Decomposing the Ins and Outs of Cyclical Unemployment

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Abstract

This paper analyzes the contribution of the composition of the pool of employed and unemployed individuals to labor market dynamics in different phases of the business cycle. Using individual-level data from the Current Population Survey (CPS), we decompose differences in employment status transition rates between upswings and downturns into explained and unexplained parts. We find that the duration of unemployment contributes to explaining unemployment outflows to employment and observe that its initially positive contribution turns negative in deep recessions. Composition effects play an important role for unemployment outflows to non-participation but dampen the cyclicality of unemployment inflows from employment.

JEL-Classification: J63, J64, J21, E24

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1 Introduction

Starting with the contribution of Shimer (2012), the cyclicality of the US labor market has attracted a great deal of attention recently. The main question in this debate concerns the relevance of the inflows into and the outflows from unemployment, which has typically been addressed by the analysis of aggregate time series of labor market transitions.[1] We contribute to the debate by exploiting the micro information available at the individual worker level to study the underlying factors of unemployment inflows and outflows, paying particular attention to the contribution of the duration of unemployment.

The empirical analysis performed in this paper is descriptive in nature. We use individual-level longitudinal data from the Current Population Survey (CPS) for the time period February 1976 - October 2009 to study the determinants of transition rates from employment to unemployment, from unemployment to employment, and from unemployment to non-participation, respectively. We apply a Blinder-Oaxaca decomposition to decompose the estimated transition rates between economic upswings and downturns into a part that is due to "composition effects" (i.e., differences in observed characteristics that describe the socioeconomic and demographic composition of employed and unemployed populations) and a part that may be attributed to differences in coefficients associated with these characteristics and differences in sample-specific intercepts, which may be considered as "unexplained". This approach allows us to derive several important stylized facts about cyclical upswings and downturns since February 1976. We also compare specific booms and busts to describe the "big picture" that holds for most boom-bust cycles, and to point out peculiarities of specific recessions.

A strand of the economic literature that is closely related to our analysis focuses on the duration of unemployment, either with respect to trends over the last decades (e.g., Abraham and Shimer, 2002, Portugal, 2007) or regarding the latest recession (e.g., Aaronson,

[1] While earlier studies found inflows from employment into unemployment to be the decisive factor for the cyclicality of unemployment (e.g., Darby, Haltiwanger, and Plant, 1986) and later studies found a more important role for outflows from unemployment to employment (Hall, 2005, Shimer, 2012), more recent articles have established a relatively balanced role for inflows into and outflows out of unemployment (e.g., Elsby, Michaels, and Solon, 2009, Yashiv, 2008, Fujita and Ramey, 2009, and Elsby, Hobijn, and Sahin, 2010).

Mazumder, and Schechter, 2010; Kroft, Lange, Notowidigdo, and Katz, 2014). Our analysis is closest to Baker (1992) who uses CPS data in order to examine the (cyclical) determinants of the expected duration of unemployment of different worker groups as they enter unemployment. He concludes that composition effects did not play an important role for unemployment duration during the 1980s. Consequently, aggregate unemployment duration (and, concurrently, the outflow rate out of unemployment) was driven by increases in unemployment duration occurring across most demographic groups.

Another strand of the literature that is related to our analysis examines inflows into and outflows out of unemployment. In their seminal papers, Darby, Haltiwanger, and Plant (1985, 1986) examine the role of the level and the composition of inflows and outflows for the cyclical variation of the stock of unemployment. Using time-series techniques for worker flows constructed from individual-level data, they find that the composition of unemployment inflows is an important determinant of unemployment over the cycle. Also analyzing unemployment flows, Shimer (2012) shows that composition effects do not play an important role for unemployment outflows.

The importance of the participation margin has recently been stressed by Elsby, Hobijn, Sahin, and Valletta (2011), Kroft, Lange, Notowidigdo, and Katz (2014) and Elsby, Hobijn, and Sahin (2015). Kroft, Lange, Notowidigdo, and Katz (2014), who analyze CPS data for the time period 2002-2007 and calibrate a matching model, argue that transitions to (and from) non-participation may play an important role for the rise in long-term unemployment and the observed outward shift of the Beveridge curve after 2008. Elsby, Hobijn, and Sahin (2015) find that the participation margin accounts for around one-third of unemployment fluctuations. They also argue that the share of individuals with high labor market attachment in the pool of the unemployed increases during recessions – a fact also established by Mueller (2012). This reduces the transition probability from unemployment to non-participation in times of recession.

We contribute to these studies of the US labor market by exploiting available micro data and by quantifying the importance of composition effects for the cyclicality of labor market flows within a multivariate context. Previous studies have mainly focused

on the use of time-series techniques, thereby losing at least some of the heterogeneity present in micro data. We apply the Blinder-Oaxaca decomposition method, which has become a standard tool in labor economics for the analysis of the gender wage gap, to perform a detailed analysis of the contribution of composition effects to labor market transitions over the last four decades. The detailed decomposition of the composition effects allows us to quantify the contribution of specific variables to unemployment flows over the cycle. We are able to study the contribution of both fixed (personal) characteristics and time-varying variables to the composition effects uncovered. Our analysis is particularly relevant for a better understanding of the long-term unemployment rate, which – especially during the recent recession – has become a serious concern among the public, policymakers and economists alike (Mukoyama and Sahin, 2009; Elsby, Hobijn, and Sahin, 2010; Elsby, Hobijn, Sahin, and Valletta, 2011).

Our empirical findings may be summarized as follows. First, we quantify the importance of overall composition effects for unemployment flows. We find that unemployment inflows from employment are strongly affected by composition effects, which exert a dampening effect. In line with Shimer (2012), we observe that composition effects play no significant role for the unemployment outflows to employment. We also show that this overall finding is the result of varying signs of the contributions of underlying variables. Moreover, our findings reveal that composition effects are a major determinant of unemployment outflows to non-participation, contributing nearly one-third to the difference in the corresponding transition rate between booms and recessions. These results are qualitatively in line with Elsby, Hobijn, and Sahin (2015), who find an even larger role for composition effects.

Second, our detailed decomposition results indicate that a larger share of highly educated workers in a recession makes transitions to unemployment 18.1 percent less likely, leading to the dampening effect mentioned above. Consistent with Elsby, Hobijn, and Sahin (2015) and Mueller (2012), our analysis confirms that the share of individuals with high labor market attachment in the pool of the unemployed increases during recessions, which makes transitions to non-participation more unlikely. In addition, we are able to

quantify the contribution of different worker characteristics (such as age, education, and gender) to transitions from unemployment to non-participation.

Third, we perform a dynamic analysis of the contribution of unemployment duration to the transition rate from unemployment to employment over the course of every recession since 1976. Our findings are consistent with the results of Baker (1992) for the 1980s. Furthermore, providing an analysis up to the time period of the "Great Recession", we show that the relevance of changes in the duration of unemployment seems to be a special feature of deep recessions.

The remainder of this paper is organized as follows. The next section describes the data used and provides descriptive evidence on the cyclicality of the US labor market. The third section explains the methodology employed. The fourth section presents the results, the last section summarizes the main results and concludes the discussion.

2 Data and Descriptive Analysis

2.1 Data

To analyze transitions from unemployment to employment and from unemployment to non-participation, we use basic monthly data from the Current Population Survey (CPS) for the time period February 1976 - October 2009, which also constitute the basis of the "gross flow data" employed by Fujita and Ramey (2009) and Yashiv (2008). The data are readily available from the website of the National Bureau of Economic Research (NBER).[2]

The CPS is a rotating panel, which follows individuals who enter the survey for four consecutive months, then leave the sample for eight months, re-enter the sample for another four consecutive months, and then leave the sample altogether. We use an updated version of Shimer's program code to match observations over time.[3] In particular, we match individual records from one month to the next using the household identifica-

[2]See `http://www.nber.org/data/cps_basic.html`.

[3]The original program files are available at `http://sites.google.com/site/robertshimer/`.

tion number, the serial suffix when household identification numbers are not unique, the person's line number within the household, and the person's age, race, and sex.[4] Exact matches are required for all of the variables except age, where we accept cases in which age increased by no more than one year.[5]

To examine unemployment outflows, we only keep 16 - 65 year old individuals who are unemployed at an initial point in time $t-1$ and are either employed, unemployed, or not in the labor force at time t. We generate two dependent variables that are used to study unemployment outflows: (1) an indicator variable that is equal to one if the observed (initially unemployed) individual has moved from unemployment at time $t-1$ to employment at time t, and zero otherwise, and (2) an indicator variable that is equal to one if the observed individual has moved from unemployment at time $t-1$ to non-participation at time t, and zero otherwise. After dropping observations with missing values on one of the variables used in our analysis, our sample of unemployment outflows contains 306,594 observations over the entire sample period. On average, we observe 778 individuals per month.

