are used to classify respondents based on addresses; however, since more than one person often resides in a household the line number is used to distinguish these respondents.
I calculate “sample-weighted transition probabilities”\textsuperscript{17} between any two employment states and then seasonally adjust using the ratio-to-moving average method.

In constructing transition probabilities between four different employment states, I use a different question from the CPS survey than the one used by Shimer (2012) to classify the labor force status of respondents. My variable of choice is labeled prwkstat by the CPS; however it will be referred to as the “Full/Part-Time Work Status” variable. Instead of presenting respondents a choice simply between employed, unemployed, or not in labor force, the “Full/Part-Time Work Status” variable offers respondents a chance to distinguish their employed state as either full-time or part-time. While the variable allows me to distinguish between full-time and part-time classified workers, it is not without its own limitations. One issue with this data was caused by the redesign of the CPS in 1994 which altered possible answers for the “Full/Part-Time Work Status” question:

<table>
<thead>
<tr>
<th>Possible Answers Jan-1989 to Dec-1993</th>
<th>Possible Answers Since Jan-1994</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not in Labor Force</td>
<td>Not in Labor Force</td>
</tr>
<tr>
<td>FT Schedules</td>
<td>FT Hours (35+), Usually FT</td>
</tr>
<tr>
<td>PT for Economic Reasons, Usually FT</td>
<td>PT for Economic Reasons, Usually FT</td>
</tr>
<tr>
<td>PT for Non-Economic Reasons, Usually PT</td>
<td>PT for Non-Economic Reasons, Usually FT</td>
</tr>
<tr>
<td>PT for Economic Reasons, Usually PT</td>
<td>Not at Work, Usually FT</td>
</tr>
<tr>
<td>Unemployed FT</td>
<td>PT Hours, Usually PT for Economic Reasons</td>
</tr>
<tr>
<td>Unemployed PT</td>
<td>PT Hours, Usually PT for Non-Economic Reasons</td>
</tr>
<tr>
<td></td>
<td>FT Hours, Usually PT for Economic Reasons</td>
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<tr>
<td></td>
<td>FT Hours, Usually PT for Non-Economic Reasons</td>
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<tr>
<td></td>
<td>Not at Work, Usually PT</td>
</tr>
<tr>
<td></td>
<td>Unemployed FT</td>
</tr>
<tr>
<td></td>
<td>Unemployed PT</td>
</tr>
</tbody>
</table>

This major redesign of the survey in 1994 has a significant impact on the levels of some measured transition rates. A potential method for removing the impact of this redesign will be

\textsuperscript{17} Shimer, 135.
discussed in the next section. Other more minor changes regarding the “Full/Part-Time Work Status” variable in the CPS do occur pre-1994; however, these changes are mostly cosmetic and do not significantly alter the levels of measured flow rates.

*Empirical Strategy*

In order to measure the impact of individual transition rates on the part-time employment rate in the economy, the first step is to measure gross flows into and out of part-time employment. The gross flow measurements can then be used to calculate transition probabilities between different employment states. The BLS used to produce such tables, as Williams (1995) used unpublished “Gross Change Tables” from the BLS to directly determine the number of transitions (i.e. gross flows) between different employment states; however, these tables are no longer constructed. Given these tables are no longer assembled by the BLS, a new measure for gross flows analysis must be considered. My adapted Shimer (2012) method of calculating gross flows involves first extracting individual respondent information from CPS files and then performing a match across consecutive months. Using these matched records I am then able to construct gross flows measures between my four employment states as an intermediate step in producing the final transition rate estimates. The transition rate estimates are subsequently used to isolate the individual effects of movements in each of the transition rates on the part-time employment rate.

My first step in decomposing the effect of individual transition rates on the part-time employment rate involved extracting survey data from the raw CPS files. Microdata from the CPS are organized as strings of numbers corresponding to the answers of a respondent. A data dictionary constructed by the BLS describes the location of each variable. By modifying
Shimer’s extraction code to include my variable of interest (Full/Part-Time Work Status), I was able to successfully construct monthly cross-sectional data files for every month since January 1976. Included in my extraction were variables describing household identifiers, line number of respondent, month in sample, age, sex, race, and sample weight in addition to the key Full/Part-Time Work Status variable.

