METU Studies in Development, 42 (April), 2015, 111-128

Reassessing the heterogeneity hypothesis in unemployment dynamics

Hakan Ulucan
Pamukkale University, Department of Economics, Kınıklı, Denizli, Turkey.
e-mail: hulucan@pau.edu.tr

Hakan Ercan
Middle East Technical University, Department of Economics, Çankaya, Ankara, Turkey
e-mail: hercan@metu.edu.tr

Semih Tümen
Central Bank of the Republic of Turkey, Research Department, Ulus, Ankara, Turkey
e-mail: semih.tumen@tcmb.gov.tr

Abstract

Investigation of the sources of unemployment fluctuations has been a longstanding research objective. This line of research has attracted a great attention recently, because, as Shimer (2012) has confirmed that the celebrated Mortensen-Pissarides equilibrium search and matching model fails to explain the observed unemployment fluctuations for the USA. The aim of this study is to reexamine the flows into/out of unemployment by following Sider (1985) and Baker (1992) in order to find out whether Shimer's results are still valid from a different perspective. Using the 1996–2012 data, we show that the heterogeneity hypothesis is still rejected but the degree of co-movement between the rate of unemployment and the aggregate expected duration is somewhat weaker, which casts doubt on Shimer's conclusions.

Keywords: Heterogeneity hypothesis, unemployment duration, business cycles.
JEL codes: J6, E32.

1. Introduction

Investigation of the sources of unemployment fluctuations has been a research objective for a long time. This line of research has attracted a great attention recently, because, as Shimer (2012) has confirmed that the celebrated Mortensen-Pissarides equilibrium search and matching model cannot explain the observed unemployment fluctuations for the USA. Knowing the exact sources of fluctuations would provide empirical guidance on how to modify the model and obtain the

results that can be empirically proven. It is also important for practical and policy purposes, aside from the theoretical concerns.

Kiefer (1988) suggests that unemployment rate reflects both the incidence-occurrence of unemployment and duration of unemployed individuals. This indicates that the number of individuals and unemployment duration are the main determinant factors of unemployment rate. The main question in the literature is "Which factor is the main determinant of fluctuations of unemployment: Is the unemployment incidence or unemployment duration?" The variation in the number of unemployed, or the pool of unemployed, is mostly caused by the variations of exit from employment to unemployment. The variation in unemployment duration is, on the other hand, closely linked to exit from unemployment to employment. This is due to the fact that longer durations reflect lower job finding probabilities while the shorter durations reflect higher job finding probabilities. To illustrate, an individual who has high job finding probability doesn't wait for a long time to find a job. Therefore the exit from and entry into unemployment are at the center of the debate in the literature.

The most of the empirical studies in the literature confirm that average unemployment duration exhibits countercyclical variation. There are two opposite views explaining this reality. The first view suggests that average unemployment duration fluctuates but this fluctuation is caused by the variations in the compositions of the pool of unemployment [see Darby, Haltiwanger, and Plant (1986)]. It means that unemployment duration at individual level doesn't fluctuate but the pool of unemployment changes. The second, and opposite, view suggests that the variations in average unemployment duration reflect the changes in unemployment durations of individuals, and account for the most of the fluctuations of unemployment rate [see Sider (1985), Baker (1992), Shimer (2005) and Shimer (2012)]. This result is closely linked to theoretical literature, since the magnitude of the variation of unemployment duration is beyond the predictions of Search Models.

The studies in the literature analyzing the unemployment fluctuations mainly focus on the USA case. Early papers from this literature [see, for example, Darby, Haltiwanger, and Plant (1985)] argue that the rate of unemployment fluctuates mainly because of compositional effects in the USA. At the center of this argument lies the perception that job finding and exit probabilities are different across different groups in the worker population. The main idea is that the group-level job finding and/or exit probabilities do not change, but the composition of groups in the pool of unemployed varies over the business cycle, which is claimed to be the main reason behind unemployment fluctuations. This assertion is called the heterogeneity hypothesis in the macro-labor literature.

Papers including Sider (1985), Baker (1992), and Shimer (2012), on the other hand, have argued that the heterogeneity hypothesis is not valid empirically and the

rate of unemployment fluctuates mainly because of fluctuations in the exit from unemployment in the USA. More precisely, Shimer (2012) has explicitly documented using both macro- and micro-level evidence that "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" since 1948. This result is in stark contrast with the conventional wisdom arguing that "the amplitude of fluctuations in the flow out of employment is larger than that of the flow into employment" [see Blanchard and Diamond (1990)]. A further implication of this conventional view is that the amplitude of the underlying fluctuations in job destruction is larger than that of job creation [Davis and Haltiwanger (1990, 1992) and Davis, Haltiwanger and Schuh (1996)]. This implication has motivated a large volume of subsequent research starting with Mortensen and Pissarides (1994), whose model predicts—after feeding this implication in—that the employment exit probability should be significantly more volatile than the probability of job finding. Shimer argues that his results contradict the conventional wisdom that has guided the development of macroeconomic models of the labor market since 1990.