Our analysis of inflows from employment to unemployment is complicated by the fact that information on job tenure is not available in the basic monthly data of the CPS. This is a severe data restriction, because in any econometric analysis of labor market transitions, it is of paramount importance to control for the duration an individual has spent in the state of origin before making a transition. However, information on job tenure is available in the Job Tenure and Occupational Mobility Supplements, which were collected 11 times in January or February of specific years of the sample period. When analyzing inflows from employment to unemployment, we therefore restrict our sample to the time periods when this information is available, and combine it with the information on transitions computed from the basic monthly files as described above. For unemployment inflows from non-participation, it is not possible to determine the time spent in non-participation before making a transition. We therefore refrain from

[4]As a result of changes in household identifiers in the public-use files, there are several gaps in the time series (see Shimer (2012) for details).

[5]Unfortunately, a non-representative sample of about 25% of the survey records may not be matched due to sample attrition (Shimer, 2012).

analyzing transitions from non-participation to unemployment econometrically.

We restrict the sample for the analysis of unemployment inflows to 16 - 65 year old individuals who are employed at an initial point in time $t-1$ and are either employed or unemployed at time t. After dropping observations with missing values on one of the variables of interest, our sample includes 129,115 observations. Our dependent variable for the analysis of unemployment inflows is an indicator variable that is equal to one if the observed (initially employed) individual has moved from employment at time $t-1$ to unemployment at time t, and zero otherwise.

The set of explanatory variables used in our analysis can be divided into the following groups: unemployment duration/job tenure, education, age, gender, and race. Specifically, we use unemployment duration (in weeks) in the sample of unemployment outflows and focus on job tenure (months with the current employer) in the sample of unemployment inflows. We are particularly interested in the contribution of these variables to the observed employment status transitions. We further control for a set of indicator variables to describe the remaining dimensions. Specifically, we consider the following levels of education: "Less than high school" (11 years or less), "High school" (12 years), "Some college" (13 years), "College" (14 or 15 years), and "Higher college" (16 years or more). Moreover, we generate indicator variables for different age groups (16 - 24 years, 25 - 44 years, and 45 - 65 years), gender (male/female), and race (white/non-white). As a robustness test for our analysis of unemployment inflows, we also included controls for industry and occupation. However, this did not change the results significantly. Finally, the regressions include monthly indicators in order to account for potential seasonality of the transition probabilities considered.

2.2 The Cyclicality of the US Labor Market

Our definition of recession dates follows Elsby, Michaels, and Solon (2009) who determine start and end dates by the respective minimum and maximum quarterly unemployment rates preceding and following the NBER recession dates. Instead of using the quarterly unemployment rate, we consider the closest local minimum or maximum unemployment

rate as a boundary to obtain recession dates that coincide precisely with the lowest and highest unemployment rate of the relevant period.[6,7] Figure 1 displays the times of recession considered in our empirical analysis and the US unemployment rate over the sample period.

< Figure 1 about here >

Descriptive evidence on the transitions between employment and unemployment over time is provided in Figures 2 - 5, as well as in Table 1A.[8] Figure 2 shows that the transition rate from employment to unemployment is typically higher in a downturn than in an upswing, and average job tenure seems to be higher in recessions than in booms. In contrast, Figures 3 and 4 reveal a clear tendency of the unemployment outflow rates to decline in recessions. This pattern is mirrored by an increase in the average duration of unemployment displayed in Figure 5. Figure 5 also reveals that the duration of unemployment typically remains relatively constant or even continues to fall at the beginning of a recession but rises considerably at a later stage of a recessionary period.

< Figures 2 - 5 about here >

The summary statistics in Table 1A confirm the countercyclicality of unemployment inflows and the procyclicality of unemployment outflows. We also observe that job tenure and unemployment duration are countercyclical. Low-skilled individuals exhibit higher transition rates from employment (E) to unemployment (U) than high-skilled individuals.

[6]The recessionary periods defined by the NBER's Business Cycle Dating Committee are taken from `http://www.nber.org/cycles`. As noted by Elsby, Michaels, and Solon (2009), the NBER recession dates are not suitable for the analysis of labor market dynamics because the NBER definition places a relatively high weight on GDP growth and a lower weight on employment.

[7]Due to the small number of time periods available, we deviate from this strict definition and also consider time periods within three months after a recession as recessionary periods when analyzing unemployment inflows. Specifically, we consider January 1983 and January 2010 as part of the preceding recessions. Both months are characterized by high transition rates from employment to unemployment.

[8]We present weighted numbers throughout the paper, using weights provided by the basic monthly files of the CPS.

They are also more likely to transition from unemployment (U) to non-participation (N) but less likely to move from unemployment (U) to employment (E).

< Table 1A about here >

The sample averages of educational attainment in Table 1B confirm that highly educated individuals are more likely to be employed during recessions than less educated individuals. At the same time, highly educated individuals are also more likely to be unemployed during recessions than less educated individuals because lower levels of education are associated with higher transition rates from U to N (see Table 1A). Similarly, we find that the oldest age group is more strongly represented among both the employed and the unemployed during recessions because older (and more experienced) individuals are more likely to remain employed and less likely to transition from U to N. In contrast to age and education, there appears to be little variation in the gender and race distribution between upswings and downturns.

< Table 1B about here >

The linear probability estimates of transitions between employment states presented in Table 2 are in line with the descriptive evidence and with results typically found in the literature (e.g., Nagypál, 2008). Specifically, shorter job tenure is associated with a higher likelihood of making a transition from E to U. A shorter unemployment duration is associated with a higher likelihood of finding a job and a lower likelihood of leaving the labor force. Moreover, highly educated workers are less likely to lose their job and higher levels of education among unemployed individuals are related to a higher probability of finding a job and a lower probability of leaving the labor force. The returns to education with regard to unemployment inflows are higher during recessions, i.e., highly educated workers are relatively more likely to keep their job in a downturn compared to an upswing. In contrast, the returns to education with regard to unemployment outflows are lower during recessions. We also find that older workers (aged 45-64 years) are significantly less likely to exit U into E than younger workers, and that the difference in the likelihood of finding a job between younger and older workers is twice as high in a downturn compared

to an upswing. Men are more likely to make a transition between E and U but less likely to make a transition from U to N than women. We further observe significant differences in the unemployment outflow probability between white and non-white individuals, while racial differences in the inflow probability are not significant.

< Table 2 about here >

In sum, we observe considerable differences in observed characteristics and estimated parameters between upswings and downturns. Although the sample means confirm the countercyclicality of inflows and the procyclicality of outflows, we do not know whether the observed variations in transition probabilities over the business cycle are the result of variations in the socioeconomic and demographic composition of the underlying samples or of different returns to certain characteristics. The following sections address this issue in greater detail.

3 Methodology

We employ the decomposition proposed by Blinder (1973) and Oaxaca (1973) and generalized by Oaxaca and Ransom (1994) to examine the contribution of observed characteristics and returns to these characteristics to differences in transition probabilities between upswings and downturns. Labor economists have typically used this approach to decompose wage differentials between male and female workers or changes in wage rates over time (see, e.g., Wellington, 1993). We perform a decomposition analysis to examine the contribution of characteristics and returns to differences in transition probabilities between upswings and downturns. Our analysis uses the sample means and the estimated coefficients of the transition probabilities presented in Tables 1A, 1B, and 2 as smallest elements of the decomposition equation.