The next step in constructing transition rate estimates is to match records for individuals. In theory I would be able to match individuals by using a unique household identifier and line number. However, as Hoyt Bleakley et al. (1999) note, the line numbers are not always “perfectly implemented” across the sample. In order to track the same individual I use other characteristics such as age, sex, and race to ensure that the matched individual is the same across two months. By using the extracted variables above (minus Full/Part-Time Work Status and sample weight), I am able to perform a successful match across monthly records.

As mentioned earlier, since the CPS is a rotating 4-8-4 panel we would expect that only ¾ of the available extracted respondents would be able to be matched across consecutive months. As I deal across many years, each month will serve as both the “first” and “second” month during the matching process. For any given month, a particular observation potentially serves as both the first of two consecutive matched months -- matching with the subsequent month -- and as the second month of a match -- matching with a previous month. Shimer’s method of

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18 The sample weight variable is constructed by the CPS and is “used for most tabulations, controlled to independent estimates for 1) states; 2) origin, sex, and age; and 3) age, race, and sex.” (BLS Data Dictionary). This variable is used to construct sample weighted transition probabilities between employment states.


21 Except Jan 1976, Sept 2013, and selected months in which data is unavailable.
matching records involves dropping observations when the month in sample variable indicates a respondent is either rotating into or rotating out of the survey. He selectively drops these observations dependent on which month, “first” or “second,” the observation falls within. For example if an extracted monthly file has an individual rotating out of the survey (month in sample variable equals 4 or 8), there would be no match in the next month. This observation is dropped if it occurs in the “first” month being matched. However, if this observation were to occur in the “second” month it would be kept because the observation can be linked to the previous month. For similar reasons, if an observation is rotating into the survey (month in sample variable equals 1 or 5) it would be unable to be matched with the previous month. If a respondent in the “second” month has a month in sample variable equal to 1 or 5, the observation would be dropped; however, if this observation were to occur in the “first” month it would be kept.

Regardless of whether or not an observation is dropped during construction of the merged file, the observation remains in the extracted file from the first step. Therefore, conditional on observations in period t being possible in period t+1 (i.e. not rotating out of the survey) and observations in period t being linked to observations in period t-1 (i.e. not rotating into the survey), we would expect the match rate to be 75%. This match rate is derived from ¼ of the sample being replaced each month with a new incoming portion of the sample; therefore, this ¼ of the sample population is unable to be matched because the respondents were not surveyed in both months. For the entire sample, I am able to match nearly 45,000,000 records -- an average of 100,000 per month. The average monthly match percentage over the entire sample is 67.9%.

In a perfectly implemented CPS rotating sample I would expect to have a 75% match rate. As I match 67.9% of the survey respondents across months, the remaining 7.1% can be
attributed to what the Brigitte Madrian and Lars Lefgren (1999) call the “non-merge rate.”\(^{22}\)

Madrian and Lefgren published a paper regarding matching CPS respondents and found that four main factors can contribute to the non-merge rate: non-responses, mortality, migration, and recording errors.\(^{23}\) The authors estimate non-responses alone account for 6-7% \(^{24}\) of the sample population; therefore, a 67.9% successful match rate with stringent requirements to limit false positives (i.e. a registered match when in fact the respondents represent two individuals) represents a positive outcome for the matching technique.

The non-merges in the sample can never be reconciled by using a CPS matching technique to have the 75% successful match rate that would be expected if there were no non-merges. This inability to match records with the expected success rate is due to the fact that survey information regarding these non-merges is simply missing from the records for one of the reasons above. While beyond the scope of this paper, Bleakley et. al (1999) note that the probability of not matching (“non-merge rate”) corresponds to household characteristics: “regressions suggest that almost every observable can be significantly linked to an increased or decreased probability of matching.”\(^{25}\) In order to obtain a true estimate of flows, Bleakley et. al (1999) reweight the matched sample such that it is representative of the entire U.S. population. My non-reweighted estimates could potentially introduce a bias into the measurement of the gross flows and the respective transition rates; however, Shimer (2012) does consider this problem. Shimer (2012) compared his gross flows estimates to the independent estimates from

\(^{23}\) Madrian and Lefgren, 7-8.
\(^{24}\) Madrian and Lefgren, 7.
\(^{25}\) Bleakely, Ferris, and Fuhrer, 53.
Bleakley and found that “the two series are virtually identical.” Given that my analysis is based on adapting Shimer’s method, I am confident that the gross flows estimates used to calculate transition probabilities in this paper will not be significantly biased by not reweighting the matched sample.