The cyclicality of unemployment duration variable has also some implications for the positive and negative duration dependence. Duration dependence is the positive or negative relationship between the hazard rate and unemployment duration. Positive duration dependence suggests that an increase in duration of unemployment increases the hazard rate. Negative duration dependence indicates that an increase in the time spend in unemployment decreases exit rate from unemployment [see Van den Berg and Van Ours (1996)]. Quality of workers, seasonal factors, characteristics of labor market, and business cycle effects play important role in the relationship between the hazard rate and unemployment duration. The strong correlation between unemployment duration and unemployment incidence may implicate that there is negative duration dependence since in the long durations unemployment rate is higher and exit rate is lower. Abbring, Van den Berg and Van Ours (2001) suggest that the about half of the fluctuations of the unemployment rate is explained by the fluctuations in unemployment rate. They also find that in long durations exit rates are lower, which indicates negative duration dependence.

The aim of this study is to reexamine the flows into/out of unemployment by following Sider (1985), and Baker (1992) in order to find out whether Shimer's results are still valid from a different perspective. Our purpose is to check the validity of Baker's results and then extend his analysis using the most recent data. We start our analysis by testing the validity of the heterogeneity hypothesis using the most recent CPS data. We build on the empirical framework developed by Baker, who analyzes the CPS data for the 1980–1989 period and rejects the

heterogeneity hypothesis in the United States. Most importantly, he shows that the rate of unemployment moves closely with the aggregate duration of unemployment, which suggests that cyclicality in the job finding probability, is the major determinant of unemployment fluctuations. Using the 1996–2012 data, we show that the heterogeneity hypothesis is still rejected but the degree of co-movement between the rate of unemployment and the aggregate expected duration is somewhat weaker, which casts doubt on Shimer's conclusions.

The study is planned as follows. In Section 2, the model accounting for the average unemployment duration depending on the unemployment continuation probabilities is presented. In Section 3, the characteristics of the data set are explained. In Section 4, the details of the estimation process is provided. In Section 5, the estimation results are exposed. The study ends with conclusion at section 5.

2. Model

Sider (1985) and Baker (1992) are followed to explain the relationship between the unemployment duration and unemployment rate. Average unemployment duration is determined by the number of individuals experiencing unemployment and the unemployment spells of these individuals. We describe $f_i(x,t)$ as conditional probability that group i's unemployment duration of x-1 month goes on xth month at time t. The summation of this continuation probability and the corresponding exit probability equals to unity. This continuation probability is represented in equation (1). $N_i(\mathrm{x},t)$ in equation (1) is the number of individuals whose unemployment duration is x month at time t. Equation (2) represents the sample estimate of the continuation probability. $n_i(\mathrm{x},t)$ is the sample estimate of $N_i(\mathrm{x},t)$. Equation (3) represents the average unemployment duration as a function of the number of unemployed people and unemployment duration. $n(0)$ is the cohort that just entered unemployment at time t.

$$f_i(x,t) = \left(\frac{N_i(\mathrm{x},t)}{N_i(\mathrm{x}-1,t-1)} \right) \tag{1}$$

$$\widehat{f_i}(x,t) = \left(\frac{n_i(\mathrm{x},t)}{n_i(\mathrm{x}-1,t-1)} \right) \tag{2}$$

$$D_i = \sum_{x=1}^{n} \frac{x\big(n_i(x-1,t) - n_i(x,t)\big)}{n_i(0)} \tag{3}$$

This summation at time t equals to:

$$= \frac{n_i(0)}{n_i(0)} + \frac{n_i(1,t)}{n_i(0)} + \frac{n_i(2,t)}{n_i(0)} \qquad \cdots\cdots$$

$$= \sum_{x=0}^{n} \frac{n_i(x,t)}{n_i(0)}$$

When we substitute the continuation probability designed for the integers of x expressed in Equation (2) into equation (3) we have equation (4)

$$D_i = 1 + f_i(1,t) + f_i(1,t)f_i(2,t) + f_i(1,t)f_i(2,t)f_i(3,t) + \cdots \qquad (4)$$

The model gives an opportunity to find out average unemployment duration by observing the incomplete unemployment spells. Completed unemployment spell, which is defined as the unemployment duration of an individual from the beginning of unemployment to the time when the individual gets a job, is not available in the most of the data sets since it requires information on the time when individual finds a job. This is a very hard task. The individuals should be interviewed very frequently in order to observe the time when the individual finds job. Data sets are generally created in a manner that the individuals are interviewed by yearly, monthly or, at best, weekly intervals. Thus, the accurate completed unemployment duration information doesn't exist in the most of the population surveys. This problem, regarded as right censoring in the literature, is one of the major problems in unemployment duration studies.

