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The Recent Rise in Youth Unemployment Rate in Korea: A Flow Decomposition Analysis*

Jiwoon Kim**

This study quantifies the contribution of labor market transition rates to the rise in youth (20–29 years old) unemployment rate in Korea during 2012–2017. Under the assumption that there was no entry into or exit from the labor force, decreasing job-finding rates and increasing job-separation rates account for 2.82%p and 0.02%p of the increase in youth unemployment rate during 2012–2017 (2.47%p). The two-state analysis shows that a falling job-finding rate serves as the main factor for the rise in youth unemployment rate. When entry into or exit from the labor force is explicitly considered, the increase in youth unemployment rate can be mainly attributed to the decline in transition rate from the unemployed to the employed and that from the "not in the labor force" (NILF) to the employed, with the impact of the former double that of the latter. The results of the three-state analysis are similar to those of the two-state analysis. The decrease in transition rate from the unemployed and NILF to the employed was the main factor in the rise in youth unemployment rate during 2012–2017.

JEL Classification: E24, J6
Keywords: Youth Unemployment Rate, Labor Market Transition, Flow Decomposition, Korea

I. Introduction

This study quantifies the contribution of labor market transition rates to the rise in youth unemployment rate in Korea during 2012–2017 to provide policy implications for reducing the level of youth unemployment rate. In this study, youth age is defined as 20–29 years old, although the International Labour Organization defines youth age as 15–29 years old. As shown in the left panel of Figure 1, the

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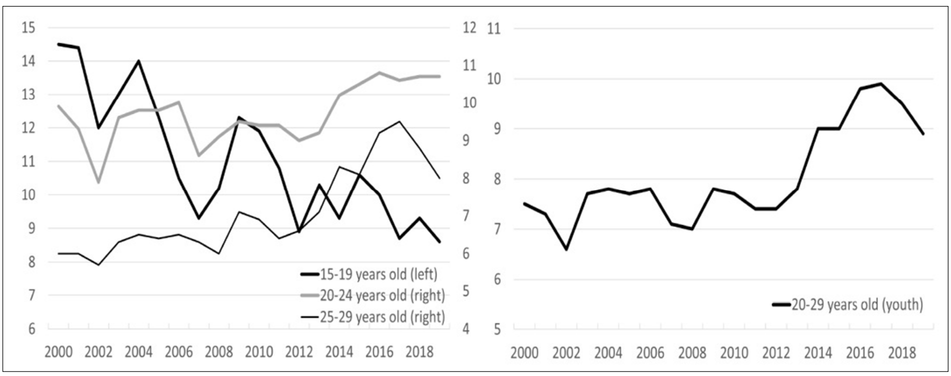
** Assistant Professor, School of Economics, Hongik University, 94 Wausan-ro, Mapo-gu, Seoul 04066, Korea, E-mail: jwkim@hongik.ac.kr

unemployment rate for those 15–19 years old in Korea is on the decline. Therefore, the analysis in this study is limited to individuals 20–29 years old who have recently experienced rapid increases in unemployment rate. In 2017, the youth (20–29 years old) unemployment rate in Korea was 9.9%, the highest level since 2000. As shown in the right panel of Figure 1, youth unemployment rate maintained a constant level (about 7.4%) until 2012. However, it rose rapidly since then and reached a peak in 2017. Although youth unemployment rate has fallen slightly in recent years, it is still far above the historical average. In response to this youth unemployment problem, the government prepared an additional budget worth 2.8 trillion won in April 2018.

[Figure 1] Youth Unemployment Rate in Korea

(Unit: %)



Sources: EAPS, 2000-2019, Statistics Korea.

Unemployment rate is determined by six labor market transition paths: inflows into unemployed (transition from employed to unemployed and transition from "not in the labor force" (NILF) to unemployed), outflows from unemployed (transition from unemployed to employed and transition from unemployed to NILF), and others (transition from employed to NILF and transition from NILF to employed).

The policy direction to reduce youth unemployment rate varies greatly depending on which of the six labor market transition paths the rise in youth unemployment rate is mainly due to. For example, if the recent rise in unemployment rate is mainly caused by a decrease in the transition from unemployed to employed, then it is necessary to focus on policy support to increase the job-finding probability of the unemployed. Suppose the increase in the transition from employed to unemployed is the main cause of the increase in youth unemployment rate. In that case, efforts to lower the job-separation probability through resolving the mismatch and providing education and training will be necessary depending on whether the cause of job loss is voluntary or involuntary.

On the other hand, if the increase in the transition from NILF to unemployed is the leading cause of the increase in youth unemployment rate, then the rise in youth unemployment rate can be interpreted as a positive phenomenon.

The main contribution of this paper is in decomposing the increase (2.47%p) in youth unemployment rate in Korea during the period 2012–2017 into the contribution of labor market transition rates. This decomposition provides useful policy implications for lowering the level of youth unemployment. Previous studies in Korea mainly analyze the contribution of labor market transition paths to the volatility in youth unemployment rate over business cycles, an approach that is different from the present study. Nam and Lee (2012), Park (2014), and Han and Kim (2019) examine the contribution of labor market transition paths to the volatility of the detrended youth unemployment rate in Korea.[1] However, they do not investigate trend changes in the youth unemployment rate. Therefore, their studies can draw useful policy implications for reducing the volatility of the unemployment rate, but these are not suitable for suggesting a policy to lower the level of unemployment rates. This study quantifies the contribution of labor market transition paths to the trend change in youth unemployment rate, because its purpose is to analyze the factors that contributed to the increase in the level, not the volatility, of youth unemployment rate during the period 2012–2017.

Similar to this study, Nam and Rhee (1998) examine the main reason for the downward trend in total unemployment rate during the 1980s. They find that decreasing inflows (job-separation rates) drove the unemployment rate decline during the 1980s, though the size of the contribution is not quantified. Unlike their studies, this study deals with the recent increase in youth unemployment rate and explicitly quantifies the contribution of each labor market transition path to the rise in youth unemployment rate during 2012–2017.

To this end, in this study, the trend changes in actual youth unemployment rate are decomposed into the contribution of both the two and six labor market transition paths. Specifically, actual unemployment rate is approximated by the steady-state unemployment rate, and then the steady-state unemployment rate is expressed by its total derivative with respect to labor market transition rates. The difference in unemployment rate between specific points in time is expressed as a function of cumulative sums of each term in the total derivative. This approximation is essentially the same as that in Fujita and Ramey (2009), except for some time subscripts, where the change in steady-state unemployment rate is approximated by a log-linearization. Fujita and Ramey (2009) use the approximation equation to decompose the volatility of the detrended unemployment rate, whereas this study uses it to decompose the trend change in

[1] Han and Kim (2019) introduce in detail various previous studies that decompose the volatility of the unemployment rate over business cycles in terms of methodology and analysis results.

unemployment rate. Similar to Han and Kim (2019), a time-aggregation bias is carefully controlled when calculating the labor market transition rates, following the methodology of Shimer (2012).

Another contribution of this paper is that it examines the contribution of labor market transition paths to changes in the unemployment rate, including the NILF. Most studies examining unemployment rates in Korea do not explicitly consider the NILF. Although Kim and Lee (2014) and Han and Kim (2019) include the NILF in decomposing the volatility of unemployment rates, they do not decompose the trend change in unemployment rate and only cover periods before 2012. It is crucial to match the data of adjacent months in the Economically Active Population Survey (EAPS) to decompose the contribution of labor market transition paths, including the NILF, to changes in the unemployment rate. However, Statistics Korea does not provide key variables for linking adjacent monthly data in the EAPS. For this reason, it is difficult to link adjacent monthly data between individuals in the EAPS because of data limitations in Korea. Given the data limitations, this study links the adjacent monthly data in the EAPS by maintaining the sample representativeness despite the sample loss that inevitably occurred during the monthly consolidation of the EAPS data. This study also contributes to related previous studies in that it shows in detail the degree of sample representativeness and limitations in linking the EAPS without using household identifiers (ID) and household member ID.

This paper proceeds as follows. First, Section 2 analyzes the contribution of the two labor market transition paths, excluding the NILF, to the increase in youth unemployment rate in Korea during 2012–2017 by applying Shimer's (2012) methodology and the total derivative of the steady-state unemployment rate. Next, Section 3 quantifies the contribution of the six labor market transition paths, including the NILF, to the rise in youth unemployment rate during 2012–2017. Section 4 shows the decomposition results for other age groups than the youth. Finally, Section 5 summarizes the main results and concludes the paper.

II. Two-State Analysis

This section analyzes the contribution of the two labor market transition paths, excluding the NILF, to the increase in youth unemployment rate in Korea during 2012–2017 by applying Shimer's (2012) methodology and the total derivative of the steady-state unemployment rate. When the NILF is not taken into account, there is an advantage that the labor market transition rates can be calculated using Shimer's (2012) methodology without linking adjacent monthly data in the EAPS.

2.1. Methodology

Let f_t and s_t be the instantaneous job-finding rate and instantaneous job-separation rate, respectively, at a specific time point t and follow a Poisson distribution. From a continuous-time perspective, unemployment dynamics are defined as follows:

$$\dot{U}_t = s_t(L_t - U_t) - f_t U_t = s_t E_t - f_t U_t \tag{1}$$

where L_t, E_t, and U_t denote the number of labor force, employed, and unemployed, respectively. The instantaneous change in the number of unemployed is equal to the number of employed who become unemployed ($s_t E_t$) minus the number of unemployed who become employed ($f_t U_t$). In the above unemployment dynamics, time-aggregation bias does not occur in calculating the job-finding rate (f_t) and job-separation rate (s_t) since time is assumed to be continuous. Time-aggregation bias[2] refers to the bias in which flows occurring between two adjacent surveys are omitted.

Shimer (2012) develops a novel method to calculate the instantaneous job-finding rate and job-separation rate without time-aggregation bias using the number of short-term unemployed. Specifically, the monthly job-finding rate between periods t and $t+1$ without time-aggregation bias can be calculated by the number of newly unemployed people between periods t and $t+1$ and the short-term unemployed whose duration of unemployment is less than one month (U^s_{t+1}) as follows:[3]

$$F_t = 1 - \frac{U_{t+1} - U^s_{t+1}}{U_t} \tag{2}$$

where U^s_{t+1} denotes the number of newly unemployed people between periods t and $t+1$. U^s_{t+1} includes the unemployed who were employed and then re-unemployed between periods t and $t+1$.[4] $U_{t+1} - U^s_{t+1}$ denotes the number of unemployed people who have never been employed between periods t and $t+1$

[2] Suppose an individual A, who was classified as employed in the January and February surveys of the EAPS, experienced brief unemployment between the January survey and the February survey. In this case, the labor market status of A will be recorded as "employed → employed" based on the survey data. However, the actual labor market transition is "employed → unemployed → employed," resulting in an error in calculating labor market transition.

[3] Please refer to Shimer (2012) for the detailed derivation of Equation (2).

[4] For example, U^s_{t+1} includes a sample surveyed as unemployed in period $t+1$ who was unemployed in period t but employed for a short time between period t and $t+1$ and then lost a job again.

as it eliminates movements between survey periods that cause time-aggregation bias. $1-F_t$ means the probability of never finding a job between periods t and $t+1$. Therefore, F_t stands for the job-finding probability in which time-aggregation bias is corrected between the periods.