The final step in calculating transition rate probabilities between four employment states involves using an adapted form of Shimer’s transition matrix. I introduce the fourth employment state by separating Shimer’s “Employed” state into “Full-Time” and “Part-Time.” This necessarily means the transition matrix expands from a 3x3 to a 4x4 matrix. In diagram format, the transitions are as follows:

![Transition Probability Diagram](image)

Figure 2: Transition probability diagram. Full-Time (F), Part-Time (P), Unemployed (U), and Not in Labor Force (N) are the four labor force states that are possible for each respondent. The transition rates represent a transition from period one to period two. For example, FP represents the transition probability from full-time status in period one to part-time status in period two. The other transitions are interpreted accordingly. The arrows point from the state in period one to the state in period two.

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26 Shimer, 135.
With this new transition diagram in mind, I use the merged CPS files to calculate the monthly “sample-weighted transition probabilities”\textsuperscript{27} between my four employment states. I classify the employment status of an individual based on the response to the Full/Part-Time Work Status variable. While this question has minor changes pre-1994, the changes do not alter the level of measured transition rates. As mentioned in the Data section, the major survey redesign in 1994 did have a pronounced effect on the transition rate probabilities: a visible gap in the transition rate data pre- and post-1994 is present.\textsuperscript{28} While the gap is not of major consequence for the cyclicality of the results, it does draw my attention to the following question: how should I classify the employment status of individual respondents post-1994?

By introducing a “usually” component to each possible answer, one must consider how this could affect the distribution of responses. Take for example a person who usually works full-time, but during the reference week\textsuperscript{29} was working reduced, part-time hours. Prior to the redesign in 1994, this person would likely answer his employment status was full-time. Assuming the respondent’s hours were to be reduced for that one week only, the respondent would still likely categorize himself as a full-time worker. In this example, he would likely argue the reduction in hours is temporary and that he is still full-time in his place of work.\textsuperscript{30} Post-1994 however, there are answers that can more accurately deal with such a situation. In this example the respondent would likely answer the following: “Part-Time for (Non)-Economic

\textsuperscript{27} Shimer, 135.
\textsuperscript{28} See Appendix for transition rate probability graphs without adjustment.
\textsuperscript{29} Note that the reference week specification was introduced in the 1994 redesign of the CPS in order to have the respondent focus on a narrower time frame for reporting employment status. Pre-1994, the question was more open-ended for the respondent to determine the time frame.
\textsuperscript{30} This is especially true because pre-1994 the reference week was not specified and the respondent could choose to classify employment status based upon his or her “normal” work status.
Therefore, for the situation in which a full-time worker has his or her hours reduced for the reference week there could be different classifications of the worker pre- and post-1994. These different answers to the same employment situation can prove to be problematic in terms of consistently classifying respondents between the pre- and post-1994 data.

In order to have a consistent scheme, I choose to classify post-1994 respondents based on what their “usually” status indicates for their employment state. For example, in the same situation above where the individual answered “Part-Time for (Non)-Economic Reasons, Usually Full-Time,” the person would now be classified as full-time in my gross flows calculation. I argue that this classification scheme represents the correct interpretation of the “Full/Part-Time Work Status” variable post-1994 because not only does it help make the pre- and post-1994 classifications more consistent, but it also more intuitively represents the employment status of the individual in the example above.

In addition to the classification issue brought on by the CPS redesign in 1994, another issue remains unresolved. As mentioned above and detailed in the Data section, the 1994 redesign had a significant effect on the measured transition rates between full-time and part-time. Although the levels of any transition rate are not significant for this paper, having no discontinuity in the measured transition probabilities is important for the stationary distribution calculations in a subsequent step. The introduction of a “usually” component to the classification was described above; however, how would this affect the measured transition

31 The economic vs. non-economic distinction would depend on the reason the respondent believes his or her hours were reduced.
32 Both the full-time to part-time transition rate and the part-time to full-time transition rate were affected by this CPS redesign. Other transition rates were not significantly altered by the redesign.
probabilities? I find the post-1994 data has higher transition probabilities (i.e. people transition between states at a more frequent rate). But why would this be so?

A transition between employment states is measured whenever a respondent changes his or her answer to the “Full/Part-Time Work Status” question from the previous month. Post-1994, respondents will more often change their status. If we consider a three month response frame in which the respondent is working part-time only during the reference week of the second month, it is easier to understand why there would be more measured transitions. In the first month of the survey the respondent post-1994 would answer “Full-Time Hours, Usually Full-Time.” The next month the answer would be “Part-Time for (Non)-Economic Reasons, Usually, Full-Time,” and in the third month the status would be “Full-Time Hours, Usually Full-Time” again. In this situation there would be two measured transitions in the post-1994 data. However, in the pre-1994 data the respondent is free to interpret the time frame of the question; therefore, he will classify himself as full-time in each month (i.e. there are no measured transitions).

