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Research Report

Work Flow and Its Cyclical Fluctuations in Korea

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| Preface |

The dynamics of flows between employment, unemployment and inactivity determines fluctuations in aggregate indicators, such as employment and unemployment rates. Hence, they are important to our understanding of labor market dynamics and business cycle fluctuations.

This paper constructs a number of stylized facts about the properties of the Korean labor market flows by exploring data from EAPS. These stylized facts are of interest to policy makers and macroeconomists. For policy makers, they can help improve the monitoring of business cycles, the detection of turning points and the assessment of labor market tightness. For macroeconomists, this paper provides a reference for the calibration of a number of parameters, and also a guideline for the properties one should expect a model to have for Korean economy.

I believe that this research shows the size and cyclical patterns of the flows and transition rates between employment, unemployment and not-being-active-in the labor force. I hope that the evidence presented here proves useful to policy-makers. The author would like to thank Heeil Koo for excellent research assistance. The views expressed herein are those of the author and should not be attributed to the Korea Development Institute.

Oh-Seok HYUN
President of KDI

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Summary

This paper studies work flow dynamics in Korea from 2000 to 2011 by using data from Economically Active Population Survey (EAPS). We examine the size and cyclicity of both the gross work flows and the associated transition rates between the labor market states of employment, unemployment, and inactivity. We find that about 5% of the working age population changes labor market status in each month. Inflows and outflows of unemployment are counter-cyclical, while flows between employment and inactivity are procyclical. We also decompose unemployment fluctuations into the parts due to changes in inflow and outflow rates. Conventional decomposition method finds that both inflow and outflow rates contribute substantially to unemployment fluctuations in Korea and particularly inflow through inactivity plays a relatively larger role in unemployment dynamics in Korea, compared to other countries.

CHAPTER 1

Introduction

This paper investigates the labor market fluctuation in Korea between 2000 and 2011. We build up gross work flows data using the monthly Economically Active Population Survey (EAPS). Our data set enables us to examine the size and cyclical patterns of the flows and transition rates between employment, unemployment and not-being-active-in the labor force. We find that relatively large size of working age population changes labor market status in each month and Korean unemployment fluctuation can be accounted particularly by the inflow rate through inactivity status.

The dynamics of flows between employment and unemployment and inactivity determines fluctuations in aggregate indicators, such as the employment and unemployment rates. Hence they are important to our understanding of labor market dynamics and business cycle fluctuations. Furthermore, work flows and transition rates are located at the heart of models of unemployment anchored in the Mortensen and Pissariades (1994) search and matching framework.

The objective of this paper is to construct a number of stylized facts about the properties of the Korean labor market flows, by exploring data from EAPS. These stylized facts are of interest to policy makers and macroeconomist. For policy makers, they can help improve the monitoring of business cycles, the detection of turning points and the assessment of labor market tightness. For macroeconomists, this paper provides a reference for the calibration of a number of parameters, and also a guideline for the properties one should expect a model to have for

Korean economy.

This study documents stylized facts on work flows and the associated transition rates in Korea. We find that there is relatively large portion (about 5%) of working age population changes labor market status in Korea, compared to other countries. The cyclicalities of work flows and the associated transition rates are investigated and we find that the cyclical patterns of work flows are similar to those found in the US. Inflow and outflow of unemployment are counter-cyclical. We show that transition probability from unemployment to employment is procyclical, while the transition probability from employment to unemployment is counter-cyclical. One outstanding feature that Korean labor market has is that work flows between employment and inactivity are relatively larger than those in the UK and Japan.

We also investigate what accounts for the cyclical behavior of unemployment: job-finding or separation. The seminal work on labor market flow by Blanchard and Diamond (1990) and Davis and Haltiwanger (1992) set the conventional wisdom that recessions are mainly driven by high job loss rates. In two recent papers, Shimer (2007) and Hall (2005) have challenged this view by presenting evidence that cyclical unemployment dynamics are largely driven by a time-varying job-finding rate and that the separation rate is very close to being acyclical. We decompose unemployment fluctuations into the parts due to changes in inflow and outflow rates. Conventional decomposition method shows that both inflow and outflow rates contribute substantially to unemployment fluctuations in Korea and particularly inflow through inactivity plays a relatively larger role in unemployment dynamics in Korea

The remainder of this paper is organized as follows. Section 2 describes our data construction. Section 3 studies some stylized facts about Korean work flow and Section 4 examines cyclicalities of work flows by conducting cyclical analysis of the data. In Section 5, we study the contribution of changes in unemployment inflow and outflow rates to unemployment dynamics. Section 6 concludes.