Since the instantaneous job-finding rate (f_t) follows a Poisson distribution, it can be calculated from the corrected job-finding probability (F_t) as follows:

$$f_t = -\ln(1-F_t) \tag{3}$$

By solving the differential equation for the unemployment dynamics and approximating it in discrete-time form, the following equation can be obtained:[5]

$$U_{t+1} = (1-e^{-f_t-s_t})\frac{s_t}{s_t+f_t}L_t + e^{-f_t-s_t}U_t \tag{4}$$

The unemployed (U_t) and labor force (L_t) can be calculated using the monthly EAPS data. Given U_t, U_{t+1}, L_t, and the already calculated job-finding rate (f_t) in Equation (3), instantaneous job-separation rate (s_t) can be calculated using Equation (4). Finally, monthly job-separation probability (S_t) can be calculated as follows:

$$S_t = 1-e^{s_t} \tag{5}$$

Given instantaneous job-finding rates (f_t), job-separation rate (s_t), and the assumption that the labor force remains unchanged, the unemployment dynamics in Equation (1) can be transformed into the unemployment rate (u_t) dynamics as follows:

$$\dot{u}_t = s_t(1-u_t) - f_t u_t \tag{6}$$

Assuming that the actual unemployment rate (u_t) for each period is close to the steady-state unemployment rate ($\overline{u}_t$) for the period,[6] the actual unemployment rate for each period can be expressed as a function of the job-finding rate (f_t) and job-separation rate (s_t) as follows:

$$u_t \simeq \overline{u}_t = \frac{s_t}{s_t+f_t} \tag{7}$$

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[5] Please refer to Shimer (2012) for the detailed derivation of Equation (4).

[6] Indeed, when unemployment rate is calculated quarterly or annually, the actual unemployment rate and steady-state unemployment rate are very similar.

By taking the total derivative of Equation (7) with respect to the job-finding rate (f_t) and job-separation rate (s_t), the change in unemployment rate (du_t) can be expressed as follows:

$$du_t = \frac{-s_t}{(s_t + f_t)^2} df_t + \frac{f_t}{(s_t + f_t)^2} ds_t \tag{8}$$

This equation is essentially the same as that in Fujita and Ramey (2009), except for some time subscripts, where the change in steady-state unemployment rate is approximated by a log-linearization. Fujita and Ramey (2009) use the approximation equation to decompose the volatility of the detrended unemployment rate, whereas this study uses it to decompose the trend change in unemployment rate.[7]

If Equation (8) defined for a continuous variable is rewritten for a discrete variable, then the change in unemployment rate between two adjacent time points (Δu_t) can be represented as the sum of the parts related to the change in job-finding rate (Δf_t) and the change in job-separation rate (Δs_t) as shown below:

$$\Delta u_t = \frac{-s_t}{(s_t + f_t)^2} \Delta f_t + \frac{f_t}{(s_t + f_t)^2} \Delta s_t \tag{9}$$

Using Equation (9), the change in unemployment rate between two specific points in time ($t_1 > t_0$) can be decomposed into the contribution of the job-finding rate (Δu^f) and of the job-separation rate (Δu^s) as follows:

$$\begin{aligned} u_{t_1} - u_{t_0} &= \sum_{i=t_0+1}^{t_1} \Delta u_i \\ &= \underbrace{\sum_{i=t_0+1}^{t_1} \left(\frac{-s_i}{(s_i + f_i)^2} \Delta f_i \right)}_{\Delta u^f} + \underbrace{\sum_{i=t_0+1}^{t_1} \left(\frac{f_i}{(s_i + f_i)^2} \Delta s_i \right)}_{\Delta u^s} \end{aligned} \tag{10}$$

The change in youth unemployment rate during 2012–2017 can be decomposed into the contribution of the job-finding rate and of the job-separation rate using Equation (10).

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[7] Equation (8) can be expressed as follows:

$$du_t = -\bar{u}_t(1-\bar{u}_t)\frac{df_t}{f_t} + (1-\bar{u}_t)\bar{u}_t\frac{ds_t}{s_t}.$$

This equation is almost the same as that in Petrongolo and Pissarides (2008) and Fujita and Ramey (2009).

2.2. Data

Job-finding rate and job-separation rate should be computed to measure the contribution of these transition rates to the change in youth unemployment rate during 2012–2017 using Equation (10). It is possible to compute job-finding and job-separation rates without linking adjacent monthly data from the EAPS using Shimer's (2012) methodology when ignoring the movements between labor force and NILF. In this section, job-finding and job-separation rates are calculated using seasonally adjusted monthly EAPS data from 2000 to 2017. The decomposition results of 2012–2017, when the youth unemployment rate increased rapidly, are compared with the decomposition results of 2000–2011.

2.3. Labor Market Transition Rates and Probabilities

Table 1 shows the average values of job-finding rate (f_t), job-finding probability (F_t), job-separation rate (s_t), and job-separation probability (S_t) by age group.[8] The job-finding probability for the youth (aged 20–29) was 36.7% during 2012-2017. This value implies that 36.7% of the young unemployed will find a job within a month. The job-separation probability for the youth during the same period was 4.4%. This value implies that 4.4% of the young employed will lose their job within a month.

[Table 1] Average Values of Transition Rates and Probabilities by Age Group

Period	Age	f_t	F_t	s_t	S_t
2000-2011	20-29 (youth)	0.512	0.399	0.041	0.040
	30-49	0.503	0.394	0.015*	0.014*
	50+	0.567*	0.429*	0.012*	0.012*
2012-2017	20-29 (youth)	**0.459**	**0.367**	**0.045**	**0.044**
	30-49	**0.439***	**0.354***	**0.012***	**0.012***
	50+	0.559*	0.426*	**0.013***	**0.013***

Notes: f_t, F_t, s_t, and S_t denote the job-finding rate, the job-finding probability, job-separation rate, and job-separation probability, respectively. * indicates statistical significance at a 1% level for the test that determines whether each transition rate or probability is statistically different from that of the youth within the same period. A figure in bold type indicates that the transition rate or probability is statistically significantly different from that of the period 2000-2011 at a significance level of 1%.

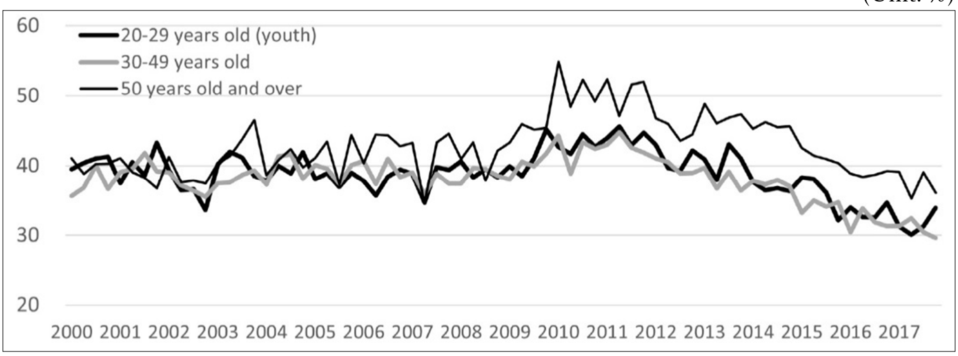
Sources: EAPS, 2000-2017, Statistics Korea.

[8] For the convenience of interpretation, job-finding probability is used instead of job-finding rate. Although there are some differences in level, they are almost similar in terms of trends and volatility. Similarly, job-separation probability is used instead of job-separation rate for the convenience of interpretation.

Job-finding probabilities for those aged 30–49 years old and 50 years old and over during 2012–2017 are 35.4% and 42.6%, respectively. The difference in job-finding probability between the youth and those aged 30–49 years old does not seem to be large in terms of level, though the difference is statistically significant. On the other hand, the job-finding probability for those aged 50 years old and over is significantly higher than that for the youth. Job-separation probabilities for those aged 30–49 years old and 50 years old and over were 1.2% and 1.3%, respectively, relatively lower than that for the youth (4.4%). The high job-separation probability among the youth may be related to the more frequent job search among young people.

[Figure 2] Quarterly Average of Monthly Job-Finding Probability

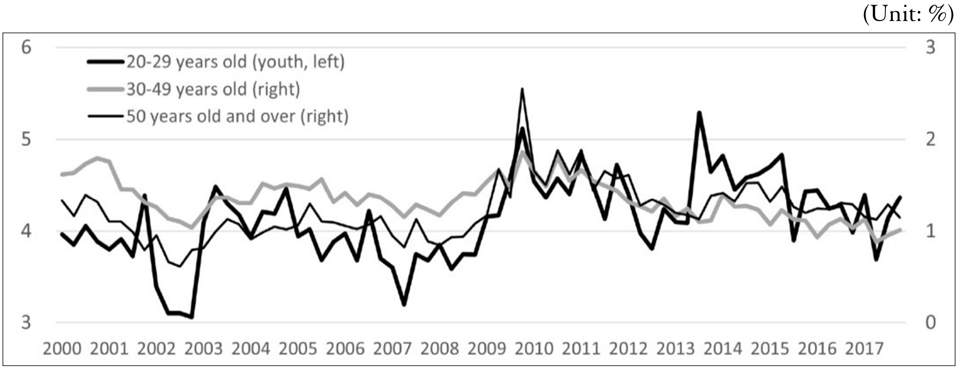
(Unit: %)



Sources: EAPS, 2000-2017, Statistics Korea.

[Figure 3] Quarterly Average of Monthly Job-Separation Probability

(Unit: %)



Sources: EAPS, 2000-2017, Statistics Korea.

Figure 2 shows the quarterly average of monthly job-finding probabilities by age group.[9] It shows the quarterly change in the probability that the unemployed will

[9] In figures in this paper, as in Shimer (2012), it is assumed that the monthly transition rate or transition probability remains constant within a quarter. Shimer (2012) states that it is appropriate to use the quarterly average because the measurement error in the monthly transition rate or transition

find a job within a month. Before 2009, when the global financial crisis appeared, the job-finding probability for all age groups remained almost constant at around 40%. It had a relatively large increase around 2010 but has continued to decrease until recently.

The increase in job-finding probability after 2009 was the largest among those aged 50 years old and over. Job-finding probability has been decreasing for all age groups since 2012. In particular, the job-finding probability for the youth and those aged 30–49 is lower than the average of 2000–2009. All other things being equal, this decrease in the job-finding probability will increase the unemployment rate. In addition, the decrease in the job-finding probability after 2012 was relatively large among the youth. Therefore, the decrease in job-finding probability may be the cause of the increase in youth unemployment rate.

Figure 3 shows the quarterly average of monthly job-separation probability by age group. It shows the change in the probability that the employed will lose their job within one month. In all age groups, the job-separation probability increased largely around 2010 but generally decreased until recently. The most notable point is that the volatility of the job-separation probability of the youth is relatively more prominent than that of other age groups. On the other hand, the job-separation probabilities for those aged 30–49 years old and 50 years old and over seem to maintain a stable trend compared to the youth. Looking at the period from 2012 to 2017, when youth unemployment rate rose steeply, the job-separation probability of the youth increased prominently compared to other age groups. The job-separation probability of the youth rose in 2013 and remained higher than that of other age groups.