By classifying post-1994 respondents based on their “usually” status I narrow and actually reverse the gap between the pre- and post- 1994 measured transition probabilities. This reversal suggests that my method of classifying post-1994 workers based on their “usually” status overcompensates for the measured transitions. This overcompensation means that pre-1994 respondents offer a distribution of responses between full-time and part-time for the situation described.

Although the method of classifying labor force status of respondents based on their “usually” status does narrow the gap between measured transition probabilities, a clear gap still

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33 Classifying a respondent based on his or her “usually” answer leads to less transitions being measured post-1994. This represents a reversal from the classification scheme that does not use “usually” to determine employment status post-1994.
does exist. As this paper is more concerned with the trends of part-time employment (rather than levels), the actual level of the transition probabilities is not of primary importance. However, the transition probabilities must be continuous over the sample period for the decomposition to work, and in order to make a continuous function I alter both pre- and post-1994 transition rates. To get the levels to match, I take the difference between pre- and post-1994 rates and move both an equidistant amount towards the average such that the discontinuity is completely removed. In particular, all of the pre-1994 full-time to part-time transition rates are decreased by 0.003 and all of the post-1994 full-time to part-time rates are increased by 0.003.\cite{footnote} The part-time to full-time rates pre-1994 are decreased by 0.02 while the post-1994 rates are increased by 0.02. In addition to these adjustments, because the transition rates from a single origin state to any other state must sum to one I must adjust the state i to state i transition rates accordingly. Therefore, the full-time to full-time rate pre-1994 is increased by 0.003 while post-1994 it is decreased by 0.003. For the part-time to part-time transition rate I increase the pre-1994 measures by 0.02 and decrease all post-1994 rates by 0.02.

In calculating transition rate probabilities, I use the matched CPS files to first construct a gross flows measurement. These gross flows measurements represent the number of people who transition from one employment state to another across two months. These gross flows measures are then used to construct the transition rate probabilities between any two employment states. The transition rate probability between two states is calculated by dividing the gross flow of workers who make the transition by the number of people who were in the original state in the first period. For example to calculate the Full-Time to Part-Time (FP) transition probability I

\footnote{It is important to note that these adjustments are made to the transition rates calculated with the “usually” classification scheme post-1994. This means that post-1994 the measured transition rates were actually lower than pre-1994 because of the gap reversal.}
divide the FP flow by the number of people in F in the first period. In order to remove seasonality associated with the transition rates, I seasonally adjust using a ratio-to-moving average method.\textsuperscript{35}

The final step involved in decomposing the effects of these individual transition rates on the part-time employment rate is to vary a single transition rate while holding all others constant at their average values throughout the sample. The goal is to construct a measure of what the part-time employment rate in the economy would be if only the one transition rate was allowed to change. Comparing this hypothetical part-time employment rate to the actual part-time employment rate data allows me to determine which transition rate has the largest effect on varying the level of part-time employment. However, one must consider whether this method of varying one transition rate while holding the others constant will serve as a good proxy for decomposing the individual transition rate effects on the part-time employment rate.

My adaptation of Shimer’s method to decompose the effects of individual transition rates on the level of part-time employment in the economy involves using a “stationary distribution.” This “stationary distribution” method takes the current transition rates and calculates what the stationary distribution across states would be if those rates were to persist far into the future. So long as the dynamics of the system converge very quickly, this approach should closely approximate the true distribution across states.

One of Shimer’s main objectives in his paper is to prove his method is valid in terms of tracing out different employment rates. In order to validate that his method does accurately describe the trends of employment rates, Shimer compares the implied distribution of workers

\textsuperscript{35} Because possible answers to the survey change in both 1989 and 1994, there are three distinct seasonality components for the measured transition rates (pre-1989, 1989-1994, and post-1994). In order to remove the seasonality from the entire sample, I perform the seasonal adjustment on each sample period separately.
across states with the actual distribution. By using actual monthly stocks of workers in the different employment states, Shimer is able to calculate the proportion of people in each individual state to determine the distribution for every month in the sample. Shimer finds that the “stationary distribution” method and the stocks measurements of the different employment rates produce similar results that differ only slightly in the level of the employment rate. The trends and the cyclical components in the rates are captured by both methods and Shimer argues that his “stationary distribution” is a valid method for studying the effects of different transitions on employment rates: “the level difference between the two probabilities is inconsequential for the cyclical behavior.”