The incomplete spell problem is coped with by the use of the model represented by the equations above since incomplete spells can be translated into completed spells in the model. Exit probabilities can also be calculated by subtracting the continuation probabilities from unity. Then, it is possible to compute the share of individuals who exit unemployment after a specific time period. Multiplying this share with the spell length gives us the information on average duration of unemployment.

The steady state assumption can be introduced into the model. A benefit of the steady state assumption is that the model can be estimated by using cross sectional data sets. Panel data is not required to estimate a steady state model since we assume that the continuation probabilities are constant in time, as Sider (1985) suggests. Therefore, steady state models provide an ease in data issues.

The assumption that the unemployment continuation probabilities remain the same in time gives an opportunity to calculate total unemployment based on the average unemployment duration. Steady state assumption requires that the level of unemployment in each period is based on the initial cohort, $N(0)$. We reorganize equation 2 to capture steady state assumption which can be seen from Equation (5) and (6)

$$U = N(0) + N(0)f(1,t) + N(0)f_i(1,t)f_i(2,t) + \cdots \quad (5)$$

$$U = N(0)[1 + f(1,t) + f_i(1,t)f_i(2,t) + \cdots]$$

$$U = DN(0). \quad (6)$$

However, steady state assumption can lead to some problems. Estimation of a steady state model with a cross sectional data sets can provide biased results, as Sider (1985) argues. In the recessions, short unemployment spells dominate the cross sectional data, which can lead to underestimate the average unemployment duration. On the other hand, in expansions, when unemployment rate diminishes, long unemployment spells dominate the data, which can result in over estimating the average unemployment duration.

Non-steady state model is preferred in this study not only for getting unbiased results but also for observing the cyclical features of unemployment duration. Equation (4) doesn't impose steady state assumption. Therefore, in the study, the fluctuations in unemployment duration and its relationship with the unemployment fluctuation are analyzed by using a dynamic model in which continuation probabilities are allowed to change in time.

3. Data

The monthly Current Population Survey (CPS) data of the USA is used in all calculations and estimations performed in the study. The CPS dataset is designed by Bureau of Labor Statistics (BLS) of the United States in order to collect information on the labor market and earnings of the US population. Bureau of Labor Statistics releases technical papers to provide detailed information on the CPS data sets [see U.S. Bureau of Labor Statistics (2002) and U.S. Bureau of Labor Statistics (2006)].

On average, 60,000 households are surveyed in every month. The survey consists of rotational groups interviewed for a consecutive 4 months before a break of 8 months, and re-interviewed 4 months following the break. Therefore, they are in the sample for 8 months, the fifth month representing the first month after the break.

We follow outgoing rotation groups for tracking a person from month to month in order to observe the transition between unemployment duration categories, and labor market status categories. We match the individuals from one month to the next by using household id numbers, individual line numbers, and the variables of personal characteristics such as sex, age, and race, since an individual identification number is not provided in the original dataset.

Our dataset captures two distinct periods, the first period is from January 1980 to December 1988 and the second period is from January 1996 to February 2012.

The dataset consists of individuals from the civilian non-institutional population between age 16 and 64. The CPS data contains information on the person, person's family, and person's household. We follow the person's record in order to get information on the labor market status, and unemployment duration of the individuals.

CPS has witnessed some changes in the period we consider. 1989, 1992, 1994, and 1995 are the years when the definition and calculation of some major variables has changed. These changes are taken into account in the design of our sample. The main important change in CPS is on the calculation of unemployment duration variable. The individuals are asked to announce their unemployment duration every month when they are in the sample before 1994, while they are only asked unemployment duration in the first and fifth months of eight months when they are in sample after the change in 1994. Unemployment duration variable is calculated automatically by adding 4 weeks to previous month's duration in the following months after the change in 1994. The redesign of unemployment duration variable has influenced the measure of short term unemployment significantly. The individuals who were recorded as unemployed previous month, but employed at any time period until the next survey date, and become unemployed again after a short term job experience, are added to short term unemployment since their job experience are taken into account in calculation of unemployment duration. The individuals are not asked to announce their duration of unemployment apart from the first and fifth month after the redesign. The unemployment duration of individuals who are unemployed in previous month and, employed at any time period to be unemployed again until the next survey date is updated by adding four months to the duration of previous month. This means that the individuals experiencing short term transitions to employment between two survey dates are not taken into account in measuring the short term unemployment in the post 1994 period. We take the redesign of the CPS into account for the estimation process by assessing the design as a benchmark in Section 4. We adjust the unemployment duration data by adding 4 weeks to the weeks announced in individual's first month in sample. The statistics provided below are from the original duration variable given by BLS. The effect of CPS redesign is clear from Table 2 and Table 3 below. The shares of low duration categories in the period from 1980 to 1989 are considerably higher than the shares of these duration categories in the period from 1996 to 2012. On the other hand, the opposite is true for the shares of long durations.