Formally, we consider the raw differential in the predicted probability of changing the employment status (we distinguish between employment, unemployment, and non-participation) between recessionary periods (denoted by $d = 1$) and cyclical upswings

(denoted by $d = 0$). Specifically, for a given employment status S_t at time t, we observe the outcome

$$Y_{id} = \begin{cases} 1 & \text{if } S_{t-1} \neq S_t \\ 0 & \text{if } S_{t-1} = S_t \end{cases}$$

and a set of characteristics $X_{id} = [X_{id1}, ..., X_{idK}]$ for each individual i in sample d. For simplicity, we assume that the conditional expectation of Y given X is linear[9] so that

$$p_{id} = Pr(Y_{id} = 1|X_{id}) = E(Y_{id}|X_{id}) = \beta_{d0} + \sum_{k=1}^{K} X_{idk}\beta_{dk}, \tag{1}$$

where the model parameters are given by the vector $\beta_d = [\beta_{d0}, \beta_{d1}, \beta_{d2}, ..., \beta_{dK}]'$. To isolate the part of the raw differential in the predicted probability of changing the employment status attributable to differences in observed characteristics from the part due to differences in coefficients, we perform the following decomposition:

$$\begin{aligned} \widehat{p}_{i1} - \widehat{p}_{i0} &= \underbrace{\sum_{k=1}^{K} (\overline{X}_{1k} - \overline{X}_{0k})\beta_k^*}_{\text{characteristics}} \\ &+ \underbrace{(\widehat{\beta}_{10} - \widehat{\beta}_{00}) + \sum_{k=1}^{K} \left[\overline{X}_{1k}(\widehat{\beta}_{1k} - \beta_k^*) + \overline{X}_{0k}(\beta_k^* - \widehat{\beta}_{0k})\right]}_{\text{coefficients}}, \end{aligned} \tag{2}$$

where hats denote estimated parameters, bars denote sample means, and the reference vector β^* is given by the linear combination $\beta^* = \Omega\widehat{\beta}_1 + (I - \Omega)\widehat{\beta}_0$.[10]

We interpret the first term on the right-hand side of equation (2) as the part of the overall difference due to "composition effects" because it results from a different

[9] We use estimates of a linear probability model to avoid problems of non-linear decomposition methods, such as path dependency (see Fortin, Lemieux, and Firpo, 2011).

[10] Numerous studies have addressed the problem of the particular choice of the weighting matrix Ω and the resulting reference vector (Blinder, 1973; Oaxaca, 1973; Reimers, 1983; Cotton, 1988; Neumark, 1988). We employ an approach proposed by several recent studies (Fortin, 2008; Jann, 2008; Elder, Goddeeris, and Haider, 2010) and estimate the reference vector through a pooled regression model over both samples, including a sample-specific intercept.

composition of the two samples with regard to observed characteristics. For example, a larger number of individuals with short unemployment duration in the pool of the unemployed during recessions would be associated with an increase in outflows from U to E. The second term on the right-hand side of the equation is due to differences in the returns to observable characteristics and differences in sample-specific intercepts, which may be interpreted as "unexplained".[11]

To understand the factors that contribute to differences in transition probabilities between economic upswings and downturns, we also perform a detailed decomposition of the raw differential into components describing the contribution of single (groups of) characteristics.[12] A detailed decomposition is not unproblematic because arbitrary scaling of continuous variables may affect the components of the gap attributable to different coefficients (Jones, 1983; Jones and Kelley, 1984; Cain, 1987; Schmidt, 1998).[13] Although the continuous variables employed in our analysis (tenure and unemployment duration) do not appear to suffer from arbitrary scaling, we avoid this problem by focusing on overall differences in coefficients instead of performing a detailed decomposition of this component.

A problem related to the detailed decomposition of dummy variables is the arbitrary choice of reference categories that are omitted from the regression model due to collinearity (Schmidt, 1998; Oaxaca and Ransom, 1999; Horrace and Oaxaca, 2001; Gardeazabal and Ugidos, 2004; Yun, 2005). Although a normalization may avoid having omitted reference categories (Gardeazabal and Ugidos, 2004; Yun, 2005), it complicates the economic interpretation of the decomposition results (Gelbach, 2002; Fortin, Lemieux, and Firpo, 2011). Our detailed decomposition analysis focuses on groups of dummy variables, which

[11]It is important to note that our method is descriptive in nature, i.e., it does not necessarily pick up causal effects. For example, the education of an individual could be correlated with unobservables, such as unobserved abilities, which may affect transitions into and out of employment. Therefore, our results cannot be interpreted as causal because the underlying parameter estimates may pick up correlations with unobservables.

[12]Jann (2008) describes the calculation of standard errors of all components of the decomposition equation.

[13]For example, Jones and Kelley (1984) estimate income regressions to illustrate that replacing a regressor measuring "years of schooling" by an equally plausible regressor measuring "age left school" produces identical predicted income levels but different decomposition results due to arbitrary scaling.

are not affected by the choice of reference categories.

In addition to a pooled decomposition analysis of complete upswing and downturn periods, we are also interested in the evolution of the quantitative relevance of composition effects for the transition probabilities of outflows from U to E from the beginning to the end of each recession. In order to do so, we compare every upswing in our sample with specific data from the following recession. For every such comparison, we use the data on the entire upswing and a "slice" of the following recession, which is gradually extended, and perform the decomposition analysis outlined above on these data.

For example, when taking the first boom-recession pair in our sample, we start by selecting the data on the entire upswing (1976:2 - 1979:4) as well as the first recessionary month (1979:5) to obtain the decomposition results for the change in transition probabilities between these two time periods. We obtain a second set of results by comparing the entire upswing (1976:2 - 1979:4) with the first two recessionary months which follow (1979:5 - 1979:6). We gradually extend the recessionary period considered until the end of the recession is reached. In sum, we compare the period 1976:2 - 1979:4 with the time periods {1979:5, 1979:5 - 1979:6, 1979:5 - 1979:7, ..., 1979:5 - 1980:7}. We perform this exercise separately for each of the five upswings that were followed by a recession over the time period 1976:2 - 2009:10. The results can be used to trace the dynamic evolution of the role of composition effects for the recessions in our sample, which allows us to determine the recessions that are exactly in line with the overall stylized facts concerning the role of composition effects, where differences become apparent, and why this may be the case.

4 Results

The decomposition method described in the previous section allows us to examine the contribution of composition effects to business cycle variations. We begin by studying the raw differential in transition probabilities between downturns and upswings, using a pooled sample. Since job tenure is only available for a few years during the period 1983:1 - 2010:1, we limit our analysis of unemployment inflows (i.e., transitions from E

to U) to a pooled sample. To study unemployment outflows (i.e., transitions from U to E and transitions from U to N), we also use a pooled sample of the period 1976:2 - 2009:10. Additionally, we perform a separate analysis of unemployment outflows for different pairs of booms and recessions and further examine the extent to which composition effects evolve over the business cycle by comparing entire upswings with cumulative parts of the following recessions.

4.1 Composition Effects and Labor Market Flows

The results of the decomposition analysis of the pooled samples of unemployment inflows and outflows are presented in Table 3. The observed difference in unemployment inflow probabilities between downturns and upswings is relatively small but significantly positive, reflecting the countercyclicality of transitions from E to U. We find that overall composition effects have a negative sign, indicating that they have a dampening impact on the cyclicality of unemployment inflows. Specifically, overall composition effects reduce the cyclicality of the unemployment inflow rate by 27.2 percent. This result is mainly driven by the composition of workers with regard to job tenure and educational attainment in different phases of the business cycle.

The contribution of job tenure to the raw differential is negative because jobs with shorter tenure are more likely to be destroyed in a recession than jobs with longer tenure. Since the latter jobs are generally more stable, increases in job tenure reduce unemployment inflows in recessions. Composition effects with regard to education have a similar dampening impact. In particular, the educational composition of workers reduces unemployment during recessions because highly educated workers are more likely to keep their jobs in a recession than less educated workers. We find that the dampening impact of job tenure accounts for 10.4 percent of the increase in unemployment inflows during recessions, while the negative contribution of education even makes up 18.1 percent.

Given the negative contribution of job tenure and education, one would expect a negative differential in transition rates from E to U between downturns and upswings. However, it is important to note that unemployment inflows are determined by many

other factors that are not included in our model (such as unobserved ability, the quality of a job-worker match, etc.). Because transition rates from E to U are higher in downturns than in upturns despite the presence of dampening effects, the unexplained part of the raw differential (i.e., the contribution of differences in coefficients between booms and busts) is larger than 100 percent.

< Table 3 about here >

The raw differential of outflows from U to E is significantly negative because the transitions from U to E are lower during recessions. We find that overall composition effects are also negative, i.e., they contribute to the general labor market development in a recession, although the overall contribution of observed characteristics to the raw differential is only 2.0 percent.