By showing the cyclical behavior is unchanged by using the “stationary distribution” method, Shimer is able to prove that this is a viable approach to studying employment rates.

To confirm Shimer’s method works for my distribution of employment states with full-time, part-time, unemployed, and not in labor force, I first calculate monthly stocks from the data. Using these stocks I am able to construct the monthly share of each different employment state, and from there I take the quarterly averages of the shares. This stock method of calculating the employment shares can now be compared to Shimer’s “stationary distribution” method. As seen in Figure 3 on the next page, the two methods are highly correlated. Both follow the same movements and differ only in the level; however, for the purpose of this paper the difference in the levels of any one employment state are not important.

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36 Shimer, 135.
Given that Shimer’s “stationary distribution” method is able to successfully model the trend of any employment state in the economy, this method can also be used to decompose the effects of individual transition rates. If I allow one transition rate to vary while holding all others constant at their average values, and again calculate the stationary distribution given those transition rates, I can measure how each labor market status rate (e.g. unemployment rate or part-time employment rate) would change under these conditions. For example, if I would like to examine how the full-time to part-time (FP) transition rate affects the part-time employment rate, I would allow this FP rate to vary while holding all others at their average values. I would then calculate the stationary distribution using those rates, and from that stationary distribution I could calculate the part-time employment rate for each period. This means that any movement in this
calculated part-time employment rate is due only to changes in the varying transition rate, thereby isolating any effects of that specific transition. If the calculated part-time employment rate is highly correlated with the actual part-time employment rate, then the varied transition rate has a significant role in determining the level of part-time employment. However, if the opposite is true, then the transition rate does not significantly contribute to the changing level of part-time employment. The varying transition rate can be changed one at a time to include all of the transition rates from the 4x4 matrix. By examining all of these variations together, I am able to determine if the overall trend in the part-time employment rate is mostly due to a single transition rate or a combination of transition rates that are changing.

Results

The 4x4 Markov matrix of transition rates necessitates that there are sixteen different flow rates for each month in the sample. Considering flows can happen within the same state, there are twelve such rates that represent a transition from one state of employment to a different state. The flow rates are summarized in the following table.

\[
\begin{array}{cccc}
  P_{F,F} & P_{F,P} & P_{F,U} & P_{F,N} \\
  P_{P,F} & P_{P,P} & P_{P,U} & P_{P,N} \\
  P_{U,F} & P_{U,P} & P_{U,U} & P_{U,N} \\
  P_{N,F} & P_{N,P} & P_{N,U} & P_{N,N} \\
\end{array}
\]

The table above represents a stochastic matrix over each month in the sample. Each rate \( P_{i,j} \) represents a transition from the \( i^{th} \) state to the \( j^{th} \) state across two consecutive months. Given that the probability of a transition from state \( i \) to another state \( j \) or remaining in state \( i \) must be equal to one, the following definition must also be true:
\[
\sum_{j} (P_{i,j}) = 1
\]

Since the probability of either transitioning from one state of employment to another or remaining in the same state must adhere to the definition above, the transitions across any one row must sum to one for every single month. This is true in the raw transition probabilities before seasonally adjusting.

However, the ratio-to-moving averages seasonal adjustment alters the levels of the measured transition rates. While very nearly one, the rates often sum to slightly above or below one. Shimer corrects this by defining the transition rate from state i to state i to be

\[
P_{i,i} = 1 - \sum_{j \neq i} (P_{i,j})
\]

After performing the three part seasonal adjustment discussed in the Empirical Strategy section, I decompose the effects of individual transition rates on the level of part-time employment in the economy. Figure 4 on the next page shows the contributions of the twelve individual transition rate fluctuations to the variation in the part-time employment rate. As a point of comparison, the actual part-time employment rate is simultaneously plotted.