Another problem in the data that should be taken into account for the estimation procedure is the digit preference problem. Digit preference problem is due to the tendency of individuals to declare their weekly duration by rounding actual duration to closest integer month. The solution to this problem will be explained in the estimation procedure.

Table 1
Unemployment Duration in the Period between 1980 and 1989

Duration Category	Total	Male	Female
0-4 week	0.475	0.411	0.37
5-8	0.177	0.181	0.175
9-12	0.09	0.093	0.102
13-26	0.156	0.138	0.17
27-52	0.097	0.08	0.112
53+	0,055	0.037	0.071

Notes: The average percentages of the unemployment duration categories announced by the individuals surveyed in CPS data for the period from January 1980 to December 1988.

Table 2
Unemployment Duration in the Period between 1996 and 2012

Duration Category	Total	Male	Female
0-4 week	0.315	0.325	0.307
5-8	0.15	0.154	0.146
9-12	0.104	0.104	0.104
13-26	0.185	0.182	0.187
27-52	0.138	0.135	0.14
53+	0,105	0.1	0.116

Notes: The average percentages of the unemployment duration categories announced by the individuals surveyed in CPS data for the period from January 1996 to December to February 2012.

4. Estimation Procedure

The model is used to estimate the expected unemployment duration and continuation probabilities for certain specific groups. These groups are constructed according to the sex, age, race, education, and the unemployment status of individuals. Separating population to certain specific groups contributes to analyze the difference in the duration behavior caused by heterogeneity is examined.

The synthetic cohort approach of Baker (1992) is followed in order to estimate the expected average unemployment duration. $\hat{f}_i(x,t)$ is regarded as the demographic group i's probability to continue unemployment after x period of unemployment in time t. i denotes the specific group of individuals. The estimated expected unemployment duration as a function of estimated continuation probabilities is presented in Equation (7).

$$\widehat{D}_i(t) = 1 + \hat{f}_i(1,t) + \hat{f}_i(1,t)\hat{f}_i(2,t) + \hat{f}_i(1,t)\hat{f}_i(2,t)\hat{f}_i(3,t) + \cdots \qquad (7)$$

Baker (1992) is followed in order to estimate the relationship between unemployment rate and duration for the whole population and for the sub-groups constructed according to sex, age, by reason for unemployment, and education. $\hat{f}_i(1,t), \hat{f}_i(2,t), \hat{f}_i(3,t), \hat{f}_{i_i}(4-6,t), \hat{f}_i(7-12,t), \hat{f}_i(13-24,t)$ are the estimated probabilities for group i. $\hat{f}_i(1,t)$ denotes the ratio of the number of the individuals with $5-8$ weeks of duration in time t to the number of the individuals with $0-4$ weeks in time $t-1$. $\hat{f}_i(2,t)$ denotes the ratio of number of individuals with $9-12$ weeks of duration in time t to the number of the individuals with $5-8$ weeks of duration in time $t-1$. $\hat{f}_i(3,t)$ shows the ratio of the number of the individuals with $13-16$ weeks of duration in time t to the number of individuals with $9-12$ weeks of duration in time $t-1$. Similarly, $\hat{f}_i(4-6,t)$ represents the ratio of the number of the workers with $27-39$ weeks of duration in time t to the number of the individuals with $13-26$ weeks of duration in time $t-3$. $\hat{f}_i(7-12,t)$ shows the ratio of the number of individuals with $53-78$ weeks of duration in time t to the number of individuals with $27-52$ weeks of duration in time $t-6$. $\hat{f}_i(13-24,t)$ represents the ratio of the individuals with $100+$ weeks of duration in time t to the number of the individuals with $53-99$ weeks in $t-12$.

This relationship between unemployment duration and incidence and heterogeneity hypothesis are tested by employing the following econometric strategy. First, expected unemployment duration for each group is estimated using Current Population Survey (CPS) data for the 1980–1989 period. Then, the log of this group-level duration variable on seasonal dummies, a trend term, and the log of seasonally adjusted unemployment rate for the civilian non-institutional population. This regression is performed for each group. The reason of these regressions is to understand the degree of the correlation between the rate of unemployment and the group-level duration of unemployment, for each group. If these group-specific correlations are adequately close to each other, then one can conclude that compositional effects are not so important and, therefore, the heterogeneity hypothesis should be rejected. Baker rejects this hypothesis by showing that the group-level correlations are close to each other in reality. Although, the comparison among the estimation results of subgroups provides an idea about heterogeneity hypothesis, we conduct another regression, the details of which are explained in this section, in order to test heterogeneity hypothesis directly.