2.4. Decomposition Results for the Youth

As shown in Equation (7), when decomposing changes in the youth unemployment rate, the actual unemployment rate is approximated as the steady-state unemployment rate. Therefore, the two unemployment rates need to move similarly to enable an accurate decomposition of the unemployment rate and reduce the residuals. According to Table 2, the mean and standard deviation of the two unemployment rates for both men and women are almost the same. Figure 4 also confirms that the actual unemployment rate and steady-state unemployment rate move quite similarly, suggesting that the residual associated with the approximation of actual unemployment rates will be small.

probability is large.

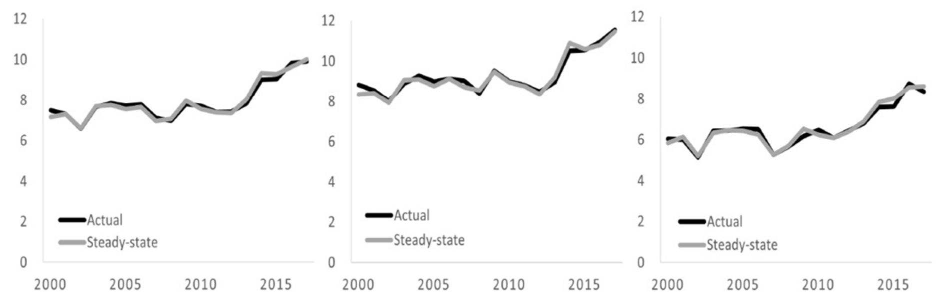
[Table 2] Actual vs. Steady-State Unemployment Rate (Two-State Analysis): Statistics

Period	Age	Unemployment rate (%)	All		Men		Women	
			Mean	S.D.	Mean	S.D.	Mean	S.D.
2000-2017	20-29	Actual	7.92	0.93	9.30	0.96	6.57	0.96
		Steady-state	7.91	0.99	9.25	1.01	6.60	1.02

Notes: "S.D." denotes a standard deviation.
Sources: EAPS, 2000-2017, Statistics Korea.

[Figure 4] Actual vs. Steady-State Unemployment Rate (Two-State Analysis): Trends

(Unit: %)



(a) All (b) Men (c) Women

Sources: EAPS, 2000-2017, Statistics Korea.

Table 3 shows the decomposition results for the contributions of the two labor market transition paths to the change in youth unemployment rate during 2012–2017 using Equation (10). The decomposition reveals that changes in the job-finding rate account for most of the rise in youth unemployment rate during the period. Moreover, 2.82%p of the change in youth unemployment rate during 2012–2017 (2.47%p) was explained by the fall in job-finding rate and 0.02%p by the rise in job-separation rate.

[Table 3] Decomposition Results: Two-State Analysis

Period	Age	Gender	Decomposition			
			Δu	Δu^f	Δu^s	Residual
2012-2017	20-29	All	2.47 (100.0)	2.82 (114.3)	0.02 (1.0)	-0.38 (-15.3)
		Men	3.06 (100.0)	3.01 (98.4)	0.35 (11.5)	-0.30 (-9.9)
		Women	1.91 (100.0)	2.70 (141.5)	-0.32 (-16.8)	-0.47 (-24.7)

Notes: Δu, Δu^f, and Δu^s denote the changes (%p) in the unemployment, contribution of the job-finding rate, and contribution of the job-separation rate, respectively. The number in parentheses indicates the contribution rate (%) of each transition path.
Sources: EAPS, 2012-2017, Statistics Korea.

By gender, the rise in youth unemployment between 2012 and 2017 was more pronounced in men. The unemployment rate for men rose 3.06%p while that for women rose only 1.91%p. Regarding the contribution of the labor market transition paths, 3.01%p of the change in the youth unemployment rate (3.06%p) for men was explained by the decrease in job-finding rate and 0.35%p by the increase in job-separation rate. On the other hand, in the case of women, 2.70%p of the change in the youth unemployment rate (1.91%p) was explained by the fall in job-finding rate and -0.32%p by the rise in job-separation rate. The contribution of the job-separation rate was negative for the women because this rate fell steadily during the period and resulted in a decreasing youth unemployment rate for women. This negative contribution implies that the change in the youth unemployment rate for women could have increased by 0.32%p if the job-separation rate had not fallen. Although the job-finding rate decreased in both young men and women, the degree of change was slightly greater for men in the data. In the case of the job-separation rate, it remained at almost the same level in men but was significantly lowered in women in the data, a result that partially offset the increase in unemployment rate caused by the decrease in job-finding rate.

III. Three-State Analysis

This section examines the contribution of the six labor market transition paths, including the NILF, to the increase in youth unemployment rate in Korea during 2012–2017.[10] In the two-state analysis that does not consider the NILF, Shimer's (2012) methodology is used to compute transition rates and probabilities without matching adjacent monthly data in the EAPS. However, it is essential to match adjacent monthly data in the EAPS when calculating the contribution of the six labor market transition paths, including the NILF, to the changes in unemployment rate. Given labor market transition rates, the methodology of the two-state analysis is extended to quantify the contribution of each transition rate to the change in youth unemployment rate.

3.1. Methodology

By matching the adjacent monthly data in the EAPS, it is possible to calculate the nine labor market transition probabilities (P_t^{ij}) among the employed (E), unemployed (U), and NILF (N) in each month as follows:

[10] Although there are nine labor market transition paths, only six labor market transition paths are independent in terms of probability.

$$P_t^{ij} = \frac{\sum_n (ij)_{n,t}}{\sum_n (i)_{n,t-1}} (i \in \{E,U,N\},\ j \in \{E,U,N\}) \tag{11}$$

where $\sum_n (i)_{n,t-1}$ is the sum of the number of samples that the labor market status is $i \in \{E,U,N\}$ at period $t-1$, and $\sum_n (ij)_{n,t}$ is the sum of the number of samples that the labor market status is $i \in \{E,U,N\}$ in period $t-1$ and $j \in \{E,U,N\}$ in period t. The nine labor market transition probabilities can be represented in the form of a matrix:

$$P_t = \begin{pmatrix} P_t^{EE} & P_t^{UE} & P_t^{NE} \\ P_t^{EU} & P_t^{UU} & P_t^{NU} \\ P_t^{EN} & P_t^{UN} & P_t^{NN} \end{pmatrix} \tag{12}$$

The transition probabilities calculated in this way may reflect the time-aggregation bias. Following Shimer's (2012) and Elsby et al.'s (2015) methodology, it is possible to compute the six labor market transition rates (p_t^{ij}) without the time-aggregation bias in the following way:[11]

$$p_t = \begin{pmatrix} -p_t^{EU} - p_t^{EN} & p_t^{UE} & p_t^{NE} \\ p_t^{EU} & -p_t^{UE} - p_t^{UN} & p_t^{NU} \\ p_t^{EN} & p_t^{UN} & -p_t^{NE} - p_t^{NU} \end{pmatrix} = V_t^P \ln(D_t^P)(V_t^P)^{-1} \tag{13}$$

where V_t^P denotes a matrix composed of the eigenvectors of the matrix P_t, and D_t^P denotes a diagonal matrix with the eigenvalue of the matrix P_t as a diagonal element. The labor market transition probability adjusted for the time-aggregation bias ($\hat{P}_t^{ij}$) can be calculated using the labor market transition rate (p_t^{ij}) as follows:[12]

$$\hat{P}_t^{ij} = 1 - e^{-p_t^{ij}} \quad \text{if} \quad i \neq j \tag{14}$$

$$\hat{P}_t^{EE} = 1 - \hat{P}_t^{EU} - \hat{P}_t^{EN},\ \ \hat{P}_t^{UU} = 1 - \hat{P}_t^{UE} - \hat{P}_t^{UN},\ \ \hat{P}_t^{NN} = 1 - \hat{P}_t^{NE} - \hat{P}_t^{NU} \tag{15}$$

Given the labor market transition rates (p_t^{ij}), the methodology of the two-state analysis is extended to quantify the contribution of each transition rate to the change in youth unemployment rate. The dynamics of the employed (E), unemployed (U), and NILF (N) can be expressed as follows:

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[11] For the detailed derivation, please refer to Shimer (2012) and Elsby et al. (2015).

[12] Each transition rate is assumed to follow a Poisson distribution.

$$\dot{E}_t = -(p_t^{EU} + p_t^{EN})E_t + p_t^{UE}U_t + p_t^{NE}N_t \tag{16}$$
$$\dot{U}_t = p_t^{EU}E_t - (p_t^{UE} + p_t^{UN})U_t + p_t^{NU}N_t \tag{17}$$
$$\dot{N}_t = p_t^{EN}E_t + p_t^{UN}U_t - (p_t^{NE} + p_t^{NU})N_t \tag{18}$$

Assuming that the actual unemployment rate (u_t) for each period is close to the steady-state unemployment rate ($\overline{u}_t$)[13], the actual unemployment rate can be expressed as a function of the six labor market transition rates using Equations (16), (17), and (18).

$$\begin{aligned} u_t &\simeq \overline{u}_t \\ &= \frac{p_t^{EN}p_t^{NU} + p_t^{NE}p_t^{EU} + p_t^{NU}p_t^{EU}}{(p_t^{EN}p_t^{NU} + p_t^{NE}p_t^{EU} + p_t^{NU}p_t^{EU}) + (p_t^{UN}p_t^{NE} + p_t^{NU}p_t^{UE} + p_t^{NE}p_t^{UE})} && (19) \\ &= \frac{\hat{s}_t}{\hat{s}_t + \hat{f}_t} && (20) \end{aligned}$$
$$\hat{s}_t = p_t^{EN}p_t^{NU} + p_t^{NE}p_t^{EU} + p_t^{NU}p_t^{EU} \tag{21}$$
$$\hat{f}_t = p_t^{UN}p_t^{NE} + p_t^{NU}p_t^{UE} + p_t^{NE}p_t^{UE} \tag{22}$$

By taking the total derivative of Equation (19) with respect to the six labor market transition rates and approximating them with discrete variables, the change in unemployment rate (Δu_t) can be expressed as the sum of the contributions of the changes in the six labor market transition rates (Δp_t^{ij}) as shown below:

$$\begin{aligned} \Delta u_t = {} & \frac{\hat{f}_t(p_t^{NE} + p_t^{NU})}{(\hat{s}_t + \hat{f}_t)^2}\Delta p_t^{EU} + \frac{-\hat{s}_t(p_t^{NU} + p_t^{NE})}{(\hat{s}_t + \hat{f}_t)^2}\Delta p_t^{UE} + \frac{-\hat{s}_t(p_t^{UE}) + \hat{f}_t(p_t^{EN} + p_t^{EU})}{(\hat{s}_t + \hat{f}_t)^2}\Delta p_t^{NU} \\ & + \frac{-\hat{s}_t(p_t^{NE})}{(\hat{s}_t + \hat{f}_t)^2}\Delta p_t^{UN} + \frac{\hat{f}_t(p_t^{NU})}{(\hat{s}_t + \hat{f}_t)^2}\Delta p_t^{EN} + \frac{-\hat{s}_t(p_t^{UN} + p_t^{UE}) + \hat{f}_t(p_t^{EU})}{(\hat{s}_t + \hat{f}_t)^2}\Delta p_t^{NE} \end{aligned} \tag{23}$$