Fluctuations in the full-time to part-time transition rate account for nearly the entire variation in the part-time employment rate. When I allow only the full-time to part-time transition rate to vary, the hypothetical part-time employment rate is very highly correlated with movement in the actual part-time rate. This means that the variation in the full-time to part-time
Figure 4: Decomposition of transition rate effects on the part-time employment rate. The “stationary distribution method” is used to measure the individual contributions of the twelve transition rates to the overall fluctuations in the part-time employment rate. The actual part-time employment rate is simultaneously plotted for comparison.
transition rate has significant explanatory power for the variation in the overall part-time employment rate. Considering the full-time employment share is approximately 50% of working age adults, even a small variation in the transition involving the full-time state to the much smaller part-time state will have significant effects on the part-time employment rate. As an example, during the Great Recession the hypothetical part-time employment rate increased almost three percentage points; however, during this time period the full-time to part-time transition rate was maintained within a range of 1.6 percentage points. Thus even though the full-time to part-time transition rate might not have increased significantly relative to previous values, it caused a significant increase in the hypothetical part-time employment rate. While the full-time to part-time transition rate explains generally the movements in the part-time employment rate throughout the data, what happens if I look specifically at a recession?

As was discussed previously, during a recession one expectation is that part-time employment rises considerably. Particularly during a recession, the full-time to part-time transition rate has a tremendous influence on the rising level of part-time employment. For every recession since 1976 the hypothetical part-time employment rate constructed by varying only this one transition shows a significant increase during the recession. Occasionally this transition even “overestimates” what the actual part-time employment rate would be. This suggests that the driving force for the large increase in part-time employment during a recession is the full-time to part-time transition rate increase.

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37 This increase during the recession represents a 1.7% increase in the transition probability from full-time to part-time. The almost three percentage point increase in the part-time employment rate represents a 17.5% increase in the hypothetical part-time employment rate.

38 The Great Recession is an example of this phenomenon. The peak hypothetical part-time employment rate generated by varying the full-time to part-time transition rate is measurably higher than the peak actual part-time employment rate.
While the full-time to part-time transition rate is able to explain much of the variation in the part-time employment rate, particularly during a recession, it does not explain the persistent nature of the part-time employment rate post-Great Recession. As visible in the Figure 4, the hypothetical part-time employment rate calculated by varying the full-time to part-time transition rate decreased significantly from its peak after the recession. However, the actual part-time employment rate has remained persistently high compared to pre-recession levels. What could account for the persistent nature of the part-time employment rate post-Great Recession? The transition rate that explains this persistence is the part-time to full-time transition rate.

When evaluating the hypothetical part-time employment rate caused by varying the part-time to full-time transition rate, it is important to note that the hypothetical rate is trending down over time. This trend downwards suggests that the part-time to full-time transition rate must be increasing. People leave part-time employment for full-time opportunities at a higher rate which contributes to the decline of the hypothetical part-time employment rate. After each recession prior to the most recent one, as the actual part-time employment rate has declined so has the hypothetical part-time employment rate when varying only the part-time to full-time transition rate. As mentioned above, the initial rise in the part-time employment rate during a recession is caused by an increase in the full-time to part-time transition rate. Naturally, the decline in the part-time employment rate post-recession is due to an increase in part-time to full-time transitions following these recessions (i.e. people are returning to full-time schedules when the recession is over). However, this has not been the case post-Great Recession. Since the Great Recession was declared over in June 2009, the hypothetical part-time employment rate due to part-time to full-time transitions has remained at a relatively constant level. Instead of declining like after every previous recession, the hypothetical rate remains at its previous level. I argue
that this fact is what has driven the persistent part-time employment rate seen after the Great Recession. Much of the labor force was shifted to part-time employment during the Great Recession (like every other recession); however, there has not been a subsequent shift back into full-time employment. Ultimately, because the part-time to full-time transition rate has remained stagnant over the last five years the part-time employment rate has remained persistently high post-recession.

![Part-time to full-time (PF) transition rate trend. The transition probability was calculated using the gross flows method. The trend is increasing over time; however, after the latest recession the rate has become stagnant.](image)

The part-time to full-time transition rate is graphed above. As can be seen in the graph, since the recession was declared over, the part-time to full-time transition rate has remained at the same level. Therefore, the increased number of people who were reduced to part-time during the recession are not transitioning back to full-time work at a fast enough rate to reduce the level of part-time employment in the current economy. Ultimately the persistent part-time employment rate is due to a part-time to full-time transition rate that has become stagnant at a level below what would be required to reduce part-time employment to its pre-recession levels.
Robustness

Gross flows analysis represents a powerful way to study transitions between employment states. However, this method of analysis is not without its own critics. One significant critique of the gross flows method of analysis was described by Paul Flaim and Carma Hogue (1985):

“The main problem with the gross flow statistics from the CPS” “is that they generally show movements into and out of the various labor force categories which, when balanced out, do not yield the same net changes as are shown by the published data. What is even more disturbing is the fact that the net changes that one may derive from the gross flow statistics have often differed from the official net changes not only in magnitude, but even direction, or sign.”