CHAPTER 2

The Data

This section we explain how we construct the data by using the monthly Economically Active Population Survey (EAPS). The EAPS is conducted by the Statistical Survey Bureau, Statistic Office and have been used for the employment statistics in Korea. The EAPS has approximately 32,000 households in sample and every month 1/36 of total households leave and are replaced by new 900 households. The EAPS is not meant to be constructed for a panel data set. We use household and individual codes in monthly EAPS data and construct a panel from 2000 to 2011.

In the EAPS, an individual is classified into three categories: employed (E), unemployed (U) and inactive (I). The sum of the stocks in the first two labor market states (E+U) are the size of labor-force and the sum of the stocks in the three labor market states (E+U+I) measures working age population. Work flows between these states are denoted by two consecutive capital letters: EE, EU, EI, UE, UU, UI, IE, IU, and II. For example, individual is in EU if she transit from the “employed” state to the “unemployed” state over one month.

By matching individuals across the two consecutive months, we compute the transition rate over the labor market states. Denote ω_{jt} as a sample weight of sample j at month t and G_t^{XY} as a set of individuals that transit from a labor state $X \in \{E, U, I\}$ to the state $Y \in \{E, U, I\}$ at month t . Then the gross flows from state X to state Y can be computed as follows:

$$F_t^{XY} = \sum_{j=G_t^{XY}} \omega_{jt}$$

Monthly transition rates, denoted as p_t^{XY} , are calculated using the grow flows. For example, the transition rate from employment state to unemployment state is computed as:

$$p_t^{EU} = \frac{F_t^{EU}}{\sum_{Y \in \{E, U, I\}} F_t^{EY}}$$

Then we seasonally adjusted the series using U.S. Census Bureau X-12 monthly seasonal adjustment Method and converted these monthly series to quarterly frequency by simple averaging.

CHAPTER 3

Work Flows in Korea

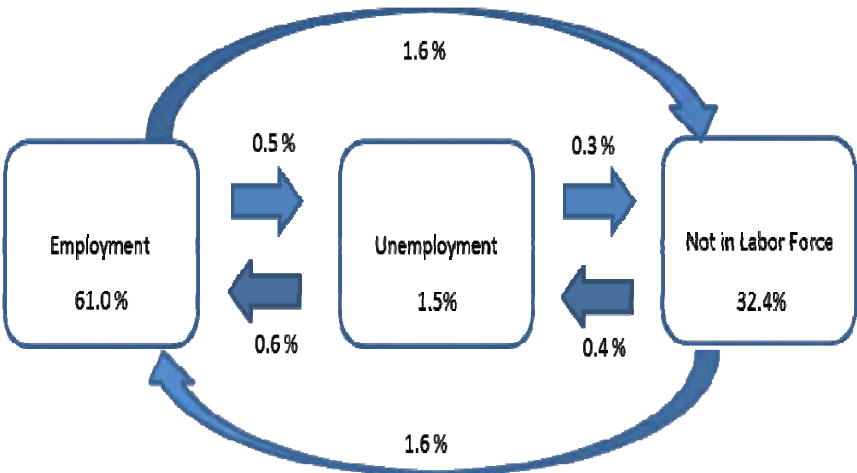
In this section, we discuss some characteristics of the Korean work flows data. Figure 1 shows the average work flows between employment, unemployment and inactivity as a percentage of the working age-population.

Table 1 compares the average monthly gross work flows for Korea with those for Japan, the US and the UK. Table 1 shows that the size of outward work flows in Korea is larger than those in the Japan and the UK but smaller than that in the US. It can be shown that the labor market dynamics in Korea is relatively more active but the US.

Figure 2 shows that the evolution of the employment rate, unemployment rate and inactivity rate in Korea from 2000Q1 to 2011Q4¹. The employment rate increased with the beginning of year 2000 after Asian crisis and was relatively stable around 63% until the end of 2007 when it started to drop at 2008. Then it gradually increased to 64.3% at the end of 2011. For the last 11 years, Korean economy has a gradually-growing employment rate. The unemployment rate was high at the beginning of year 2000 and declined till the early of 2003. It again declined gradually till the next economic downturn in the end of 2007. The inactivity rate has steadily increased since 2005 till the end of 2008 and has been gradually going down since 2010. Overall inactivity rates

¹ The employment rate is defined as the ratio of employment to the working-age population. The unemployment rate is defined as the ratio of unemployment to the labor force (the sum of employment and unemployment). The inactivity rate is defined as the ratio of inactive to the working-age population.