Using Equation (23), the change in unemployment rate between two specific points in time ($t_1 > t_0$) can be decomposed into the contribution of the six labor market transition rates (Δu^{ij}) as follows:

$$u_{t_1} - u_{t_0} = \sum_{i=t_0+1}^{t_1} \Delta u_i \tag{24}$$

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[13] When unemployment rate is calculated annually, the actual unemployment rate and steady-state unemployment rate are similar. Since this study uses annual unemployment rates, the assumption that the actual unemployment rate is close to the steady-state unemployment rate is innocuous.

$$= \underbrace{\sum_{i=t_0+1}^{t_1}\left(\frac{\hat{f}_i(p_i^{NE}+p_i^{NU})}{(\hat{s}_i+\hat{f}_i)^2}\Delta p_i^{EU}\right)}_{\Delta u^{EU}} + \underbrace{\sum_{i=t_0+1}^{t_1}\left(\frac{-\hat{s}_i(p_i^{NU}+p_i^{NE})}{(\hat{s}_i+\hat{f}_i)^2}\Delta p_i^{UE}\right)}_{\Delta u^{UE}}$$

$$+ \underbrace{\sum_{i=t_0+1}^{t_1}\left(\frac{-\hat{s}_i(p_i^{UE})+\hat{f}_i(p_i^{EN}+p_i^{EU})}{(\hat{s}_i+\hat{f}_i)^2}\Delta p_i^{NU}\right)}_{\Delta u^{NU}} + \underbrace{\sum_{i=t_0+1}^{t_1}\left(\frac{-\hat{s}_i(p_i^{NE})}{(\hat{s}_i+\hat{f}_i)^2}\Delta p_i^{UN}\right)}_{\Delta u^{UN}}$$

$$+ \underbrace{\sum_{i=t_0+1}^{t_1}\left(\frac{\hat{f}_i(p_i^{NU})}{(\hat{s}_i+\hat{f}_i)^2}\Delta p_i^{EN}\right)}_{\Delta u^{EN}} + \underbrace{\sum_{i=t_0+1}^{t_1}\left(\frac{-\hat{s}_i(p_i^{UN}+p_i^{UE})+\hat{f}_i(p_i^{EU})}{(\hat{s}_i+\hat{f}_i)^2}\Delta p_i^{NE}\right)}_{\Delta u^{NE}}$$

The change in youth unemployment rate during 2012–2017 can be decomposed into the contribution of the six labor market transition rates using Equation (24).

3.2. Data

In the two-state analysis without considering the NILF, Shimer's (2012) methodology is used to compute transition rates and probabilities without matching adjacent monthly data in the EAPS. However, when calculating the contribution of the six labor market transition paths, including the NILF, to the fluctuations in unemployment rate, it is essential to link adjacent monthly data in the EAPS.

Since the EAPS provides household ID and household member ID for the period 1986–1999, more than 90% of a sample for a specific month can be linked to a sample for the next month by using variables such as household ID, household member ID, birth year, birth month, and gender. However, since 2000, household ID and household member ID have no longer been provided, making it challenging to link as many samples as in the period 1986–1999. In the process of retroactively revising the weights of the EAPS by Statistics Korea in 2018, the variable for the birth month after 2000 was also excluded from the publicly available variables. For this reason, the proportion of samples linked to the next month further decreased.

In this study, the old EAPS data before revising the weights are used for analysis to increase the matching ratio of adjacent monthly data because the old EAPS data contain a variable for the birth month. Kim (2018) confirms that there is no significant difference in the employment rate, unemployment rate, and labor force participation rate by age group before and after correction of the weights in the EAPS. Therefore, the error caused by using the old EAPS data instead of the weight-corrected EAPS data in 2018 is not considered large in the present study. The household ID and household member ID have not been provided after 2000. Therefore, variables for birth year, birth month, gender, educational attainment, marital status, farm/non-farm household, and relationship with head of the household are used as identifiers to maximize the matching ratio of adjacent monthly data in the EAPS.

Table 4 shows the matching rate of adjacent monthly data in the EAPS by period. The average matching rate for the period 1986–1999 was 91.8% when the household ID and household member ID were used as additional identifiers. However, the matching rate was significantly reduced to 20.4% when the household ID and household member ID were not used. Although the matching rate decreases to 20.4%, the average number of matched samples is 15,129, which is sufficiently large.

[Table 4] Matching Rate of Adjacent Monthly Data in the EAPS

Period	Matching Rate		Remark
	Using HHID and HHMID	Not Using HHID and HHMID	
1986-1999	91.8% (68,814)	20.4% (15,129)	
2000-2017	-	35.1% (23,389)	Old EAPS data
2012-2017	-	39.1% (24,208)	Old EAPS data

Notes: HHID and HHMID denote the household ID and household member ID, respectively. Figures in parentheses represent the period average of the number of linked samples. The old EAPS data denotes data before correcting weights in the EAPS.

Sources: EAPS, 1986-2017, Statistics Korea.

The matching result shows that about 35.1% of the total sample in each month was linked to the data of the following month for the period 2000–2017. This figure was significantly lower than the matching rate (67%) in Elsby et al. (2015), which previously studied the United States. Although the matching rate is 35.1%, the average number of matched samples is 23,389, which is sufficiently large. In particular, the matching rate for the period 2012–2017, the main analysis period in this study, rises to 39.1%.[14] Therefore, if samples are dropped randomly when matching data, problems with sample representativeness will be limited.

To check the sample representativeness indirectly, the labor market statistics when the data were linked using the household ID and household member ID and when the data were linked not using the household ID and household member ID were compared for the period 1986–1999. Table 5 compares the six labor market transition probabilities and the proportion of labor market status by age group. The probabilities of the remaining employed and NILF for those aged 15 years and over

[14] The matching rate can be increased by 59% when the workplace information of employed persons (industry, occupation, status of workers, size of employment) and the previous workplace information of the unemployed and NILF are additionally utilized. However, for the unemployed and NILF, previous job information is omitted for the sample one year after unemployment or turnover. Therefore, the matching ratio of the employed increases asymmetrically when matching using workplace information, causing a problem of sample representativeness. In particular, the proportion of the number of employed, unemployed, and NILF may vary significantly between the linked and overall samples. In this case, it is likely to be problematic to calculate the six labor market transition probabilities using linked samples.

are underestimated by 0.7%p and 1.2%p, respectively, when the household ID and household member ID are not used. The transition probability from employed to the NILF is overestimated by 0.7%p. Except for these transition probabilities, there was no statistically significant difference in transition probabilities between the two cases.

[Table 5] Differences in Labor Market Statistics: 1986-1999

Age	Data	Labor Market Transition Probability (%)									Labor Status (%)		
		P^{EE}	P^{EU}	P^{EN}	P^{UE}	P^{UU}	P^{UN}	P^{NE}	P^{NU}	P^{NN}	E	U	N
All (15+)	w/o ID	95.6	0.7	3.7	25.7	65.2	9.1	5.8	0.6	93.5	58.9	2.1	39.0
	w/ ID	96.3	0.7	3.0	27.0	64.4	8.6	4.7	0.6	94.7	58.4	1.9	39.7
	diff.	-0.7*	0.1	0.7*	-1.3	0.8	0.5	1.1	0.0	-1.2*	0.5	0.2*	-0.7
15-19	w/o ID	92.8	1.9	5.3	24.7	62.2	13.1	3.0	0.7	96.3	30.6	2.9	66.5
	w/ ID	91.9	1.9	6.2	25.7	61.8	12.5	1.3	0.4	98.3	11.8	1.3	86.9
	diff.	1.0	-0.1	-0.9	-0.9	0.3	0.6	1.7*	0.3*	-2.0*	18.9*	1.6*	-20.4*
20-29	w/o ID	96.0	1.2	2.9	25.0	66.8	8.2	6.7	1.7	91.6	65.4	3.9	30.6
	w/ ID	96.0	1.1	2.9	24.5	67.2	8.3	5.0	1.5	93.5	61.1	3.9	35.1
	diff.	0.0	0.1	0.0	0.5	-0.4	-0.1	1.7*	0.2*	-1.9*	4.3*	0.1	-4.4*
30-49	w/o ID	96.7	0.7	2.6	25.9	66.5	7.6	9.6	1.2	89.2	76.3	2.5	21.2
	w/ ID	97.2	0.6	2.2	31.1	61.5	7.4	7.5	0.7	91.8	75.1	1.6	23.2
	diff.	-0.5*	0.1*	0.4*	-5.2*	5.0*	0.2	2.1*	0.5*	-2.6*	1.2*	0.9*	-2.1*
50+	w/o ID	93.9	0.3	5.8	26.9	58.1	15.1	4.8	0.2	95.0	44.8	0.6	54.6
	w/ ID	95.1	0.3	4.6	27.9	60.7	11.3	5.3	0.2	94.4	53.1	0.7	46.2
	diff.	-1.2*	0.0	1.2*	-1.1	-2.6	3.7*	-0.6*	0.0	0.6*	-8.4*	-0.1	8.4*

Notes: P^{ij} denote the labor market transition probability (%) from a status $i \in \{E, U, N\}$ to a status $j \in \{E, U, N\}$. E, U, and N denote the proportion (%) of the employed, the unemployed, and the NILF, respectively. "w/ ID" and "w/o ID" denote the data linked using HHID and HHMID, the data linked not using HHID and HHMID, respectively. "diff." is computed by subtracting statistics in "w/ ID" from "w/o ID". * indicates statistical significance at a 1% level for the test that determines whether the difference is statistically different from zero.

Sources: EAPS, 1986-1999, Statistics Korea.

The differences in proportion of the employed, unemployed, and NILF in the two cases were 0.5%p, 0.2%p, and -0.7%p, respectively, indicating that the differences are relatively small. One thing to note is that the differences between the two samples are significantly larger in the age group of 15–19 years. In particular, in the case of 15–19 years old, there is a large difference in labor force status, which is not suitable for analysis related to labor market transition. This is one of the reasons those aged 15–19 years old were not included in the youth in this study.

In the case of 20–29 years old, the main subject of this study, there was no significant difference in transition probability except for a few probabilities: the probabilities from the NILF to employed and unemployed are overestimated by 1.7%p and by 0.2%p and the probability of remaining the NILF is underestimated by 1.9%p when the household ID and household member ID are not used. The differences in proportion of the employed, unemployed, and NILF between the two cases were 4.3%p, 0.1%p, and -4.4%p, respectively. The differences in proportions of the employed and NILF are relatively large compared to the overall population, suggesting that some errors may occur in the analysis of the youth.

[Table 6] Differences in Descriptive Statistics: 2000-2017

Data	Gender (%)		Age Group (%)				Edu. (%)		Marital (%)		Labor Status (%)		
	Men	Women	15-19	20-29	30-49	50+	CG-	CG+	N.Mar.	Mar.	*E*	*U*	*N*
Linked	49.8	50.2	3.1	21.8	36.7	38.5	76.1	23.9	31.9	68.1	60.1	2.5	37.4
Whole	48.8	51.2	8.1	16.9	40.9	34.1	80.1	19.9	27.9	72.1	59.6	2.2	38.2
diff.	1.0*	-1.0*	-5.1*	4.9*	-4.2*	4.4*	-4.0*	4.0*	3.9*	-3.9*	0.6*	0.3*	-0.9*

Notes: "Edu." and "Marital" denote the education attainment and marital status. "CG-" and "CG+" denote "less than college graduates" and "college graduates or higher", respectively. "N.Mar." and "Mar." denote "never-married" and "married", respectively. "diff." is computed by subtracting statistics in the whole sample from those in the linked sample. * indicates statistical significance at a 1% level for the test that determines whether the difference is statistically different from zero.