The model is estimated for two periods, as explained. First, the model is estimated for the period from 1980 to 1989, which is the same time period studied in Baker (1992), in order compare the findings, and check the sensitivity of the results to the random selection applied for the digit preference problem explained

below. Then, the model is estimated for the period from 1996 to 2012. This period is chosen due to the data discontinuities and matching problems occurred in the period from 1989 to 1996.

The procedure implemented in 1994 redesign is applied to the data from 1980 to 1989 in order to get rid of the difference between the periods from 1980 to 1989 and the period from 1996 to 2012. The duration in the first month of the interview is taken as the accurate information. The duration variable in the following three months are calculated by adding 4 weeks, 8 weeks and 12 weeks to the announced first month's duration respectively for estimation. The same procedure is applied to the period after the 8 months of break. The estimation for the period from 1980 to 1989 is conducted after this correction. Ignoring temporary job experiences in calculation of the duration variable is one of the most importing distinctions of our study from Baker's study. Differences in our and Baker's estimation results can to some extent be attributed to this distinction in calculation of duration variable.

Baker (1992) corrects for the digit preference problem explained in Section 3 by reallocating 30% of respondents at 4, 8, 12, 16, and 26 weeks, 40% of those at 52 weeks, and 50% of those at 78 and 99 weeks in each month of the sample to adjacent later weeks. It is not obvious from his study what kind of a reallocation strategy he follows. In particular, who are transferred to the adjacent months is not clear. The problem is that the group of workers who have announced, say, 4 weeks of unemployment duration is a mix of black/white, male/female, skilled/unskilled, married/nonmarried, urban/rural, etc. individuals. Some of the workers need to be moved to the 5 weeks category to smooth out the digit preference problem. But there is not a unique method to reallocate these workers. For example, one can utilize the population weights as the benchmark, while others may choose using the weights for those in the 4 week category only or just simply allocate them randomly. Each of these procedures will produce different results and we observe that Baker's findings are quite responsive to the choice of the allocation procedure.

We implement the following procedure in order to test directly whether the explanatory power of unemployment duration on unemployment rate is taken into account by variation in unemployment duration of the individuals or compositional effects. We weight continuation probabilities by the shares of each subgroup in population for each duration category in two different specifications. We first assume that the variation of the shares of each group is constant. This specification is called as shares constant (sc specification). In this specification, the group specific continuation probabilities are allowed to vary. Secondly, we allow the group specific probabilities to be constant over time while the shares of each subgroup in the population are allowed to fluctuate. This specification is called as pc specification since probabilities are assumed to be constant in this regression. Then, we conducted two separate regression to measure the explanatory power of

both specification on unemployment rate. If the heterogeneity hypothesis was true for the sample, we would expect that the parameter of the sc specification would be different from the results presented in Table 3. This is due to the fact that the weighted group specific probabilities are different when we assume that the shares are constant. This suggests that there are compositional effects deriving the relationship between unemployment duration and unemployment rate. The explanatory power of the probability of pc specification, on the other hand would give significant and similar results to the results represented in Table 3 if heterogeneity hypothesis was true.

$$f_{sc}(x,t) = \sum_{i=0}^{n} \overline{\left(\frac{n_i(\mathrm{x}-1)}{n\,(\mathrm{x}-1)}\right)} \widehat{f_i}\,(x,t) \tag{8}$$

$$f_{pc}(x,t) = \sum_{i=0}^{n} \left(\frac{n_i(\mathrm{x}-1,t-1)}{n\,(\mathrm{x}-1,t-1)}\right) \overline{f_i}(x,t) \tag{9}$$

The probability of sc specification is given by equation (8). The probability of pc specification is given in equation (9). In equation (8), $\overline{\left(\frac{n_i(x-1)}{n\,(x-1)}\right)}$ is the average value of the share of considered group over the sample. The probabilities are weighted by the average of the shares of the subgroups over the sample, in order to derive the variation that is only resulted by the variation of the probabilities of the groups. On the other hand the pc probability specification is given by equation (9) where $\overline{f_i}(x,t)$ shows the average of the probability of the group considered over the sample. We calculate two expected duration specifications based on the specifications explained above. Estimation results of pc specification are reported in the first rows of each decomposition in Table 4. Estimation results for the sc specification are shown in the second rows of each decomposition in Table 4.

To check the robustness of Baker's results, we integrate our estimations with a simple simulation exercise. We draw 30% of the individuals randomly (i.e., using a uniform assignment) from weeks 4, 8, 12, 16, and 26, 40% of those at week 52, and 50% of those at weeks 78 and 99 to corresponding adjacent weeks. Then, the model is estimated and estimates are recorded. We carry out this random assignment exercise 1000 times (independently) and save the estimates for each of the groups that Baker analyzes. By the law of large numbers, this mechanism is likely to produce a normal distribution of estimates for each worker group. Then we calculate the mean estimate over these 1000 trials. We compare these averages with Baker's estimates.