The small contribution of composition effects may be attributed to varying signs of the contributions of the underlying groups of variables, which partly cancel each other out. Above all, the contribution of unemployment duration is significantly negative, accounting for almost nine percent of the raw differential in unemployment outflows between booms and recessions. The negative composition effect with regard to age contributes an additional 2.3 percent to the raw differential. In contrast, the components of the remaining variable groups have a positive sign and therefore exert a dampening effect on the cyclicality of unemployment outflows. Most notably, the education level of the unemployed in a recession changes in such a way that unemployment outflows would (all else equal) actually increase during a recession. This result may be attributed to the positive impact of education on unemployment outflows and an increase in the share of highly educated individuals in the pool of the unemployed in a recession, which confirms the results of Mueller (2012), who argues that there are more workers with a high wage in their previous job – and especially workers with high skills – in the pool of the unemployed during a recession.[14]

Turning to the decomposition of outflows from U to N, Table 3 shows that the raw

[14]In accordance with Mueller (2012), we confirm that high-skilled workers exhibit a stronger increase in the transition rate from E to U in a recession than low-skilled workers (cf. Table 1A).

differential between booms and recessions is relatively large, amounting to around half the size of the corresponding gap in transition rates from unemployment to employment. Furthermore, and in contrast to unemployment outflows to employment, composition effects amount to nearly one-third of the raw differential and thus contribute considerably to the cyclicality of the unemployment outflow to non-participation. Therefore, the pool of the unemployed changes in such a way that transitions from U to N are less likely in a recession. Differences in coefficients are responsible for the remaining two-thirds of the raw differential.

The detailed decomposition of composition effects reveals that education is the most important contributing factor (making up 16.4 percent of the raw differential), followed by gender (7.9 percent) and age (7.5 percent). Intuitively, the pool of the unemployed exhibits lower transition rates to non-participation in recessions because it includes more individuals with characteristics that are related to a stronger labor market attachment. In contrast, the contribution of unemployment duration is negative because longer unemployment durations during a recession make transitions from U to N more likely.

4.2 Differences between Time Periods

The decomposition analysis of the cyclicality of transitions between labor market states may hide important differences between downturns and upswings. To address this issue, we perform a separate decomposition analysis for each upswing and the following downturn in the sample period. Due to data limitations, our analysis focuses on unemployment outflows. We are particularly interested in the contribution of the duration of unemployment, which turned out to have the strongest contribution to transitions from U to E (see Table 3). A more detailed analysis of the determinants of unemployment outflows to non-participation is beyond the scope of the paper and is therefore left for future research.

The numbers in Table 4 show that the outflow rate from unemployment to employment is significantly lower in recessions than in booms for virtually all cases considered, with the first period being the only exception. Although the contribution of differences

in coefficients to the raw differential is positive in all cases, we observe substantial heterogeneity in the contribution of composition effects over time. Specifically, overall composition effects are positive in the early 1980s and 1990s and insignificant in the remaining time periods. The estimates suggest that the contribution of the duration of unemployment to the raw differential may either be positive or negative, while the composition effects due to "remaining factors" are either significantly positive or insignificant.

< Table 4 about here >

On balance, the estimates presented in Table 4 reveal some commonalities and considerable heterogeneity with regard to the contribution of composition effects. These differences between recessions are either due to differences in observed characteristics or coefficients. To gain a better understanding of the role of the duration of unemployment, Table 5 presents the underlying sample means and coefficients that were used to calculate the contribution of the duration of unemployment to outflows from U to E (Table 4).

Table 5 reveals that the average duration of unemployment may either increase or decline in recessions, compared to the preceding upswing. An increase in the duration of unemployment (recessions of the early 1980s, the early 2000s and the late 2000s) is associated with a negative contribution of the composition effect of the duration of unemployment to the outflow rate from U to E, as shown in Table 4. In contrast, a positive contribution is observed if the duration of unemployment increases.

< Table 5 about here >

The strong variation across time periods may be the result of differences between booms and recessions with regard to their length and magnitude. To explore this possibility, the next section studies the gradual contribution of the duration of unemployment to transitions from U to E as the economy slips deeper into recession.

4.3 Dynamic Aspects of Composition Effects

To examine the evolution of the contribution of composition effects to the raw differential in transition rates from U to E from the beginning to the end of a recession, we compare

every upswing in our sample with cumulative parts of the following recession. This approach allows us to study the contribution of the changing duration of unemployment at different stages of a recession. Figures 6 - 10 depict the results of this exercise for the raw differential and the duration of unemployment. The data points presented for each point in time are obtained from a separate decomposition analysis of the entire upswing and a cumulative part of the following recession. Therefore, the last set of data points displayed in each figure is a graphical representation of the raw differential and the part that is due to changes in the duration of unemployment reported in Table 4.

< Figures 6 - 7 about here >

Two facts that are common to the last four recessions under investigation become apparent from Figures 6 - 10.[15] First, the raw differential quickly increases at the beginning of a recession before starting a gradual but sustained decline, turning negative before the end of all four recessions. Second, the contribution of the composition effect with regard to unemployment duration is positive at the beginning of each recession, but then gradually falls, taking on a negative sign at the end of two of the five recessions.

These two stylized facts are intimately related. At the beginning of a recession, there are many people in the pool of the unemployed who recently lost their jobs, and whose chances of being re-hired quickly are relatively high. In addition, firms might use this opportunity to engage in worker churning to improve the quality of their workforce (Burda and Wyplosz, 1994). Compared to the preceding upswing, this process leads to a relatively high outflow rate from unemployment. Therefore, the composition effect with regard to unemployment duration is positive at this stage of the recession.

< Figures 8 - 10 about here >

As the recession continues, the share of short-term unemployed individuals in the pool of the unemployed gradually falls, as does the outflow rate from unemployment. At

[15]The recession of the early 1980s does not share either of these two facts. This is in all likelihood due to the nature of the recovery between the two recessions at the beginning of the 1980s. This recovery was brief, but nevertheless identified as a true expansion by the NBER committee (Boldin, 1994).

the end of two of the five recessions considered – the recession in 1981/1982 and the last "Great Recession" – , both the raw differential and the part attributable to the duration of unemployment are negative. This result implies that the duration of unemployment contributes to a reduced unemployment outflow rate at the end of these two recessions, which were particularly severe (see, e.g., Romer, 2006, Table 4.1).

In the middle of a recession, the outflow rate is typically lower than in the preceding upswing, but the share of short-term unemployed persons is still relatively high. Therefore, the composition effect with regard to unemployment duration exerts a dampening role on the outflow rate at this intermediate stage of a recession. This feature can be observed in the middle of the two severe recessions of the 1981/1982 and of the late 2000s, as well as at the end of the recession of the early 1990s, which was relatively shallow.

In sum, the dynamic decomposition of the composition effects shows that there is a common mechanism to the majority of the recessions considered, which explains some of the differences in estimation results reported in Table 4. In particular, at the beginning of a recession, the pool of the unemployed features a relatively large share of short-term unemployed individuals, which leads to a positive effect on the transition rate to employment. This composition effect however becomes smaller over the course of the recession as the share of short-term unemployed individuals falls, and can turn negative when the recession is very strong.

5 Conclusion

The recent "Great Recession" has further increased the interest in the cyclical nature of both labor market transitions and the duration of unemployment. We contribute to the debate by investigating the underlying composition effects of unemployment inflows and outflows. A Blinder-Oaxaca decomposition is used to decompose the differential in employment status transition rates between economic downturns and upswings into a part that is attributable to changes in the socioeconomic and demographic composition of the underlying population and a part that is due to changes in the coefficients associated with observed characteristics. The decomposition analysis allows us to establish several

stylized facts regarding the role of composition effects for labor market dynamics.

The decomposition of the transition rate from E to U shows that composition effects exert a dampening impact on unemployment inflows during recessions. Specifically, without composition effects, the differential of inflows from E to U would be about 27 percent higher than actually observed. The results of a detailed decomposition indicate that composition effects of this inflow rate are mainly driven by the composition of workers with regard to job tenure and educational attainment in different phases of the business cycle.

While composition effects play an important role for the cyclicality of unemployment inflows from employment, they contribute little to the cyclicality of unemployment outflows to employment, which is consistent with Shimer (2012). However, we show that this overall finding has to be qualified, because the contribution of specific variables nevertheless exists. In particular, the small contribution of overall composition effects to the raw differential of outflows from U to E is the result of varying signs of the contributions of underlying variables. Such countervailing effects are often left unnoticed in the literature on unemployment flows, which generally takes a macro approach using time-series techniques. Our detailed decomposition results reveal that the duration of unemployment at the individual level contributes significantly to the overall difference in the transition rate from U to E between economic downturns and upswings, which reflects the well-known duration dependence of the outflow rate. Our analysis shows that, without this duration dependence, the outflow rate would be 9 percent higher.

Our decomposition of outflows from U to N reveals that the raw differential between booms and recessions is about half as large as the corresponding gap in transition rates from U to E. Composition effects play an important role in this context, amounting to nearly one-third of the raw differential. The detailed decomposition indicates that education is the most important determinant of this result, followed by gender and age.