Sources: EAPS, 2000-2017, Statistics Korea.

A direct comparison as shown in Table 5 is not possible for data from 2000 to 2017 as the household ID and household member ID are not provided. Therefore, alternatively, descriptive statistics from the whole sample and the linked sample are compared for 2000–2017. Table 6 shows the difference in descriptive statistics between the linked sample and the whole sample. In the linked data, the proportion of men was 1%p higher, that of the youth (20–29 years old) was 4.9%p higher, and that of 30–49 years old was 4.2%p lower, while that of 50 years old and older was 4.4%p higher. By educational attainment, the proportion of college graduates or higher (CG+) was 4.0%p higher, and by marital status, the proportion of never-married persons (N.Mar.) was 3.9%p higher in the linked data. Lastly, the proportion of employed and unemployed was 0.6%p and 0.3%p higher, respectively, while that of the NILF was 0.9%p lower in the linked data.

Table 7 shows the difference in descriptive statistics between the linked sample and the whole sample by age group. In the case of 20–29 years old, the main subject of this study, the differences in statistics between the linked sample and the whole sample are relatively small compared to those in other age groups. There are no statistically significant differences in descriptive statistics except for the proportion of gender and the labor force status. The differences in proportions of the employed and NILF are relatively large compared to the overall population, suggesting that some errors may occur in the analysis of the youth. Note that there are relatively large differences in the proportion of labor market status for 15–19 years old and the marital status for 30–49 years old, implying that the error may be relatively large in the analysis using linked samples for these age groups.

[Table 7] Differences in Descriptive Statistics by Age Group: 2000-2017

Age	Data	Gender (%)		Edu. (%)		Marital (%)		Labor Status (%)		
		Men	Women	CG-	CG+	N.Mar.	Mar.	*E*	*U*	*N*
15-19	Linked	48.8	51.2	99.9	0.1	98.7	1.3	18.3	2.2	79.5
	Whole	51.5	48.5	100.0	0.0	99.8	0.2	7.7	1.0	91.3
	diff.	-2.7*	2.7*	0.0*	0.0*	-1.1*	1.1*	10.6*	1.2*	-11.8*
20-29	Linked	48.5	51.5	76.0	24.0	80.0	20.0	62.3	4.7	33.0
	Whole	47.7	52.3	76.4	23.6	81.6	18.4	59.2	5.1	35.8
	diff.	0.8*	-0.8*	-0.4	0.4	-1.6	1.6	3.1*	-0.4*	-2.8*
30-49	Linked	52.6	47.4	64.9	35.1	28.9	71.1	76.0	2.7	21.3
	Whole	50.8	49.2	69.5	30.5	14.4	85.6	75.5	2.1	22.4
	diff.	1.9*	-1.9*	-4.6*	4.6*	14.6*	-14.6*	0.5*	0.6*	-1.1*
50+	Linked	47.9	52.1	85.1	14.9	2.1	97.9	46.9	1.1	52.0
	Whole	46.2	53.8	89.6	10.4	1.0	99.0	52.8	1.1	46.1
	diff.	1.7*	-1.7*	-4.5*	4.5*	1.2*	-1.2*	-5.8*	-0.1*	5.9*

Notes: "Edu." and "Marital" denote the education attainment and marital status. "CG-" and "CG+" denote "less than college graduates" and "college graduates or higher", respectively. "N.Mar." and "Mar." denote "never-married" and "married", respectively. "diff." is computed by subtracting statistics in the whole sample from those in the linked sample. * indicates statistical significance at a 1% level for the test that determines whether the difference is statistically different from zero.
Sources: EAPS, 2000-2017, Statistics Korea.

In this study, approximately 39.1% of monthly data in the EAPS are linked for the period 2012–2017. Nevertheless, it does not appear that the selection bias resulting from the loss of samples significantly undermines the sample representativeness based on Tables 5, 6, and 7, especially for the youth. However, as already emphasized, when examining labor market transitions for 15–19 and 30–39 years old with linked samples, sample selection bias can occur relatively largely. Therefore, it is necessary to interpret the results of this study in consideration of this data limitation. A more precise study can be conducted when Statistics Korea provides household ID and household member ID in the future.

3.3. Labor Market Transition Rates and Probabilities

Table 8 shows the average values of the labor market transition rates, which are computed using Equation (13). In terms of interpretation, it is more beneficial to use the labor market transition probability instead of transition rates. Table 9 shows the average values of the labor market transition probabilities, which are adjusted for the time-aggregation bias, by age group. Most notably, similar to the results of the two-state analysis, the transition probability from unemployed to employed ($\hat{P}_t^{UE}$) considerably decreased among the youth and those aged 30-49 years old, except for those aged 50 years old and over. This result is consistent with the trend of job-finding probability by age group shown in Figure 2.

On the other hand, the transition probability from employed to unemployed ($\hat{P}_t^{EU}$) among the youth and those aged 30–49 years old decreased while that for aged 50 years old and over increased. This result is different from the trend of job-separation probability shown in Figure 3. This difference suggests that the two-state analysis, assuming that there is no movement between the labor force and the NILF, may not be suitable for analyzing the unemployment rate in Korea.

[Table 8] Average Values of Labor Market Transition Rates by Age Group

Period	Age	p_t^{EE}	p_t^{EU}	p_t^{EN}	p_t^{UE}	p_t^{UU}	p_t^{UN}	p_t^{NE}	p_t^{NU}	p_t^{NN}
2000-2011	20-29	0.951	0.016	0.033	0.339	0.511	0.150	0.062	0.031	0.907
	30-49	0.971*	0.009*	0.020*	0.294	0.570*	0.136*	0.073	0.021*	0.906
	50+	0.956	0.005*	0.038*	0.310	0.489	0.201*	0.031*	0.005*	0.965*
2012-2017	20-29	**0.959**	**0.013**	0.029	**0.246**	0.569	**0.185**	**0.049**	**0.041**	0.911
	30-49	**0.982***	**0.006***	**0.012***	**0.238**	**0.610***	**0.152***	0.040*	0.023*	0.936*
	50+	**0.964***	**0.006***	**0.030**	0.314*	0.475*	0.211*	**0.027***	**0.007***	0.966*

Notes: p_t^{ij} denotes the labor market transition rate from a status i to a status j, which is adjusted for time-aggregation bias. * indicates statistical significance at a 1% level for the test that determines whether each transition rate or probability is statistically different from that of the youth within the same period. A figure in bold type indicates that the transition rate or probability is statistically significantly different from that of the period 2000-2011 at a significance level of 1%.

Sources: EAPS, 2000-2017, Statistics Korea.

[Table 9] Average Values of Labor Market Transition Probabilities by Age Group

Period	Age	$\hat{P}_t^{EE}$	$\hat{P}_t^{EU}$	$\hat{P}_t^{EN}$	$\hat{P}_t^{UE}$	$\hat{P}_t^{UU}$	$\hat{P}_t^{UN}$	$\hat{P}_t^{NE}$	$\hat{P}_t^{NU}$	$\hat{P}_t^{NN}$
2000-2011	20-29	0.952	0.016	0.032	0.270	0.591	0.139	0.059	0.031	0.910
	30-49	0.972*	0.009*	0.019*	0.252*	0.616*	0.132	0.063	0.021*	0.915
	50+	0.957	0.005*	0.038*	0.264	0.557*	0.180*	0.030*	0.005*	0.965*
2012-2017	20-29	**0.959**	**0.013**	0.028	**0.217**	**0.616**	**0.168**	**0.048**	**0.040**	0.913
	30-49	**0.982***	**0.006***	**0.012***	**0.211**	0.648*	0.141*	**0.040***	0.023*	**0.937***
	50+	**0.964***	**0.006***	**0.029**	0.268*	0.544*	0.189*	**0.026***	**0.007***	0.967*

Notes: $\hat{P}_t^{ij}$ denotes the labor market transition probability from a status i to a status j, which is adjusted for time-aggregation bias. * indicates statistical significance at a 1% level for the test that determines whether each transition rate or probability is statistically different from that of the youth within the same period. A figure in bold type indicates that the transition rate or probability is statistically significantly different from that of the period 2000-2011 at a significance level of 1%.

Sources: EAPS, 2000-2017, Statistics Korea.

Figure 5 shows the quarterly average of the monthly transition probability from employed to unemployed ($\hat{P}_t^{EU}$) by age group. Transition probability is generally decreasing gradually in all age groups. It is noteworthy that the transition probability from employed to unemployed among the youth is considerably higher than that of other age groups. Figure 6 shows the quarterly average of the monthly transition probability from unemployed to employed ($\hat{P}_t^{UE}$) by age group. The transition probability from unemployed to employed has decreased since 2010 in all age groups. This result is consistent with the decrease in job-finding probability after 2010 for all age groups in the two-state analysis, as shown in Figure 2.

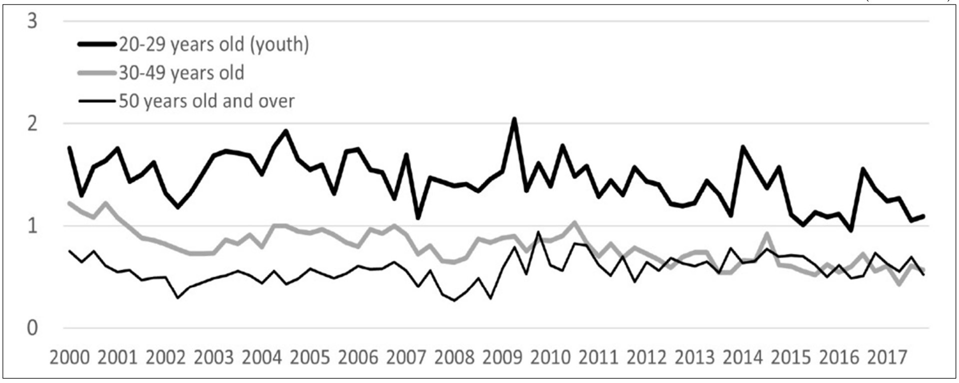
Figure 7 shows the quarterly average of the monthly transition probability from NILF to unemployed ($\hat{P}_t^{NU}$). Compared to those aged 50 years old and over, the transition probability among the youth and those aged 30–49 years old was higher on average. The transition probability for the youth is consistently high while that for those aged 30 years old and over has been gradually decreasing since 2012. An increase in the transition from NILF to unemployed leads to an increase in unemployment rate. The transition from NILF to unemployed is not likely to cause the rise in youth unemployment rate during 2012–2017 because there has been no noticeable upward trend in the transition probability of the youth during the period.

Figure 8 shows the quarterly average of the monthly transition probability from unemployed to NILF ($\hat{P}_t^{UN}$). The transition from unemployed to NILF has been decreasing since 2011 for all age groups. The decrease in transition probability is prominent for those aged 50 years old and over. This downward trend will increase the unemployment rate. The transition probability of the youth has been gradually decreasing since 2012. Therefore, the decrease in the transition from unemployed to NILF may increase youth unemployment rate.