5. Estimation results

The estimates reported in the second and third columns of Table 3 are computed based on the simulation procedure. We then make a comparison of our findings in column two with Baker's findings in column one. The results are rather surprising (in a positive sense): that is, our simulation exercise produces results that coincide with Baker's findings.[1] We conclude that his estimates are to a certain extent robust to the potential problems that could arise from a mistreatment of the digit preference problem.

At the end, we conclude that the heterogeneity hypothesis is rejected for both 1980–1989 and 1996–2012 periods. This is in line with Baker's qualitative results. On the quantitative front, we find some notable discrepancies between two periods. Using Baker's method, we show that the degree of correlation between the duration of unemployment and the unemployment rate is weaker for the 1996–2012 period. Using another method, Shimer (2012) examines whether Baker's quantitative results hold more generally for the 1948–2010 period and shows that Baker's quantitative findings are strongly valid. He emphasizes that this result is even more powerful for the 1990–2010 period. Unlike Shimer, we demonstrate that the strength of Baker's findings has undermined during the last two decades. The difference between our work and Shimer's is that we directly use Baker's method, while Shimer develops a method based on solving a differential system of unemployment dynamics. The gap between our and Shimer's results calls for additional empirical work in this literature.

[1] There are a few differences between Baker's and our estimates especially for small (non-core) worker groups such as female 16-24, black females, and male 45-64. For all of these groups, our estimates are closer to the general tendency than Baker's estimates. Data availability is rather scarce for these groups. So, lower estimates reported by Baker may be due to a mistreatment of the digit preference problem for these groups. In any case, our estimates are even stronger and reinforce Baker's results.

Table 3
Estimation Results of General Model

Category	Baker	1980-89	1996-2012
Aggregate	0.619***	0.625***	0.434***
	(0.065)	(0.121)	(0.089)
Labor Market Status			
Job Losers	0.719***	0.805***	0.514***
	(0.156)	(0.153)	(0.108)
Layoffs	0.212	0.23	0.116*
	(0.224)	(0.478)	(0.089)
Quits	0.544***	0.562***	0.327 ***
	(0.193)	(0.140)	(0.107)
New entrants	0.516***	0.562***	0.327***
	(0.223)	(0.140)	(0.107)
Re-entrants	0.397***	0.629***	0.434***
	(0.095)	(0.128)	(0.089)
Gender & Race			
White-Males	0.672***	0.78***	0.456***
	(0.121)	(0.144)	(0.085)
White Females	0.552***	0.507***	0.362***
	(0.08)	(0.109)	(0.091)
Non-white males	0.703***	0.630***	0.525***
	(0.281)	(0.154)	(0.144)
Non-white females	0.249***	0.476***	0.456***
	(0.199)	(0.165)	(0.119)
Gender& Education			
Males 0-12 years	0.622***	0.613***	0.442***
	(0.135)	(0.170)	(0.091)
Females 0-12 years	0.491***	0.520***	0.370***
	(0.086)	(0.143)	(0.106)
Males 13 years & above	0.876***	0.822***	0.509***
	(0.184)	(0.131)	(0.105)
Females13 years & above	0.529***	0.582***	0.426***
	(0.172)	(0.122)	(0.094)
Gender & Age			
Males 16-24	0.689***	0.663***	0.348***
	(0.118)	(0.169)	(0.084)
Females 16-24	0.251***	0.510***	0.293***
	(0.090)	(0.118)	(0.083)
Males 25-44	0.706***	0.812***	0.475***
	(0.178)	(0.167)	(0.101)
Females 25-44	0.655***	0.446***	0.423***
	(0.133)	(0.123)	(0.108)
Males 45-64	0.296***	0.667***	0.577***
	(0.283)	(0.223)	(0.123)
Females 45-64	0.62***	0.613***	0.442***
	(0.291)	(0.171)	(0.130)

Notes: Following Baker's methodology, CPS rotation groups are used to construct the variables in all estimates. The first column is directly taken from Baker (1992). The second and third columns report our narrow results for the 1980–1989 period and the results for 1996–2012 period, respectively. Our estimation results are based on our simulations as we describe above (i.e., each cell reports the mean of the 1000 estimates for the corresponding group). Standard errors are reported in parenthesis. *** indicates the variable is significant at 1%, and * indicates the variable is significant at 5% significance level.