We observe that the contribution of the duration of unemployment to outflows from U to E is positive at the beginning of a recession, indicating a relatively high unemployment outflow rate to employment early on in a recession. At this early stage, the unemployment

outflow rate even rises relative to the preceding upswing because there are many people in the pool of the unemployed at the beginning of a recession who have recently been laid off and who are re-hired again relatively quickly. Later on in a recession, the share of long-term unemployed individuals rises, which exerts a negative impact on the unemployment outflow rate. This result is consistent with Elsby, Hobijn, and Sahin (2010) who find that while unemployment inflows are more important at an early stage of a recession, outflows play a more prominent role later on. Our results provide a potential explanation for differences in labor market dynamics between recessions. They also indicate that composition effects may be reinforced by the prevalence of temporary layoffs at the beginning and permanent layoffs at later stages of a recession (cf. Barnichon and Figura, 2010).

Our results thus highlight the importance of individual heterogeneity for the modeling of labor market dynamics. This becomes particularly apparent through the fact that the unemployment inflow rate first rises and then declines in a recession (see, e.g., Pries (2008) and Bils, Chang, and Kim (2012) for versions of the Mortensen and Pissarides (1994) model, which were extended along this line). The importance of heterogeneity at the individual level is corroborated by the fact that the composition effect with regard to unemployment duration gradually turns negative over the course of a recession. This implies that the sorting of workers over the business cycle plays an important role in the sense that particular types of workers are hired most frequently in particular phases of the business cycle. In this context, heterogeneity on both sides of the labor market – i.e., business cycle variations in the type of firms that hire specific types of workers (Bachmann and David, 2010; Moscarini and Postel-Vinay, 2012) – is likely to have an impact. Thus, models of directed, rather than undirected, search (e.g. Albrecht, Gautier, and Vroman, 2006) may be a fruitful avenue for future research. Finally, the shift of the composition of employment relationships towards more stable jobs is consistent with job destruction affecting mainly low-productivity jobs (Caballero and Hammour, 1994).