Figure 9 shows the quarterly average of the monthly transition probability from employed to NILF ($\hat{P}_t^{EN}$). Compared with those aged 30–49 years old, the transition probabilities among the youth and those aged 50 years old and over are generally higher. In all age groups, the transition probability has been decreasing since 2012, and this trend is more pronounced among young people and those aged 50 years old and over. Since unemployment rate decreases as the transition from employed to NILF decreases, the transition probability from employed to NILF is unlikely to be a major factor in the rise in youth unemployment rate after 2012. Figure 10 shows the quarterly average of the monthly transition probability from NILF to employed ($\hat{P}_t^{NE}$). Overall, it shows a stable trend across all age groups and has gradually declined until recently. The transition probability of those aged 50 years old and over remains low compared to that of other age groups.

[Figure 5] Quarterly Average of Monthly Transition Probability ($\hat{P}_t^{EU}$)

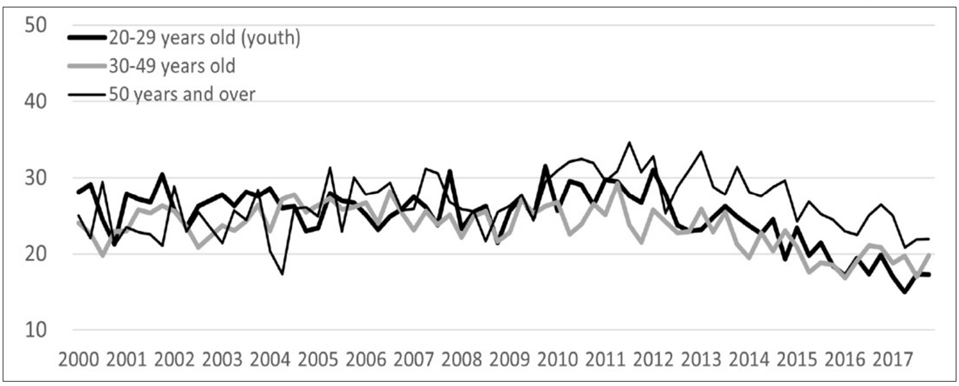
(Unit: %)



Sources: EAPS, 2000-2017, Statistics Korea.

[Figure 6] Quarterly Average of Monthly Transition Probability ($\hat{P}_t^{UE}$)

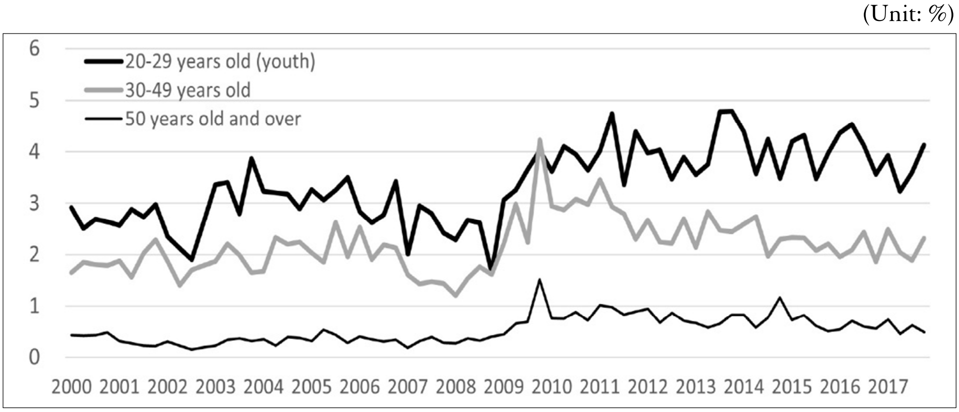
(Unit: %)



Sources: EAPS, 2000-2017, Statistics Korea.

[Figure 7] Quarterly Average of Monthly Transition Probability ($\hat{P}_t^{NU}$)

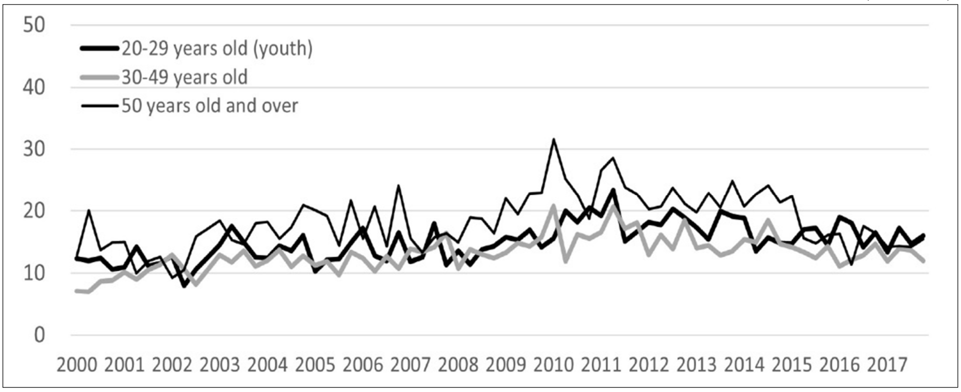
(Unit: %)



Sources: EAPS, 2000-2017, Statistics Korea.

[Figure 8] Quarterly Average of Monthly Transition Probability ($\hat{P}_t^{UN}$)

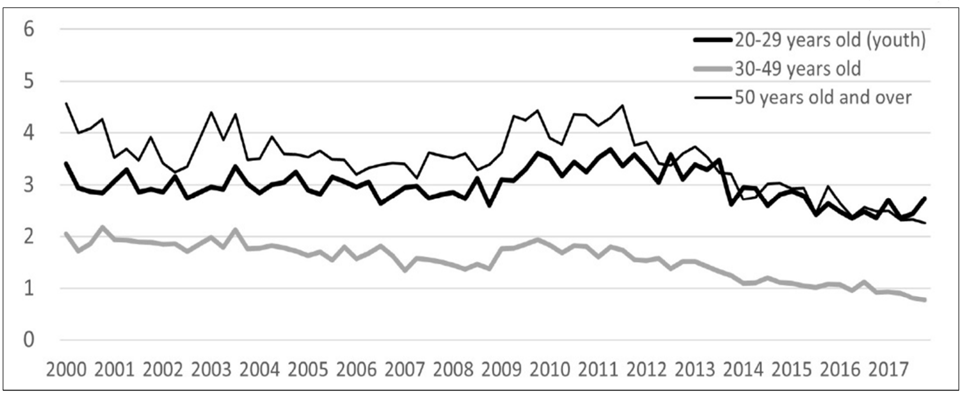
(Unit: %)



Sources: EAPS, 2000-2017, Statistics Korea.

[Figure 9] Quarterly Average of Monthly Transition Probability ($\hat{P}_t^{EN}$)

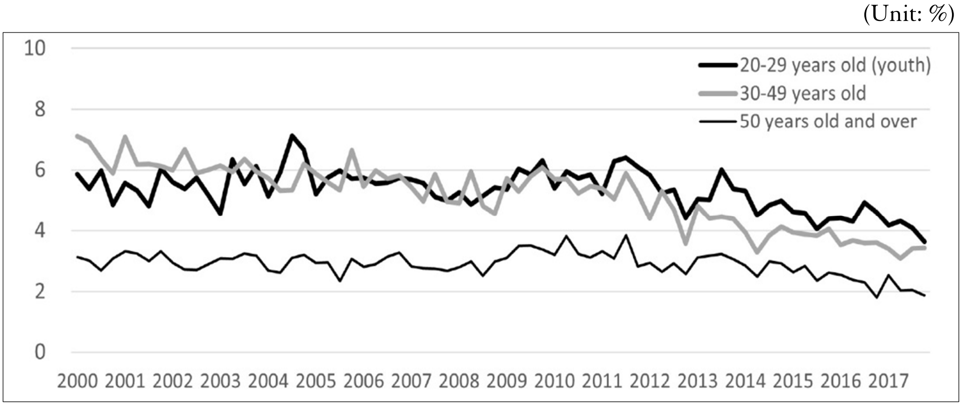
(Unit: %)



Sources: EAPS, 2000-2017, Statistics Korea.

[Figure 10] Quarterly Average of Monthly Transition Probability ($\hat{P}_t^{NE}$)

(Unit: %)



Sources: EAPS, 2000-2017, Statistics Korea.

3.4. Decomposition Results for the Youth

The analysis so far provides clues to the causes of the rise in youth unemployment between 2012 and 2017, but it does not show an accurate contribution of each transition rate to changes in youth unemployment rates. As shown in Equation (19), when decomposing changes in the youth unemployment rate, actual unemployment rate is approximated as steady-state unemployment rate. Therefore, the two unemployment rates need to move similarly to enable an accurate decomposition of unemployment rate and reduce the residuals.

Table 10 shows the mean and standard deviation of the two unemployment rates. Unlike the two-state analysis, there is a slight difference between the actual and steady-state unemployment rates. The steady-state unemployment rate is about 1.5%p lower than the actual unemployment rate. The reason for this difference may be that the approximation of Equation (19) is not sufficiently precise in actual data or that the labor market transition rates are not accurately measured in the linked sample. In Table 7, the fact that the proportion of unemployed for the youth in the linked sample is lower than that in the whole sample is consistent with these results.

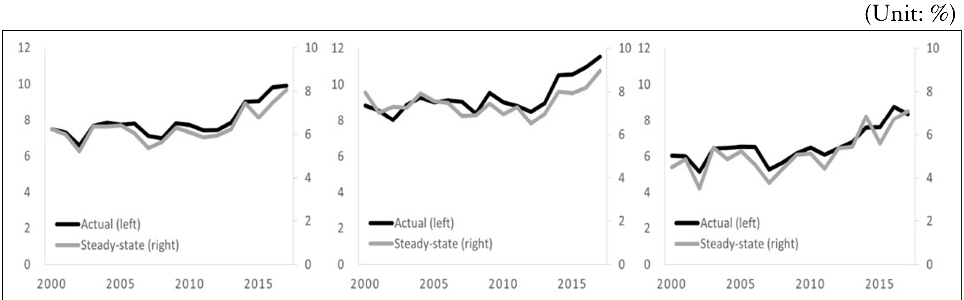
[Table 10] Actual vs. Steady-State Unemployment Rate (Three-State Analysis): Statistics

Period	Age	Unemployment rate (%)	All		Men		Women	
			Mean	S.D.	Mean	S.D.	Mean	S.D.
2000-2017	20-29	Actual	7.92	0.93	9.30	0.96	6.57	0.96
		Steady-state	6.32	0.73	7.48	0.60	5.16	0.97

Notes: “S.D.” denotes a standard deviation.
Sources: EAPS, 2000-2017, Statistics Korea.

[Figure 11] Actual vs. Steady-State Unemployment Rate (Three-State Analysis): Trends

(Unit: %)



(a) All (b) Men (c) Women

Sources: EAPS, 2000-2017, Statistics Korea.

Despite the difference in level of the two unemployment rates, it may not be a problem in the analysis because the subject of analysis in this study is the change in unemployment rate, not the level itself. If the two unemployment rates move in a similar trend, then the result of the three-state analysis is still valid. Figure 11 shows that the actual and steady-state unemployment rates move quite similarly, though the levels of unemployment rates are slightly different.

Table 11 shows the contribution of the six labor market transition rates to the change in youth unemployment rate in 2012–2017 using Equation (24). The change in youth unemployment rate during 2012–2017 (2.47%p) was explained mainly by the decrease in the transition from unemployed to employed (Δu^{UE}, 3.10%p) and from NILF to employed (Δu^{NE}, 1.63%p). In particular, the transition from unemployed to employed was the main factor because the contribution of the transition from unemployed to employed is about twice that of the transition from NILF to employed. These results are consistent with the results of the two-state analysis, where the contribution of the transition rate from NILF to employed would likely be included in that of the job-finding rate.