On the quantitative side, the key issue is the magnitude of these correlations. Baker shows that, on aggregate and for almost all subgroups, a 10% increase in the rate of unemployment is associated with approximately 6–7% increase in the duration of unemployment (see the first column in Table 3).[2] This result implicates that, for the 1980–1989 period, the duration of unemployment and the unemployment rate are positively correlated and the degree of this correlation is quite high in the United States. An immediate implication is that the main determinant of unemployment fluctuations is the cyclical movement of the job finding probability.[3] In other words, a big chunk of the fluctuations in the rate of unemployment comes from the countercyclical variation in the duration of unemployment, which is a fact that invariably holds for almost all subgroups in the worker population. This suggests that procyclicality of job finding probability (rather than heterogeneity) is the major determinant of unemployment fluctuations in the United States. Recent findings by Shimer (2012) support Baker's results.[4]

Using the estimation/simulation strategy described above, our results are in line with Baker's original results both qualitatively and quantitatively (see the second column in Table 3). We also check if his results hold for the 1996–2012 period. We find that the extended results hold qualitatively, while the quantitative results are somewhat weaker. In other words, the heterogeneity hypothesis is still rejected since the estimated correlations are similar across worker groups; but, the magnitudes of the correlations for the period 1996–2012 are significantly lower than the correlations estimated for the 1980–1989 period. More specifically, we find that a 10% increase in the unemployment rate is associated with around 4.3% increase in the duration on unemployment in this more recent period (see the third column in Table 3.

[2] The response of duration ranges between approximately 2% and 8%, but it is clear that the estimates for the core groups concentrate around 6-7%.

[3] The logic is as follows: if the entry rate were the dominant factor, then this would create a downward pressure on the correlation between the duration variable and the rate of unemployment.

[4]. For arguments againts Shimer's findings, see Fujita and Ramey (2009).

Table 4
Estimation Results of PC and SC Specifications

+ Labor Market Status	Baker	1980-89	1996-2012
PC Specification	0.045***	0.002	-0.006
	(0.008)	(0.002)	(0.006)
SC Specification	0.529***	0.495***	0.455***
	(0.075)	(0.065)	(0.107)
Gender & Race			
PC Specification	0.002	0.0018	-0.009***
	(0.004)	(0.003)	(0.001)
SC Specification	0.589***	0.607***	0.392***
	(0.072)	(0.120)	(0.092)
Gender& Education			
PC Specification	0.007	0.008	0,002
	(0.003)	(0.004)	(0.003)
SC Specification	0.552***	0.631***	0.410***
	(0.08)	(0.138)	(0.092)
Gender & Age			
PC Specification	0.017***	0.019	0.015
	(0.06)	(0.06)	(0.003)
SC Specification	0.584***	0.591***	0.414***
	(0.075)	(0.120)	(0.091)
Industry			
PC Specification	0.009	0.001***	0.004
	(0.007)	(0.003)	(0.003)
SC Specification	0.567	0.598	0.614***
	(0.078)	(0.129)	(0.18)
Region			
PC Specification	-0.001	0.07***	0.0004
	(0.002)	(0.009)	(0.0006)
SC Specification	0.619***	0.611***	0.401***
	(0.070)	(0.081)	(0.091)

Standard errors are reported in parenthesis. *** indicates the variable is significant at 1%, and * indicates the variable is significant at 5% significance level. Parameters that have no star are not significant.

Table 4 shows the estimation results of pc and sc models. The estimation results of sc specification for the 1980-89 period is very close to Baker's results for all decompositions. Estimation results of pc specification for 1980-89 period are similar to Baker's results for the gender-age, gender-race, gender-education decompositions. However, our estimation results of pc specification differ from

Baker's results for region and reason for unemployment decompositions . The estimated parameter of pc specification for regional decomposition is significant while this parameter is insignificant in Baker's study. On the other hand, our estimated parameter of pc specification of reason for unemployment specification is insignificant while that parameter is significant in Baker's study.

Estimation results of sc specification are very close to estimation results of our main model for the subgroups in two periods. This can be seen by comparing Table 3 and Table 4. This indicates that the explanatory power of unemployment duration on unemployment rate is not changed when we assume that the shares are constant. Compositions of the pool of unemployed are not changed in our sample. Therefore, there is no strong evidence for heterogeneity hypothesis for 1980-1989 and 1996-2012 periods. Estimation results of pc specification also support this conclusion. The parameter is only significant for gender-race decomposition but the parameter is not close to its corresponding estimates of our main regression the results of which represented in Table 4.

6. Conclusion

These results are of great theoretical importance because it is well known that the canonical Mortensen-Pissarides equilibrium search and matching model is criticized based on Shimer's result that the cyclical variation in the flows out of unemployment is beyond the model predicts. This study shows that the cyclical variation in the flows out of unemployment is below the Shimer's findings. On the other hand, heterogeneity hypothesis is rejected. Integrating the results from two periods, we conclude that the major forces at work that influence unemployment fluctuations may be changing over the business cycle. The results cast suspicion on the emerging agreement in the literature that fluctuations in job finding probability are the main source of unemployment variations in the U.S. The studies generally suggest that the parameter of explanatory power of unemployment duration on unemployment rate is above fifty percent in this literature. This study has one of the lowest finding on this parameter for the period from 1996 to 2012. Although 0.43, may still be regarded as a somewhat strong correlation, such a magnitude implicates, focusing on a more contemporary data period, there is ample room for other factors to have strong explanatory power. For example, the transitions into inactivity from unemployment, especially in crisis times, may have reduced the explanatory power of unemployment duration on unemployment rate. This discouraged worker effect on the relationship between the unemployment rate and unemployment duration can be considered for the future research.