6 Tables and Figures

FIGURE 1: The US Unemployment Rate

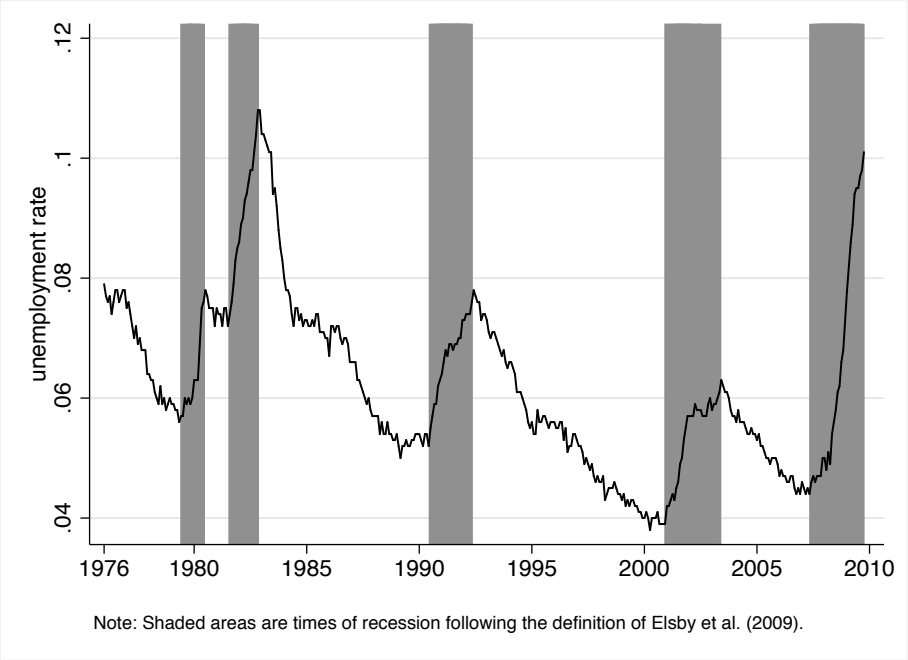


FIGURE 2: The Transition Rate from Employment to Unemployment and Tenure

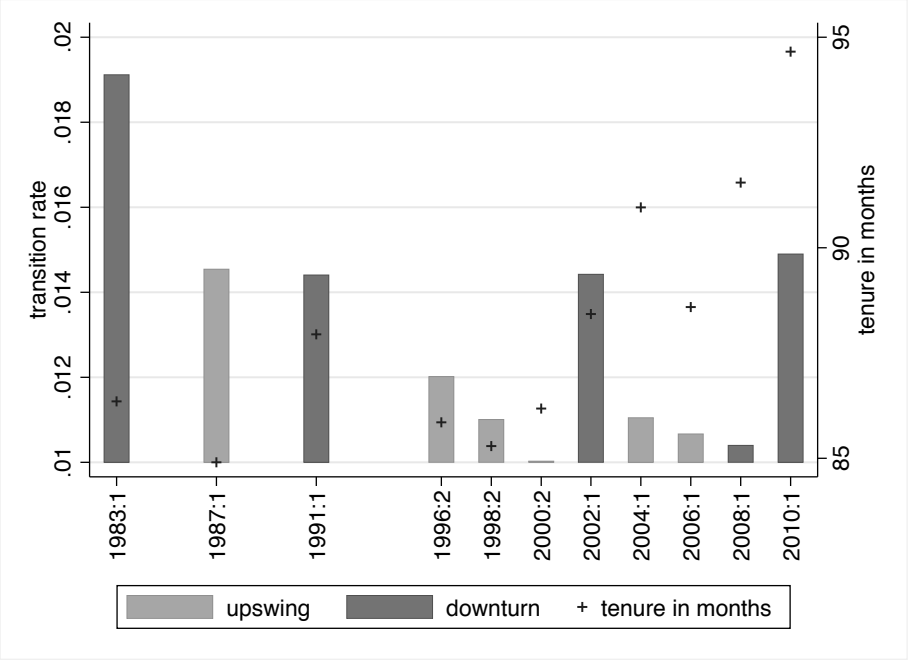


FIGURE 3: The Transition Rate from Unemployment to Employment

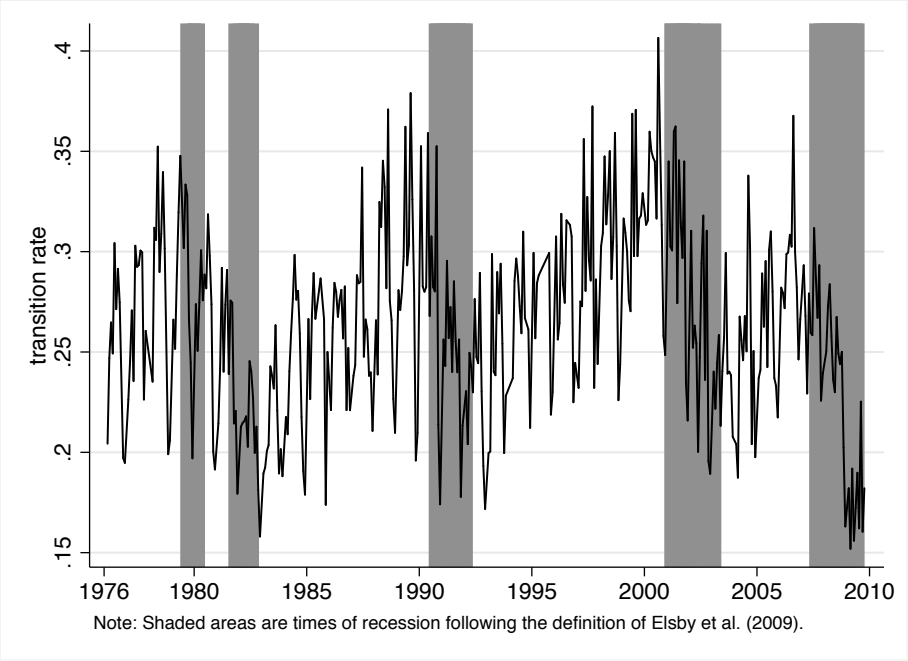


FIGURE 4: The Transition Rate from Unemployment to Non-Participation

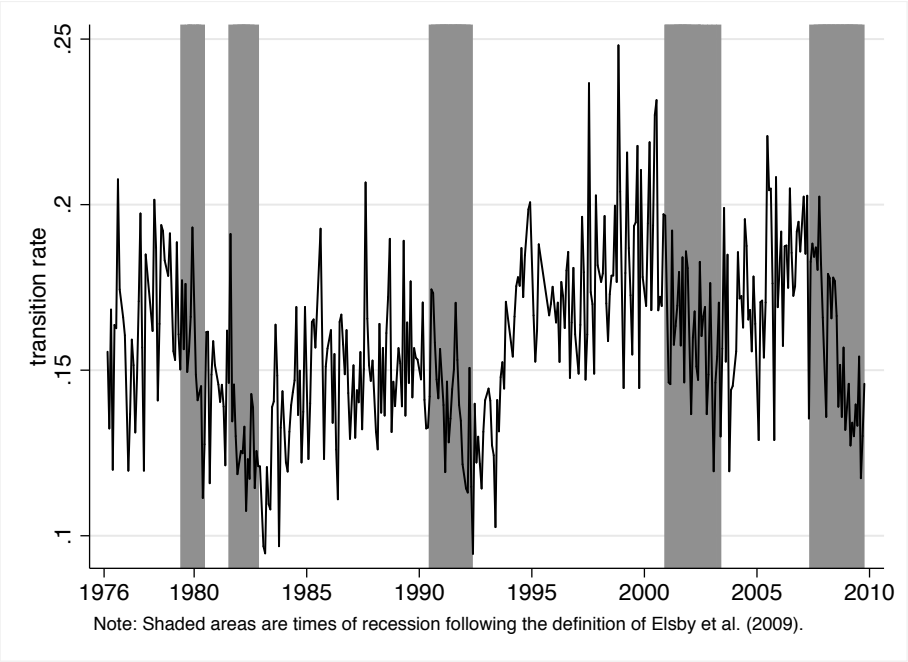


FIGURE 5: Unemployment Duration

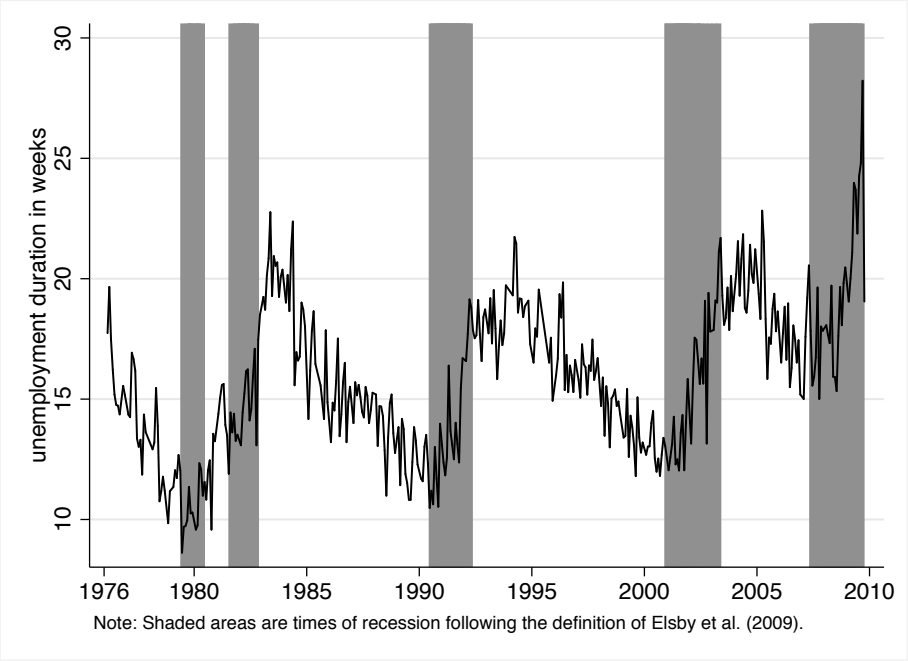


TABLE 1A. Summary Statistics: Monthly Transition Rates, Tenure, and Unemployment Duration by Skill

	High-skilled		Low-skilled		Total	
	Upswing	Downturn	Upswing	Downturn	Upswing	Downturn
INFLOW SAMPLE						
Transition rate from E to U (in %)	0.71	0.91	1.65	1.99	1.09	1.32
	(8.41)	(9.50)	(12.72)	(13.96)	(10.40)	(11.41)
Tenure in months	89.22	93.50	84.73	88.28	87.38	91.52
	(95.01)	(97.70)	(97.11)	(99.90)	(95.90)	(98.57)
N	39,511	33,323	29,599	26,676	69,110	59,999
OUTFLOW SAMPLE						
Transition rate from U to E (in %)	30.45	24.45	26.95	22.85	28.23	23.50
	(46.02)	(42.98)	(44.37)	(41.99)	(45.01)	(42.40)
Transition rate from U to N (in %)	14.73	12.68	19.67	17.59	17.87	15.59
	(35.44)	(33.27)	(39.75)	(38.07)	(38.31)	(36.28)
Unemployment duration in weeks	17.81	19.10	16.76	18.20	17.14	18.57
	(23.64)	(22.96)	(22.66)	(22.28)	(23.03)	(22.56)
N	58,965	32,844	145,257	69,523	204,222	102,367

Note: "E" refers to *employment*; "U" refers to *unemployment*; "N" refers to *non-participation*. High-skilled individuals are defined as those with "some college" or higher, low-skilled individuals have an education below "some college". Standard deviations are reported in parentheses.

TABLE 1B. Summary Statistics: Education and Demographic Characteristics

	Inflow Analysis		Outflow Analysis	
	Upswing	Downturn	Upswing	Downturn
EDUCATION (PERCENTAGES)				
11 years or less	11.11	9.51	29.54	24.92
	(31.43)	(29.33)	(45.62)	(43.25)
High school	29.72	28.57	33.93	34.35
	(45.70)	(45.18)	(47.35)	(47.49)
Some college	20.27	19.77	18.01	19.00
	(40.20)	(39.82)	(38.43)	(39.23)
College	9.46	9.81	5.78	6.72
	(29.26)	(29.74)	(23.33)	(25.04)
Higher college	29.44	32.35	12.74	15.02
	(45.58)	(46.78)	(33.34)	(35.72)
DEMOGRAPHICS (PERCENTAGES)				
Age 16-24 years	13.22	12.10	33.63	30.91
	(33.87)	(32.62)	(47.24)	(46.21)
Age 25-44 years	50.61	46.20	43.28	41.26
	(50.00)	(49.86)	(49.55)	(49.23)
Age 45-65 years	36.17	41.70	23.09	27.82
	(48.05)	(49.31)	(42.14)	(44.81)
Male	52.77	52.44	53.32	55.96
	(49.92)	(49.94)	(49.89)	(49.64)
White	85.57	84.41	73.29	73.81
	(35.14)	(36.28)	(44.25)	(43.97)
N	69,110	59,999	204,222	102,367

Note: Summary statistics based on analysis samples of inflows and outflows; EU: Transitions from employment to unemployment; UE: Transitions from unemployment to employment; UN: Transitions from unemployment to non-participation. Standard deviations are reported in parentheses.

TABLE 2. Determinants of Transition from Employment to Unemployment (EU), from Unemployment to Employment (UE), and from Unemployment to Non-participation (UN)

	Inflows: EU		Outflows: UE		Outflows: UN	
	Upswing	Downturn	Upswing	Downturn	Upswing	Downturn
Tenure in months	-0.00006***	-0.00006***				
	(0.00001)	(0.00001)				
Unemployment duration in weeks			-0.00290***	-0.00273***	0.00056***	0.00031***
			(0.00007)	(0.00009)	(0.00007)	(0.00009)
EDUCATION						
High school	-0.00891***	-0.01347***	0.04102***	0.01807***	-0.06877***	-0.06179***
	(0.00256)	(0.00392)	(0.00462)	(0.00575)	(0.00414)	(0.00533)
Some college	-0.01225***	-0.01621***	0.05929***	0.02482***	-0.06097***	-0.06082***
	(0.00258)	(0.00394)	(0.00557)	(0.00671)	(0.00489)	(0.00613)
College	-0.01500***	-0.02081***	0.05699***	0.03812***	-0.08270***	-0.07900***
	(0.00268)	(0.00399)	(0.00832)	(0.00969)	(0.00659)	(0.00774)
Higher college	-0.01697***	-0.02162***	0.05976***	0.03741***	-0.09436***	-0.08811***
	(0.00242)	(0.00375)	(0.00638)	(0.00746)	(0.00499)	(0.00605)
DEMOGRAPHICS						
Age 25-44 years	-0.00516**	-0.00736**	0.01263***	-0.00189	-0.08099***	-0.08371***
	(0.00217)	(0.00317)	(0.00446)	(0.00554)	(0.00384)	(0.00488)
Age 45-65 years	-0.00360	-0.00554*	-0.01489***	-0.02780***	-0.06434***	-0.08111***
	(0.00226)	(0.00332)	(0.00514)	(0.00601)	(0.00443)	(0.00524)
Male	0.00390***	0.00625***	0.03533***	0.01900***	-0.07274***	-0.06207***
	(0.00100)	(0.00138)	(0.00363)	(0.00432)	(0.00313)	(0.00384)
White	-0.00244	-0.00052	0.07935***	0.06102***	-0.02268***	-0.02555***
	(0.00161)	(0.00211)	(0.00406)	(0.00485)	(0.00375)	(0.00462)
Constant	0.03138***	0.03745***	0.03288***	0.04626***	-0.00734	-0.02310**
	(0.00329)	(0.00481)	(0.00867)	(0.01080)	(0.00746)	(0.00941)
N	69,110	59,999	204,222	102,367	204,222	102,367

Note: Month indicators are included in the UE and UN regressions. Robust standard errors are reported in parentheses.