[Table 11] Decomposition Results: Three-State Analysis

Period	Age	Gender	Decomposition							
			Δu	Δu^{EU}	Δu^{UE}	Δu^{NU}	Δu^{UN}	Δu^{EN}	Δu^{NE}	Residual
2012-2017	20-29	All	2.47	-0.67	3.10	-0.36	0.48	-1.26	1.63	-0.46
			(100.0)	(-27.1)	(125.5)	(-14.5)	(19.5)	(-50.8)	(65.9)	(-18.5)
		Men	3.06	-1.04	2.85	-0.82	0.68	-1.15	1.61	0.93
			(100.0)	(-34.0)	(93.0)	(-26.7)	(22.2)	(-37.6)	(52.6)	(30.5)
		Women	1.91	-0.48	3.78	-0.01	0.39	-1.34	1.79	-2.24
			(100.0)	(-25.0)	(198.2)	(-0.4)	(20.7)	(-70.2)	(94.0)	(-117.3)

Notes: Δu and Δu^{ij} denote the changes (%p) in the unemployment and the contribution of the labor market transition rate from a status i to a status j, respectively. The number in parentheses indicates the contribution rate (%) of each transition path.
Sources: EAPS, 2012-2017, Statistics Korea.

The contributions of the transition rate from employed to unemployed (Δu^{EU}, -0.67%p) and from employed to NILF (Δu^{EN}, -1.26%p) were negative. These results are attributed to the fact that the transition rate from employed to unemployed and from employed to NILF fell steadily during the period. The negative contribution implies that the change in youth unemployment rate could have increased by 1.93%p if both transition rates had not fallen.

By gender, 2.85%p of the change in youth unemployment rate (3.06%p) for men was explained by the decrease in the transition rate from unemployed to employed and 1.61%p by the decrease in the transition rate from NILF to employed. On the other hand, in the case of women, 3.78%p of the change in youth unemployment rate (1.91%p) was explained by the fall in the transition rate from unemployed to employed and 1.79%p by the drop in the transition rate from NILF to employed. Although transition rates decreased both in young men and women, the degree of changes was slightly greater for women in the data.

To summarize the results of the three-state analysis, the rise in youth unemployment over the period 2012–2017 was explained mainly by a decrease in the transition from unemployed to employed and from NILF to employed, with the former being twice as important. The contribution of the transition rate from employed to unemployed and from employed to NILF was negative. These results are attributed to the fact that the transition rate from employed to unemployed and from employed to NILF fell steadily during the period.

Table 12 compares the results of the two-state analysis and three-state analysis. For appropriate comparison, the labor market transition paths are reclassified into three categories: "outflows" from unemployed (transition from unemployed to employed and transition from unemployed to NILF), "inflows" into unemployed (transition from employed to unemployed and transition from NILF to unemployed), and "others" (transition from employed to NILF and transition from NILF to employed). In the two-state analysis, outflows and inflows correspond to Δu^f and Δu^s, respectively. In the three-state analysis, outflows, inflows, and others are defined as $\Delta u^{UE} + \Delta u^{UN}$, $\Delta u^{EU} + \Delta u^{NU}$, and $\Delta u^{EN} + \Delta u^{NE}$, respectively.

[Table 12] Decomposition Results: Two-State vs. Three-State Analysis

Gender	Two-State Analysis					Three-State Analysis				
	Δu	Outflows	Inflows	Others	Residual	Δu	Outflows	Inflows	Others	Residual
All	2.47	2.82	0.02	-	-0.38	2.47	3.58	-1.03	0.37	-0.46
	(100.0)	(114.3)	(1.0)	-	(-15.3)	(100.0)	(145.0)	(-41.6)	(15.1)	(-18.5)
Men	3.06	3.01	0.35	-	-0.30	3.06	3.53	-1.86	0.46	0.93
	(100.0)	(98.4)	(11.5)	-	(-9.9)	(100.0)	(115.2)	(-60.7)	(14.9)	(30.5)
Women	1.91	2.70	-0.32	-	-0.47	1.91	4.17	-0.48	0.45	-2.24
	(100.0)	(141.5)	(-16.8)	-	(-24.7)	(100.0)	(218.9)	(-25.4)	(23.8)	(-117.3)

Notes: The number in parentheses indicates the contribution rate (%) of each transition path.
Sources: EAPS, 2012-2017, Statistics Korea.

Compared with the three-state analysis, the most striking difference in the two-state analysis is that the contribution of outflows is underestimated mainly by women and the contribution of inflows is overestimated mainly by men. In addition, the contribution of "others" in the three-state analysis is not small. In particular, the contribution of inflows is negative in the three-state analysis mainly due to the decrease in the transition rate from NILF to unemployed in men. This means that the less active job search of young men led to reducing the youth unemployment rate, which partially offset the actual increase in youth unemployment rate. Comparisons in Table 12 suggest that the NILF should be explicitly considered to fully understand the factors that affect the change in youth unemployment rate in Korea.

Finally, Table 13 compares the results of two-state analysis using whole and linked samples. In the comparison in Table 13, the change in youth unemployment rate in each sample is used to properly compare the two cases. In the two-state analysis using the linked sample, the absolute magnitudes of the change in youth unemployment rate and the contributions are generally large for both men and women, but the contribution rates are very similar in the two cases. Although the two results are not completely identical, the fact that the main results in the two cases are consistent for both men and women implies that the three-state analysis using the linked sample for the youth in this study is reliable.

[Table 13] Decomposition Results: Two-State Analysis Using the Linked Sample

Gender	Whole Sample				Linked Sample			
	Δu	Δu^f	Δu^s	Residual	Δu	Δu^f	Δu^s	Residual
All	2.47	2.82	0.02	-0.38	2.81	3.46	-0.08	-0.57
	(100.0)	(114.3)	(1.0)	(-15.3)	(100.0)	(123.3)	(-3.0)	(-20.3)
Men	3.06	3.01	0.35	-0.30	3.43	3.68	0.67	-0.92
	(100.0)	(98.4)	(11.5)	(-9.9)	(100.0)	(107.1)	(19.6)	(-26.7)
Women	1.91	2.70	-0.32	-0.47	2.17	3.33	-0.95	-0.21
	(100.0)	(141.5)	(-16.8)	(-24.7)	(100.0)	(153.3)	(-43.5)	(-9.8)

Notes: Δu, Δu^f, and Δu^s denote the changes (%p) in the unemployment, contribution of the job-finding rate, and contribution of the job-separation rate, respectively. The number in parentheses indicates the contribution rate (%) of each transition path.
Sources: EAPS, 2012-2017, Statistics Korea.

IV. Decomposition Results for Other Age Groups

4.1. Two-State Analysis

Table 14 shows the decomposition results in the two-state analysis by age group and gender for the different periods: 2000–2011, when youth unemployment rate remained relatively stable, and 2012–2017, when youth unemployment rate rose sharply. Between 2000 and 2011, youth unemployment rate decreased by 0.05%p. -0.11%p of the change in youth unemployment rate (0.05%p) for men was explained by the decrease in job-finding rate and 0.04%p by the increase in job-separation rate. These results reflect that youth unemployment rate, job-finding rate, and job-separation rate during this period were generally stable, as shown in Figures 1, 2, and 3, respectively. The impact of the job-separation rate on youth unemployment rate was not much different for both periods: 0.04%p in 2000–2011 and 0.02%p in 2012–2017. However, the job-finding rate, which was previously stable, decreased sharply between 2012 and 2017, leading to a rise in youth unemployment rate in 2012-2017.

[Table 14] Decomposition Results by Age Group and Gender: Two-State Analysis

Period	Age	Gender	Decomposition			
			Δu	Δu^f	Δu^s	Residual
2000-2011	20-29	All	-0.05 (100.0)	-0.11 (213.8)	0.04 (-74.5)	0.02 (-39.3)
		Men	-0.35 (100.0)	-0.44 (128.3)	0.23 (-65.9)	-0.13 (37.6)
		Women	0.42 (100.0)	0.33 (80.2)	-0.08 (-19.1)	0.16 (38.8)
	30-49	All	-1.08 (100.0)	-0.26 (24.3)	-0.83 (77.6)	0.02 (-1.9)
		Men	-1.38 (100.0)	-0.39 (28.3)	-0.99 (72.2)	0.01 (-0.4)
		Women	-0.57 (100.0)	0.14 (-24.2)	-0.71 (126.1)	0.01 (-1.9)
	50+	All	-0.33 (100.0)	-0.28 (87.0)	0.02 (-5.1)	-0.06 (18.2)
		Men	-0.71 (100.0)	-0.41 (57.4)	-0.16 (22.2)	-0.15 (20.5)
		Women	0.18 (100.0)	0.11 (60.4)	0.14 (75.1)	-0.06 (-35.5)
2012-2017	20-29	All	2.47 (100.0)	2.82 (114.3)	0.02 (1.0)	-0.38 (-15.3)
		Men	3.06 (100.0)	3.01 (98.4)	0.35 (11.5)	-0.30 (-9.9)
		Women	1.91 (100.0)	2.70 (141.5)	-0.32 (-16.8)	-0.47 (-24.7)
	30-49	All	0.16 (100.0)	0.87 (534.1)	-0.73 (-450.2)	0.03 (16.1)
		Men	-0.01 (100.0)	0.65 (-9,039.2)	-0.68 (9,588.6)	0.03 (-449.5)
		Women	0.43 (100.0)	1.32 (309.4)	-0.87 (-203.7)	-0.02 (-5.7)
	50+	All	0.22 (100.0)	0.69 (312.9)	-0.43 (-194.2)	-0.04 (-18.7)
		Men	0.13 (100.0)	0.76 (566.0)	-0.64 (-470.8)	0.01 (4.8)
		Women	0.36 (100.0)	0.79 (219.4)	-0.19 (-53.0)	-0.24 (-66.3)

Notes: Δu, Δu^f, and Δu^s denote the changes (%p) in the unemployment, contribution of the job-finding rate, and contribution of the job-separation rate, respectively. The number in parentheses indicates the contribution rate (%) of each transition path.

Sources: EAPS, 2000-2017, Statistics Korea.

The increase in unemployment rate for those aged 30–49 years old was 0.16%p and for those aged 50 years old and over during 2012–2017 was 0.22%p. The unemployment rate of those age groups did not rise as high as that of the youth. For those aged 30 years old and over, the effect of reduction in job-finding rate was lower than that of the youth. In addition, the effect of the decrease in job-separation rate was huge, which seems to have largely offset the rise in unemployment rate. In other words, for those aged 30 years old and over, the fall in job-separation rate largely offsets the rise in unemployment rate caused by the fall in job-finding rate. However, since the effect of the decline in job-separation rates for the youth was relatively low, as shown in Figure 3, the large increase in unemployment rate caused by the decline in job-finding rate cannot be offset enough.

4.2. Three-State Analysis

Table 15 shows the decomposition results by age group and gender for the different periods: 2000–2011, when youth unemployment rate remained relatively stable, and 2012–2017, when youth unemployment rate rose sharply. Between 2000 and 2011, youth unemployment rate decreased by 0.05%p. The decrease is explained mainly by the falls in the transition rates from employed to unemployed, from unemployed to NILF, and from employed to NILF. These results are partly consistent with the results of the two-state analysis, but the role of the transition paths related to the NILF seems to be important in the three-state analysis.