References

ABBRING, J. H., VAN DEN BERG, G. J. and VAN OURS, J. C. (2001), "Business Cycles and Compositional Variation in US Unemployment.", Journal *of Business & Economic Statistics*, 19(4), 436-448..

BAKER, M. (1992), "Unemployment Duration: Compositional Effects and Cyclical Variability", *The American Economic Review*, 82(1), 313-21.

BLANCHARD, O. J., DIAMOND, P., HALL, R. E. and MURPHY, K. (1990), "The Cyclical Behavior of the Gross Flows of US workers", *Brookings Papers on Economic Activity*, 1990(2), 85-155.

DARBY, M. R., HALTIWANGER, J. and PLANT, M. W. (1985), "Unemployment Rate Dynamics and Persistent Unemployment under Rational Expectations", *The American Economic Review*, 75(4), 614-637.

DARBY, M. R., HALTIWANGER, J. and PLANT, M., W. (1986), "The Ins and Outs of Unemployment: the Ins Win", *NBER Working Paper*, w1997.

DAVIS, S. J., HALTIWANGER, J. (1990), "Gross Job Creation and Destruction: Microeconomic evidence and macroeconomic implications", *NBER Macroeconomics Annual, 5,MIT Press*, 5, p. 123-186.

DAVIS, S. J., HALTIWANGER, J. (1992), "Gross Job Creation, Gross Job Destruction, and Employment Reallocation", *The Quarterly Journal of Economics*, 107(3), 819-863.

DAVIS, S. J., HALTIWANGER, J. and SCHUH, S. (1996), "Small business and job creation: Dissecting the myth and reassessing the facts", *Small business economics*, 8(4), 297-315.

FUJITA, S. and RAMEY, G. (2009), "The Cyclicality of Seperation and Job Finding Rates", *International Economic Review*, 50(2), 415-430.

KIEFER, N. M. (1988), "Economic Duration Data and Hazard Functions", *Journal of economic literature*, 26(2), 646-679.

MORTENSEN, D. T. and PISSARIDES, C. A. (1994), "Job Creation and Job Destruction in the Theory of Unemployment." *The review of economic studies*, 61(3), 397-415.

SIDER, H. (1985), "Unemployment Duration and Incidence: 1968-82", *The American Economic Review*, 75(3), 461-472.

SHIMER, R. (2005), "The Cyclical Behavior of Equilibrium Unemployment and Vacancies", *American economic review*, 95(1), 25-49.

SHIMER, R. (2012), "Reassessing the Ins and Outs of Unemployment", *Review of Economic Dynamics*, 15(2), 127-148.

U.S. BUREAU OF LABOR STATISTICS and U.S. CENSUS BUREAU (2002), "Technical Paper 63: Current Population Survey--Design and Methodology"

U.S. BUREAU OF LABOR STATISTICS, U.S. CENSUS BUREAU (2006), "Technical Paper 66: Current Population Survey--Design and Methodology"

VAN DEN BERG, G. J. and VAN OURS, J. C. (1996), "Unemployment dynamics and duration dependence", Journal *of Labor Economics*, 14(1), 100-125.

Özet

İşsizlik dinamiklerinde heterojenlik hipotezinin yeniden değerlendirilmesi

İşsizlik dalgalanmalarının açıklanması uzun süreli bir araştırma hedefidir. Araştırmanın bu yönü son zamanlarda, Shimer'ın (2012) Mortensen-Pissarides Denge Arama ve Eşleştirme Modeli'nin gözlemlenen işsizlik dalgalanmalarını açıklamakta başarısız olduğunu kanıtlamasıyla, büyük ilgi çekmiştir. Bu çalışmanın amacı, Sider (1985) ve Baker'ı (1992) takip ederek, işsizlikten dışarı ve işsizlik içersine olan dalgalanmaları yeniden değerlendirerek, Shimer'ın sonuçlarının, farklı bir bakış açısından, hala geçerli olup olmadığını öğrenmektir. 1996 ve 2012 yılları arasındaki veriyi kullanarak, heterojenlik hipotezinin hala geçersiz olduğunu fakat işsizlik ve ortalama işsizlik süresi arasındaki karşılıklı etkileşim düzeyinin, Shimer'ın sonuçları üzerinde bir şüphe oluşturacak şekilde, güçsüzleştiğini gösterdik.

Anahtar kelimeler: Heterojenlik hipotezi, işsizlik süresi, çevrimsel dalgalanmalar.

JEL kodları: J6, E32.