Figure 1 | Average Gross Work Flows, 2000~2011



Note: Gross work flows are expressed as a percentage of the working-age population. The sample period for Korea covers 2000~2011.

Table 1 | Gross Flows for Korea, Japan, the US and the UK

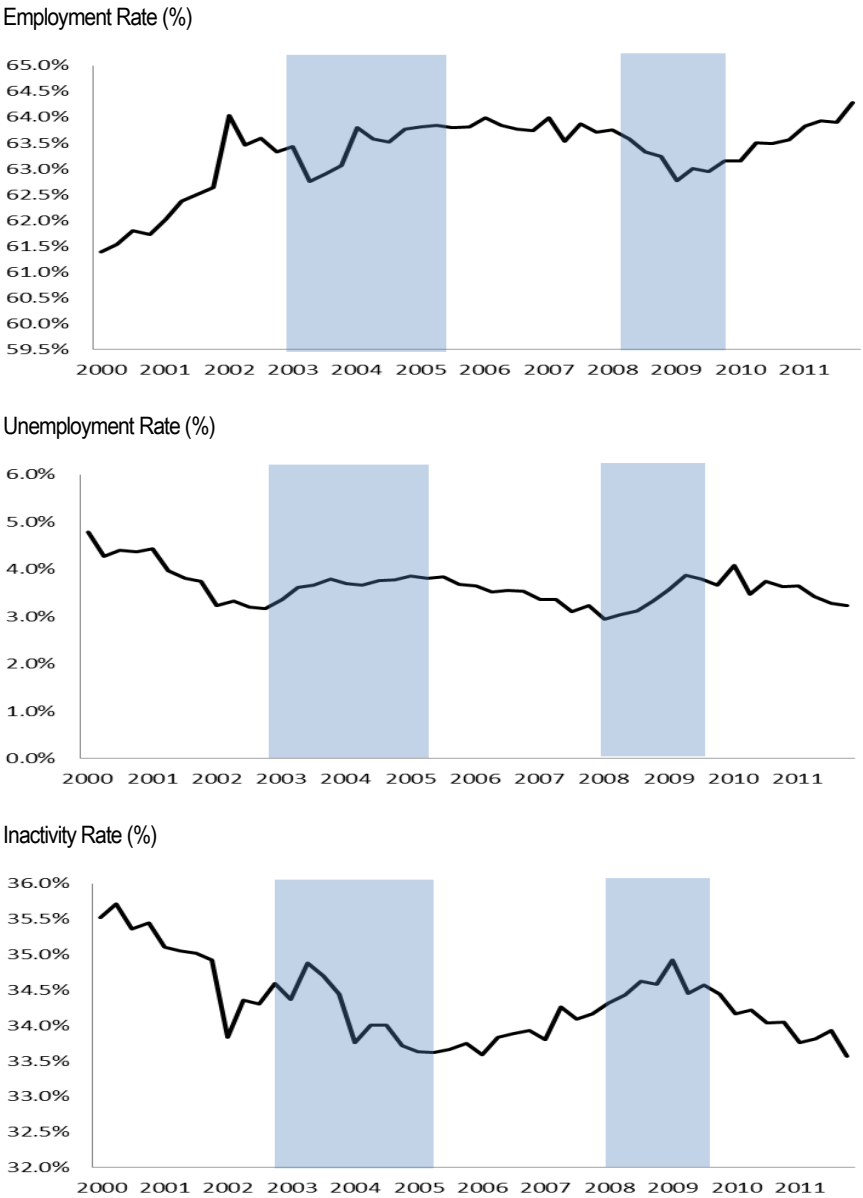
Country	EU	EI	UE	UI	IE	IU	Total
Korea	0.5	1.6	0.6	0.3	1.6	0.4	5.1
Japan	0.3	0.9	0.3	0.2	0.9	0.2	2.8
US	0.8	1.7	1.0	0.8	1.5	0.6	6.5
UK	0.4	0.5	0.5	0.3	0.4	0.4	2.5

Note: Gross work flows are expressed as a percentage of the working-age population. The sample period for Korea covers 2000~2011. The values for Japan, the US and the UK are obtained from Lin and Miyamoto (2012), Bleakley *et al.* (1999) and Gomes (2009) respectively.

has been declining for the past decade.