One could see how this would be very problematic. A difference in magnitude is an issue, but having different signs for the change in a labor force category is an issue that would question if the method is useful at all. One response to this critique from 1985 is that as researchers have become more familiar with gross flows analysis, the method has been honed to limit significant differences between the gross flows measurements and published data. Randy Ilg (2005) writes “The improved gross flow data provide the necessary linkage between stocks and flows and, therefore, may prove useful in analyzing movements in labor force measures.” The method used in this paper reflects a gross flows analysis that has been significantly improved since 1985. As an example of the reliability of these estimates, the graph below represents the part-time employment rate calculated using both the gross flows “stationary distribution” method featured prominently in this paper and the actual part-time employment rate from statistics generated by the BLS. As mentioned, the levels of any measure are not the focus of this paper; therefore, the fact that the trends amongst the two measures are very similar gives me great confidence in the gross flows method of analysis and its improvement since 1985.

Flaim and Hogue (1985) continue to argue that these discrepancies amongst data occur because the gross flows method is limited to people that can be matched across two consecutive periods: “Because there are some small but systematic differences between the labor force behavior reported by these persons [the non-merged population] and that reported by the entire sample” “it is unavoidable that there will also be some systematic differences between the net changes implicit in the gross flow data and those derived from the published stock data.” This problem of systematic differences was addressed by Bleakley et al. (1999) by reweighting the matched portion of the sample such that it was representative of the entire U.S. population. As I do not reweight the matched sample, this represents a potential improvement on transition rate estimates for future research.

Figure 6: Gross flows method of calculating the part-time employment rate vs. BLS measures of part-time employment. The gross flows measure is constructed using the “stationary distribution” method while allowing all transition rates to vary throughout the sample. The BLS measurement represents the actual part-time employment rate as generated from the survey.

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41 Flaim and Hogue, 8.
One final issue Flaim and Hogue address regarding gross flows analysis are “coding errors” that can “have a much greater impact on the gross flow data than they have on the stock measurement.” These misclassification (coding) errors are made when recording responses to the survey. If a respondent is misclassified for example as part-time when in reality he or she works full-time hours, when this misclassification is corrected the next month there will be another transition measured. If the respondent had one month earlier correctly classified his or her work status as full-time, this misclassification error in the second month would cause two transitions to be measured when in fact none occurred. Abowd and Zellner (1985) and Poterba and Summers (1986) address these issues of misclassifications; however, as in Shimer’s paper, data limitations prevent me from addressing the topic.

Gross flows analysis, as can be gleaned from this section, are far from perfect. The matching sample problem in addition to non-responses and misclassifications all represent issues that can bias analysis that incorporates the method used in this paper. However, many papers do address some of these topics in great detail. While not all adjustments are included in this paper due to data limitations, this paper represents an honest attempt to decompose the effects of different transition rates on the level of part-time employment in the economy. I believe Bleakley et al. (1999) summarize it best when the authors write: “It should be clear from this section that the process for generating these data is far from perfect. Nevertheless, we believe that our efforts reflect a good compromise given the available data. Moreover, we present evidence of substantial benefits to using gross worker flows.” Important information regarding the behavior of the part-time employment rate can be gleaned from using transition

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42 Flaim and Hogue, 8.
43 Discussed earlier in the Empirical Strategy section.
44 Bleakley, Ferris, and Fuhrer, 54.
rate estimates, and this paper represents but one “one more tool in an ongoing endeavor to provide useful information to data users and policymakers.”

Conclusion

This paper measures the impact of individual transition rates on the level of part-time employment in the economy from 1976-2013. During this time period, the full-time to part-time transition rate has the largest role in determining the part-time employment rate. The hypothetical part-time employment rate from varying this one transition rate only in the stationary distribution method most closely approximates the actual part-time employment rate compared to any other transition throughout the data. This finding is perhaps unsurprising. The largest stock in the labor market is full-time employment; therefore, changing the transition rate from this state to the significantly smaller part-time state, even ever so slightly, will have very large and significant effects on the part-time employment rate.