The increase in unemployment rate for those aged 30–49 years old and 50 years old and over during 2012–2017 was 0.16%p and 0.22%p, respectively. Similar to the youth, the transition rate from unemployed to employed and from NILF to employed decreased, which seems to increase the unemployment rate. However, as shown in Table 15, the transition rate from employed to NILF decreased, which partially offsets the rise in unemployment rate for those age groups. The results are related to the fact that the decrease in job-separation rate for those aged 30 years old and over offsets the increase in unemployment rate caused by the decrease in job-finding rate in the two-state analysis. Additional information that can be obtained from the three-state analysis is that this canceling effect is mainly caused by a decrease in the transition from employed to NILF rather than the transition from employed to unemployed.

V. Conclusion

This study investigated the contribution of labor market transition rates to the rise in youth unemployment rate in Korea during 2012–2017. Under the assumption that there was no movement between the labor force and the NILF, changes in the job-finding rate accounted for most of the rise in the youth unemployment rate. 2.82%p of the change in youth unemployment rate between

[Table 15] Decomposition Results by Age Group and Gender: Three-State Analysis

Period	Age	Gender	Decomposition							
			Δu	Δu^{EU}	Δu^{UE}	Δu^{NU}	Δu^{UN}	Δu^{EN}	Δu^{NE}	Residual
2000-2011	20-29	All	-0.05	-0.79	0.60	0.63	-0.72	-0.90	3.53	-2.41
			(100.0)	(1,487.7)	(-1,135.1)	(-1,188.6)	(1,353.9)	(1,696.2)	(-6,666.2)	(4,552.0)
		Men	-0.35	-1.93	0.01	0.34	-1.03	0.42	1.25	0.60
			(100.0)	(559.8)	(-1.8)	(-99.4)	(299.4)	(-121.3)	(-362.6)	(-174.0)
		Women	0.42	0.18	1.67	0.56	-0.40	-2.25	6.68	-6.01
			(100.0)	(42.6)	(399.7)	(133.8)	(-96.4)	(-539.7)	(1,602.1)	(-1,442.2)
	30-49	All	-1.08	-2.11	0.30	0.26	-0.33	-1.33	2.23	-0.11
			(100.0)	(195.9)	(-28.3)	(-24.5)	(30.3)	(123.8)	(-207.2)	(10.0)
		Men	-1.38	-2.62	-0.20	0.32	-0.11	-0.44	0.93	0.74
			(100.0)	(190.5)	(14.4)	(-23.6)	(8.2)	(31.9)	(-67.5)	(-53.9)
		Women	-0.57	-0.40	0.67	0.17	-0.10	-0.28	0.45	-1.08
			(100.0)	(71.2)	(-118.8)	(-29.6)	(17.4)	(49.6)	(-79.8)	(190.1)
	50+	All	-0.33	-0.36	-0.25	0.59	-0.25	-0.15	0.06	0.04
			(100.0)	(110.0)	(78.1)	(-180.1)	(78.0)	(45.8)	(-18.8)	(-13.1)
		Men	-0.71	-0.17	-0.68	0.95	-0.34	-0.20	-0.09	-0.18
			(100.0)	(23.5)	(95.4)	(-133.5)	(48.5)	(28.7)	(12.2)	(25.3)
		Women	0.18	-0.55	0.58	0.15	0.26	-0.08	0.25	-0.43
			(100.0)	(-304.1)	(320.5)	(83.3)	(142.6)	(-41.7)	(139.6)	(-240.1)
2012-2017	20-29	All	2.47	-0.67	3.10	-0.36	0.48	-1.26	1.63	-0.46
			(100.0)	(-27.1)	(125.5)	(-14.5)	(19.5)	(-50.8)	(65.9)	(-18.5)
		Men	3.06	-1.04	2.85	-0.82	0.68	-1.15	1.61	0.93
			(100.0)	(-34.0)	(93.0)	(-26.7)	(22.2)	(-37.6)	(52.6)	(30.5)
		Women	1.91	-0.48	3.78	-0.01	0.39	-1.34	1.79	-2.24
			(100.0)	(-25.0)	(198.2)	(-0.4)	(20.7)	(-70.2)	(94.0)	(-117.3)
	30-49	All	0.16	-0.57	0.72	-0.33	0.32	-0.88	0.55	0.35
			(100.0)	(-351.8)	(445.0)	(-201.1)	(196.9)	(-541.9)	(339.8)	(213.0)
		Men	-0.01	-0.90	0.61	-0.19	0.21	-0.98	0.67	0.57
			(100.0)	(12,609.7)	(-8,559.5)	(2,653.0)	(-2,996.3)	(13,764.1)	(-9,321.8)	(-8,049.1)
		Women	0.43	-0.14	1.05	-0.39	0.56	-0.85	0.57	-0.37
			(100.0)	(-32.9)	(246.4)	(-90.8)	(130.3)	(-198.5)	(133.2)	(-87.7)
	50+	All	0.22	-0.10	0.62	-0.64	0.64	-0.81	0.40	0.12
			(100.0)	(-45.9)	(279.6)	(-291.9)	(290.5)	(-369.8)	(183.0)	(54.4)
		Men	0.13	-0.28	0.99	-0.77	0.76	-0.87	0.31	0.01
			(100.0)	(-205.7)	(732.2)	(-573.8)	(560.6)	(-645.9)	(226.6)	(6.0)
		Women	0.36	0.02	0.58	-0.45	0.65	-0.72	0.64	-0.36
			(100.0)	(6.7)	(159.5)	(-125.4)	(180.2)	(-199.9)	(178.1)	(-99.2)

Notes: Δu and Δu^{ij} denote the changes (%p) in the unemployment and the contribution of the labor market transition rate from a status i to a status j, respectively. The number in parentheses indicates the contribution rate (%) of each transition path.
Sources: EAPS, 2000-2017, Statistics Korea.

2012 and 2017 (2.47%p) was explained by the fall in job-finding rate and 0.02%p by the rise in job-separation rate. In the three-state analysis where the movements between the labor force and the NILF were considered, the increase in youth unemployment rate could be mainly attributed to the decline in the transition rate from unemployed to employed and from NILF to employed, with the impact of the former double that of the latter. The contribution of the transition rate from employed to unemployed and from employed to NILF was negative. These results are attributed to the fact that the transition rate from employed to unemployed and from employed to NILF fell steadily during the period. The negative contribution implies that the change in youth unemployment rate could have increased by 1.93%p if both transition rates had not fallen. The results of the three-state analysis are partly similar to those of the two-state analysis.

This study has a few limitations. First, this study did not investigate the reasons for the decrease in job-finding rate or transition rate from unemployed to employed and from NILF to employed during 2012–2017. Kim (2018) shows that most of the increase in overall unemployment rate during 2014–2017 is explained by the lack of labor demand in the economy and the deepening of industry-level mismatch unemployment. In this regard, the decrease in job-finding rate across all age groups may be related to the decline in labor demand due to the slowdown of the economic growth and the phenomenon in which job seekers are concentrated in specific industries or occupations. According to the main result of this study, it is necessary to implement a policy to increase the transition into the employed so as to reduce youth unemployment rate. For designing specific policies to lower the youth unemployment rate by enhancing the transition to the employed, the causes of the decline in the transition rate to the employed should be further examined in future research.

Another limitation of this study regarding the three-state analysis is that the matching rate of adjacent monthly data in the EAPS is not high enough, which could impair sample representativeness. Although this study shows that the selection bias may not be large, especially for the youth, a more accurate study would be possible if samples could be linked using household ID and household member ID. It is hoped that, as in the past, Statistics Korea will disclose those variables, and thus more precise and fruitful academic and policy studies on labor market transition can be conducted in the near future.

References

Elsby, Michael W. L., Bart Hobijn, and Aysegul Sahin (2015), "On the Importance of the Participation Margin for Labor Market Fluctuations," *Journal of Monetary Economics*, 72(C), 64–82.

Fujita, Shigeru, and Garey Ramey (2009), "The Cyclicality of Separation and Job Finding Rates," *International Economic Review*, 50(2), 415–430.

Han, Jong-Suk, and Jiwoon Kim (2019), "Reassessing the Inflows and Outflows of Unemployment in Korea," *Korean Economic Review*, 35(1), 25–59.

Kim, Jiwoon (2018), "Analysis on the Increase in Unemployment Rates Since 2014," *KDI Economic Outlook 2018-2nd Half*.

__________ (2019), "A Study on Youth Unemployment from the Perspective of Worker Flow," *KDI Policy Study* (in Korean), 2019-14.

Kim, Jong-Wook (2018), "Issue Analysis: Comparison of Before and After Population Adjustment in Employment Statistics," *Monthly Labor Review* (in Korean), 158, 57–69.

Kim, Seongtae, and Junsang Lee (2014), "Accounting for Ins and Outs of Unemployment in Korea," *Korea and the World Economy*, 15(1), 17–44.

Nam, Jaeryang, and Chang Young Rhee (1998), "The Study on Korean Unemployment Trend," *Kyung Je Hak Yon Gu* (in Korean), 46(2), 31–61.

Nam, Jaeryang, and Chul-In Lee (2012), "Youth Unemployment over the Business Cycle: An Analysis of Job-finding and Job-separation Hazards," *Journal of Economic Theory and Econometrics* (in Korean), 23(4), 312–338.

Park, Kangwoo (2014), "Decomposing Volatilities and Asymmetries in Unemployment: The Ins Versus the Outs," *Journal of Economic Theory and Econometrics* (in Korean), 25(2), 84–119.

Petrongolo, Barbara, and Christopher A. Pissarides (2008), "The Ins and Outs of European Unemployment," *American Economic Review*, 98(2), 256-262.

Shimer, Robert (2012), "Reassessing the Ins and Outs of Unemployment," *Review of Economic Dynamics*, 15(2), 127–148.

최근 한국의 청년 실업률 상승: 유량(flow) 분해 분석*

김 지 운**

초 록 본 연구는 2012~2017년 사이의 한국 청년(20~29세) 실업률 상승에 대한 노동시장 이행률의 기여도를 수량화하였다. 경제활동인구와 비경제활동인구 간 이동이 없다고 가정한 2개 노동시장 이행률 분석 결과, 2012~2017년 사이의 청년 실업률 변화분(2.47%p) 중 2.82%p는 구직률 하락, 0.02%p는 실직률 상승으로 설명되어 구직률 하락이 최근 청년 실업률 상승에 주요한 요인으로 나타났다. 한편, 경제활동인구와 비경제활동인구 사이의 이행도 명시적으로 반영한 6개 노동시장 이행률 분석 결과, 청년 실업률 상승은 주로 실업자에서 취업자, 비경제활동인구에서 취업자로의 이행 감소에 의해 설명되었다. 실업자에서 취업자로의 이행 감소의 영향이 비경제활동인구에서 취업자로의 이행 감소의 영향보다 약 2배 크게 나타났다. 2개 노동시장 이행률 분석 결과와 유사하게 실업자 및 비경제활동인구에서 취업자로의 이행률 감소가 최근 청년 실업률 상승의 주된 요인으로 분석되었다.

핵심 주제어: 청년 실업률, 노동시장 이행, 유량 분해, 한국
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** 홍익대학교 경제학부 조교수, e-mail: jwkim@hongik.ac.kr