Figure 3 shows the pairwise interactions between three states in labor market. The first row displays gross flows between employment and unemployment and net work flow. Work flow from unemployment to employment has been always higher than that from employment to unemployment. The net work flow between employment and unemployment has declined since the end of 2008, which implies the measure of work flow from unemployment to employment has

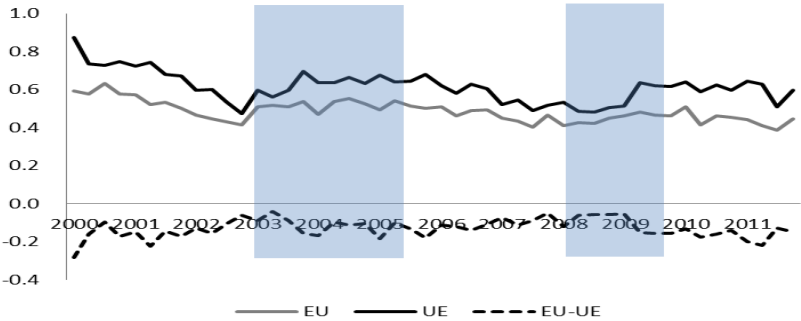
Figure 2 Labor Market Stocks



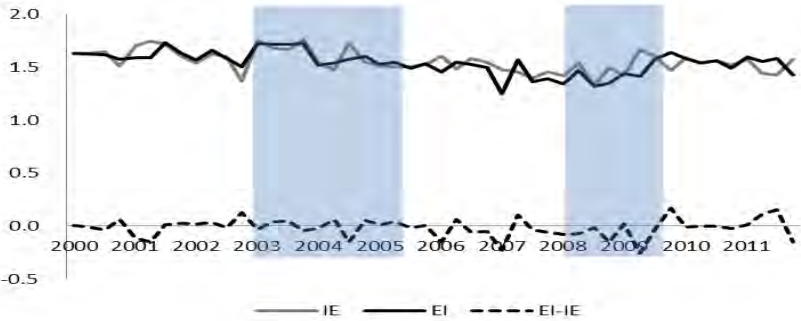
Note: Shaded areas indicate periods between peak and trough from Business Cycle Clock in National Statistical Office, Korea.

Figure 3 Labor Market Gross Flows and Net Flow, 2000~2011

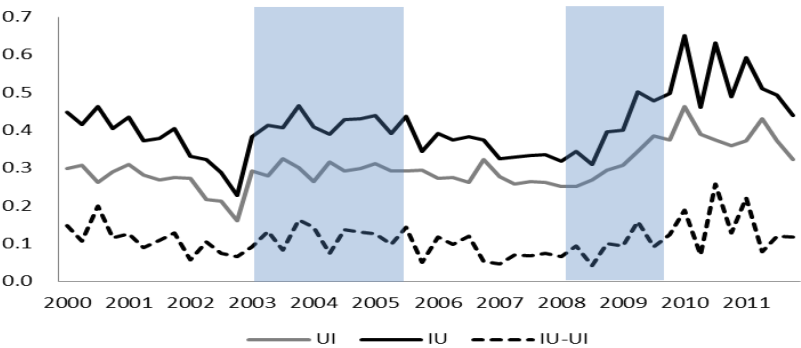
Gross Flows and Net Flow between Employment and Unemployment (%)



Gross Flows and Net Flow between Employment and Inactivity (%)



Gross Flows and net Flow between Unemployment and Inactivity (%)



Note: Shaded areas indicate periods between peak and trough from Business Cycle Clock in National Statistical Office, Korea.

outnumbered that from employment to unemployment. The second row of the figure shows gross flows and net flow between employment and inactivity. The size of gross work flow between employment and inactivity is greatest among the size of other pairwise gross flows. The net flow from employment to inactivity declined with trend till the end of 2007 and has increased since. The third row depicts the gross flows and net flow between unemployment and inactivity. The gross work flows show relatively larger increases in 2008 and then they have decreased but have not reached to the level before.

Figure 4 displays outflow transition probabilities across the three pools. Transition average probability from employment outwards over our sample periods shows that average probability to inactivity is approximately 3.2 times greater than the average probability to unemployment, while the one to inactivity is only 1.5 times bigger than one into unemployment in the US over the period from 1967 Q3 to 2007 Q2² and 1.46 times bigger in the UK³. The separation rate from employment state (transition probability from employment to unemployment) increased in the early of 2003 and came down gradually afterward with economic recovery. Recently at the late of 2008, it increased but has not been showing that it comes back. Transition probabilities from unemployment shows that the job finding rate from unemployment state is 25.9% on average over the sample in Korea while the corresponding rate is 32.11% over the period between 1967 Q3 and 2007 Q2 in the US and 27.8% for 1996-2007 in the UK. Inactivity outflow transition rates show that the direct transition to employment is 3.9 times greater than the transition to unemployment state.