However, the goal of this paper was not to merely understand which transition rate explains most of the variation in the part-time employment rate generally, but rather to understand why the increase in part-time employment during the Great Recession has been so large and prolonged. I find the large rise in the part-time employment rate during the Great Recession is due almost exclusively to the full-time to part-time transition rate. In fact, for the most recent recession this transition rate “overestimated” the peak part-time employment rate compared to the actual peak part-time rate. This leads to the conclusion that other transitions, such as unemployed to part-time and part-time to unemployed, worked to counteract the large

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45 Ilg, 17.
46 The peak hypothetical part-time employment rate calculated by varying only the full-time to part-time transition rate is higher than the peak actual part-time employment rate during the Great Recession. It is this fact that allows me to say the full-time to part-time hypothetical part-time employment rate “overestimated” the actual part-time employment rate rise during the Great Recession.
increase in part-time employment during the recession (i.e. the actual increase in the part-time employment rate is less than what would be expected if only the full-time to part-time transition rate was allowed to influence the rate). However, the full-time to part-time transition rate is unable to explain why the actual part-time employment rate remains elevated years after the recession has been declared officially over.

The burden of the prolonged, elevated part-time employment rate post-Great Recession falls to the part-time to full-time transition rate. Although this rate has been increasing over time, since the beginning of the Great Recession the rate has leveled off. Therefore, even after the recession caused a significant number of workers to become part-time employees, the part-time to full-time rate remained at its same pre-recession levels. Ultimately this means that the increased numbers of workers with hours reduced to part-time roles during the recession are unable to regain their full-time roles— a fact that contributes to the prolonged high level of part-time employment in the current economy.

While the recovery from the 1990-1991 recession was termed a “jobless recovery,” I argue that the post-Great Recession recovery should be termed an “hour-less recovery.” Workers who had hours reduced at the beginning of the recession (the full-time to part-time transition rate) contributed primarily to the increased rate of part-time employment from trough to peak during the Great Recession. However, elevated levels of part-time employment remain primarily due to a stagnant part-time to full-time transition rate. This stagnant rate means that even as more and more people became part-time employees during the recession, the opposite

47 The part-time to unemployed transition rate increases during the recession leading to less part-time workers. In contrast the unemployed to part-time transition rate decreases again leading to less part-time workers. In essence, during the recession more part-timers are being laid off and becoming unemployed while less unemployed people are able to find even part-time work.
transition back to full-time has never increased. Because more part-timers existed at the end of the recession, having a stagnant part-time to full-time transition rate means that the overall part-time employment rate will remain elevated for a prolonged period of time. Although the economy has improved from the recession, workers who had hours reduced to part-time roles are not regaining their hours post-recession.

Understanding what has contributed to the prolonged high part-time employment levels post-recession should allow policymakers to address the problem directly. By knowing that the elevated part-time employment rate is due primarily to a stagnant part-time to full-time transition rate, policymakers should institute reforms to influence employers to increase hours for part-time workers. One example could be to eliminate the disincentives to having full-time workers compared to part-time employees. This could be done by eliminating some of the cost benefits that firms achieve by hiring part-time workers. When a full-time worker is hired, in addition to the salary, the firm will incur other costs such as social security payments and benefits plans that are either non-existent or not as substantial for part-time workers. By equalizing these costs across full-time and part-time workers, firms that face a choice of hiring a full-time versus part-time worker would be more likely to consider hiring the full-time employee. In addition, policymakers could even look to the Affordable Care Act to determine how substantial the disincentive to hire new full-time workers is for some firms in the face of such mandates to provide coverage once the firm reaches fifty full-time equivalent employees.

Other reforms to increase the part-time to full-time transition rate could also be considered. However, the eventual goal should be to return the part-time workers back to their original pre-recession, full-time roles. The “jobless recovery” in the early 1990s was caused by a restructuring of the workforce in the economy. While the “hour-less recovery” could be a
prelude to a restructuring of our economy, policymakers would be prudent to incentivize firms to hire and promote full-time workers in order to speed the recovery from the general slack conditions that currently permeate our labor markets.
Appendix: Transition Probability Graphs

Figure 7: Unadjusted transition probabilities. These probabilities are constructed by classifying post-1994 respondents based on their “actual” answer to the “Full/Part-Time Work Status” variable.

Figure 8: Adjusted transition probabilities. These probabilities are constructed by classifying respondents based on their “usually” status. Note that the gap in 1994 for the FP transition rate is significantly smaller and that the gap for the PF rate has disappeared. The associated FF and PP gaps have also disappeared.