$^{*}p < 0.10,^{**}p < 0.05,^{***}p < 0.01$.

TABLE 3. Decomposition Analysis

	Inflows: EU		Outflows: UE		Outflows: UN	
RAW DIFFERENTIAL	0.00227**	100%	-0.04726***	100%	-0.02282***	100%
	(0.00086)		(0.00285)		(0.00245)	
CHARACTERISTICS						
Tenure	-0.00024***	-10.4%				
	(0.00005)					
Unemployment duration			-0.00404***	8.6%	0.00066***	-2.9%
			(0.00044)		(0.00011)	
Education	-0.00041***	-18.1%	0.00224***	-4.7%	-0.00374***	16.4%
	(0.00006)		(0.00021)		(0.00026)	
Age	0.00002	1.1%	-0.00109***	2.3%	-0.00172***	7.5%
	(0.00005)		(0.00017)		(0.00028)	
Gender	-0.00002	-0.7%	0.00076***	-1.6%	-0.00181***	7.9%
	(0.00002)		(0.00012)		(0.00023)	
Race	0.00002	0.9%	0.00038	-0.8%	-0.00012	0.5%
	(0.00002)		(0.00022)		(0.00007)	
Seasonal trend			0.00081***	-1.7%	-0.00037*	1.6%
			(0.00024)		(0.00018)	
Total	-0.00062***	-27.2%	-0.00094	2.0%	-0.00711***	31.1%
	(0.00009)		(0.00062)		(0.00051)	
COEFFICIENTS						
Total	0.00289***	127.2%	-0.04632***	98.0%	-0.01571***	68.9%
	(0.00086)		(0.00282)		(0.00243)	
N	129,115		306,594		306,594	

Note: EU: Transitions from employment to unemployment; UE: Transitions from unemployment to employment; UN: Transitions from unemployment to non-participation. Robust standard errors in parentheses.

$^{*}p < 0.10,^{**} p < 0.05,^{***} p < 0.01$.

TABLE 4. Decomposition Analysis: Transitions from Unemployment to Employment by Time Period

	Upswing followed by Downturn				
	1976:2 – 1980:7	1980:8 – 1982:12	1983:1 – 1992:6	1992:7 – 2003:6	2003:7 – 2009:10
RAW DIFFERENTIAL	0.01890***	-0.04062***	-0.01128**	-0.03117***	-0.05229***
	[0.00517]	[0.00544]	[0.00378]	[0.00415]	[0.00409]
CHARACTERISTICS					
Unemployment duration	0.01052***	-0.00368***	0.00441***	-0.00039	-0.00455***
	[0.00069]	[0.00065]	[0.00047]	[0.00058]	[0.00063]
	(55.7)	(9.1)	(-39.1)	(1.3)	(8.7)
Remaining factors	0.00577***	0.00110	0.00435***	-0.00009	0.00524***
	(0.00129)	(0.00157)	(0.00068)	(0.00067)	(0.00071)
	(30.5)	(-2.7)	(-38.6)	(0.3)	(-10.0)
Total	0.01630***	-0.00258	0.00876***	-0.00049	0.00069
	[0.00145]	[0.00170]	[0.00083]	[0.00091]	[0.00095]
	(86.2)	(6.4)	(-77.7)	(1.6)	(-1.3)
COEFFICIENTS					
Total	0.00260	-0.03804***	-0.02004***	-0.03068***	-0.05298***
	[0.00520]	[0.00551]	[0.00375]	[0.00411]	[0.00407]
	(13.8)	(93.6)	(177.7)	(98.4)	(101.3)
N	40,816	33,218	95,464	82,193	54,903

Note: Robust standard errors are reported in brackets. Percentages of the raw differential are reported in parentheses.

$^{*}p < 0.10,^{**} p < 0.05,^{***} p < 0.01$.

TABLE 5. Sample Means and Coefficients of Unemployment Duration by Time Period

	Sample Means		Coefficients UE	
	Upswing	Downturn	Upswing	Downturn
1976:02 - 1980:07	14.01	10.54	-0.00284***	-0.00384***
	(18.97)	(14.59)	(0.00013)	(0.00025)
1980:08 - 1982:12	13.81	15.17	-0.00313***	-0.00253***
	(17.40)	(19.34)	(0.00023)	(0.00014)
1983:01 - 1992:06	16.11	14.41	-0.00257***	-0.00269***
	(22.82)	(19.71)	(0.00006)	(0.00015)
1992:07 - 2003:06	16.05	16.18	-0.00303***	-0.00279***
	(22.18)	(20.52)	(0.00009)	(0.00015)
2003:07 - 2009:10	18.81	20.54	-0.00268***	-0.00256***
	(24.17)	(23.94)	(0.00010)	(0.00011)

Note: UE: Transitions from unemployment to employment. The coefficients for UE transitions are from equation (1). Robust standard errors in parentheses.

$^{*}p < 0.10,^{**} p < 0.05,^{***} p < 0.01$.

FIGURE 6: Decomposition of UE Transition Rate: 1976:2 - 1979:4 vs. {1979:5, 1979:5 - 1979:6, 1979:5 - 1979:7, ..., 1979:5 - 1980:7}

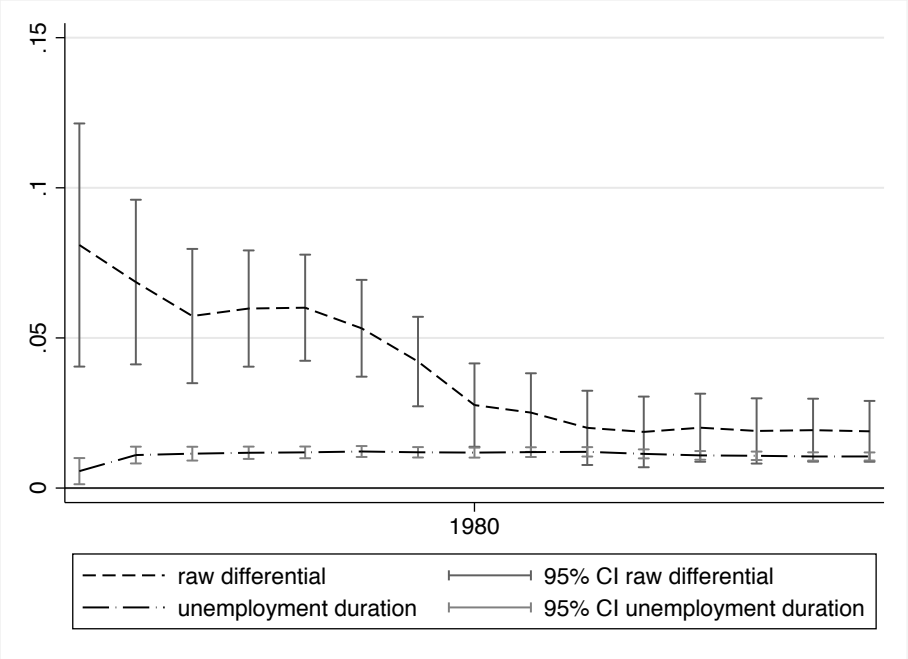


FIGURE 7: Decomposition of UE Transition Rate: 1980:8 - 1981:6 vs. {1981:7, 1981:7 - 1981:8, 1981:7 - 1981:9, ..., 1981:7 - 1982:12}