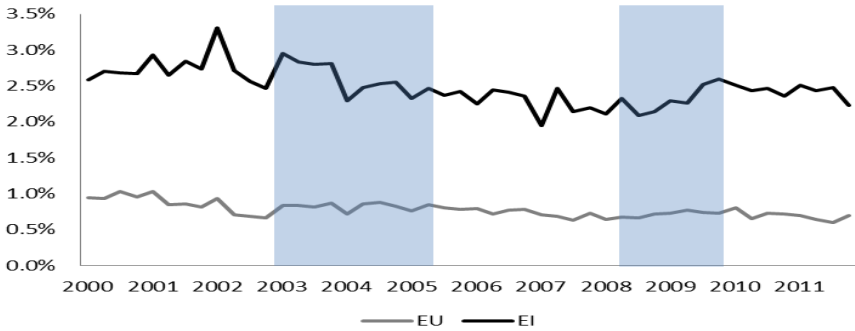
Based on these figures, a decline in unemployment since 2009 is not due to an increase in work flow from unemployment to employment but to decrease in that from employment to unemployment despite of the fact that the outflow from inactivity to unemployment outnumbered that from unemployment to inactivity.

² See Shimer's dataset from his webpage.

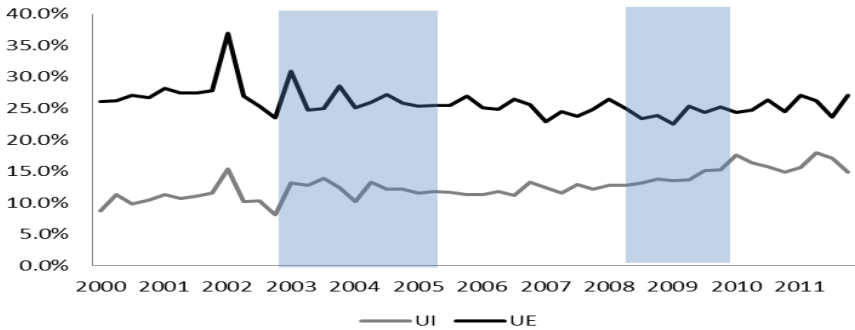
³ See Gomes (2009).

Figure 4 Labor Market Transition Rates

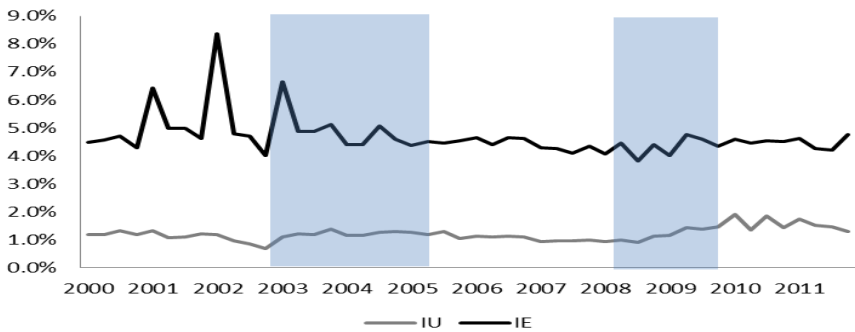
Employment Outflow Transition Rates (%)



Unemployment Outflow Transition Rates (%)



Inactivity Outflow Transition Rates (%)



Note: Shaded areas indicate periods between peak and trough from Business Cycle Clock in National Statistical Office, Korea.

CHAPTER 4

Cyclicalty of Work Flows

This section studies the cyclicalty of gross work flows and transition rates. We compute their correlation with the level of economic activity. We use the real GDP as an indicator of the business cycles. To obtain the cyclical components of the data, we use three alternative detrending methods: the Hodrick-Prescott (HP) filter with the standard smoothing parameter ($\lambda = 1600$) and with a low frequency filter ($\lambda = 10^5$)⁴, and the Boxter-King (BK) band-pass filter.⁵

Inflows and outflows from the unemployment pool are counter-cyclical. This implies that the flows in and out of the unemployment pool increase in recessions. The counter-cyclicalty of EU and IU flows is straightforward. In recession, more employed workers lose their jobs, and more inactive persons start searching for jobs, due to the “added-worker effect”. In contrast, the counter-cyclicalty of the UE flows may seem puzzling. This means that flows from unemployment to employment increase in recessions. This result can be explained in the following way. The UE flows are determined by the job finding rate and the number of unemployed workers, i.e., $F_t^{UE} = p_t^{UE} \times U$. In recessions, the job-finding rate falls and the number of unemployed workers rises. Since the latter effect dominates the former effect, the flow from

4 An HP filter with this smoothing parameter ($\lambda = 10^5$) is very close to linear detrending.

5 Following Boxter and King (1999) and Stock and Watson (1999), we use a standard decomposition of the frequency band. Thus we isolate cycles with period of 6 quarters which is one of the typical length used in this exercise.