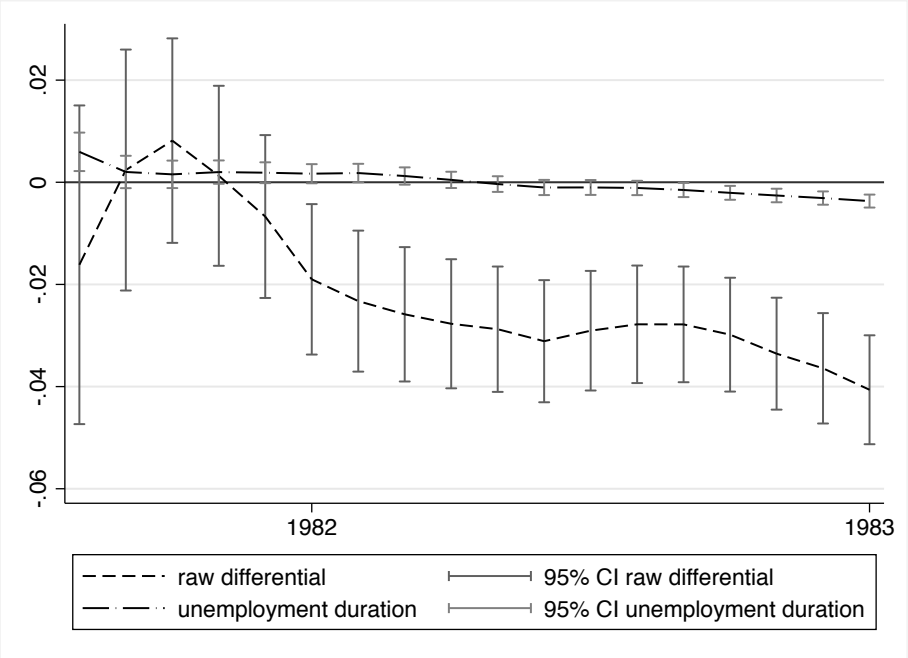


FIGURE 8: Decomposition of UE Transition Rate: 1983:1 - 1990:5 vs. {1990:6, 1990:6 - 1990:7, 1990:6 - 1990:8, ..., 1990:6 - 1992:6}

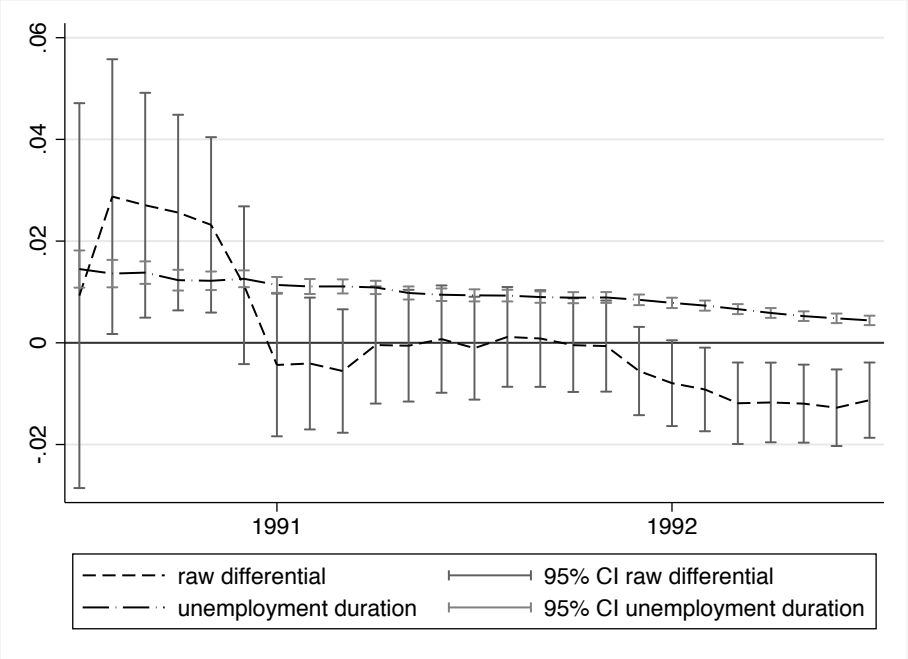


FIGURE 9: Decomposition of UE Transition Rate: 1992:7 - 2000:10 vs. {2000:11, 2000:11 - 2000:12, 2000:11 - 2001:1, ..., 2000:11 - 2003:6}

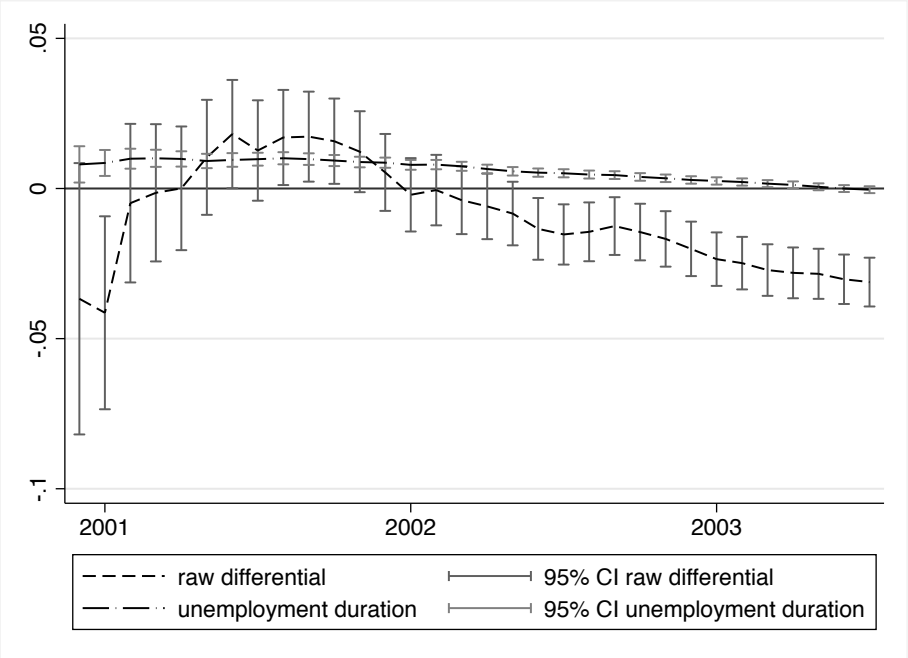
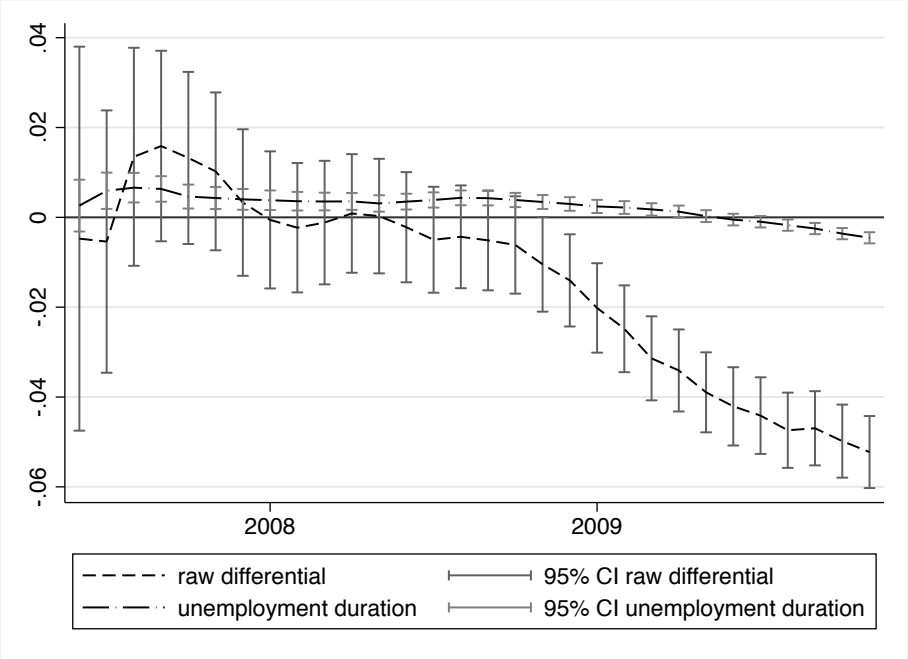


FIGURE 10: Decomposition of UE Transition Rate: 2003:7 - 2007:4 vs. {2007:5, 2007:5 - 2007:6, 2007:5 - 2007:7, ..., 2007:5 - 2009:10}



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