Table 2 Business Cycle Properties of Work Flows

2000Q1~2011Q4	HP ($\lambda = 1600$)		HP ($\lambda = 10^5$)		BK	
Gross flow	ρ	σ/σ_y	ρ	σ/σ_y	ρ	σ/σ_y
F_t^{EU}	-0.61	5.31	-0.51	5.52	-0.68	4.48
F_t^{EI}	0.08	3.23	0.05	5.45	0.06	2.74
F_t^{UE}	-0.42	6.17	-0.33	7.64	-0.31	5.18
F_t^{UI}	-0.49	7.82	-0.43	8.59	-0.39	8.66
F_t^{IE}	0.13	5.20	0.12	6.51	0.06	2.78
F_t^{IU}	-0.56	9.03	-0.51	10.38	-0.55	8.37

Note. y_t is the percentage deviation from trend of real GDP. F^{XY} is the gross work flows from state $X \in \{E, U, I\}$ to another state Y . All variables are filtered using the Hodrick-Prescott filter (with smoothing parameter 1600 or 10^5), or the Baxter-King filter.

Table 3 Business Cycle Properties of Transition Rates

2000Q1~2011Q4	HP ($\lambda = 1600$)		HP ($\lambda = 10^5$)		BK	
Transition rates	ρ	σ/σ_y	ρ	σ/σ_y	ρ	σ/σ_y
p_t^{EU}	-0.61	0.04	-0.53	0.04	-0.71	0.04
p_t^{EI}	0.12	0.10	0.11	0.14	0.14	0.07
p_t^{UE}	0.21	1.16	0.18	1.20	0.25	0.19
p_t^{UI}	-0.03	0.73	-0.03	0.79	0.06	0.20
p_t^{IE}	0.17	0.38	0.18	0.41	0.24	0.79
p_t^{IU}	-0.48	0.11	-0.46	0.12	-0.10	1.04

Note. y_t is the percentage deviation from trend of real GDP. p^{XY} is the transition rates from state $X \in \{E, U, I\}$ to another state Y . All variables are filtered using the Hodrick-Prescott filter (with smoothing parameter 1600 or 10^5), or the Baxter-King filter.

unemployment to employment rises in recessions. Gross worker flows between employment and inactivity are procyclical. However, their correlations are low, and it seems that these flows are less sensitive to business cycles.

The job-finding rate (p_t^{UE}), the transition rates from inactivity to employment (p_t^{IE}) and from employment to inactivity (p_t^{EI}) are procyclical. The separation rate (p_t^{EU}) and the transition rates from inactivity to unemployment (p_t^{IU}) are counter-cyclical. The procyclicality of the job finding rate suggests that it is relatively easier to

Table 4 | Cross-correlation Analysis

	Lags				0	Leads			
	12	6	3	1		1	3	6	12
$p_{t \pm j}^{EU}, y_t$	0.27	0.13	-0.23	-0.49	-0.61	-0.64	-0.36	0.09	0.39
$p_{t \pm j}^{EI}, y_t$	-0.25	-0.04	0.15	0.19	0.12	0.02	-0.05	0.03	0.24
$p_{t \pm j}^{UE}, y_t$	-0.31	0.17	0.25	0.30	0.21	0.07	-0.08	-0.12	0.06
$p_{t \pm j}^{UI}, y_t$	-0.03	-0.15	-0.01	-0.04	-0.03	-0.11	-0.03	0.20	0.17
$p_{t \pm j}^{IE}, y_t$	-0.31	0.04	0.25	0.27	0.17	0.06	0.06	-0.07	0.02
$p_{t \pm j}^{IU}, y_t$	0.33	0.09	-0.19	-0.38	-0.48	-0.57	-0.40	0.10	0.53

Note: y_t is the percentage deviation from trend of real GDP. p^{xy} is the transition rate from state $X \in \{E, U, I\}$ to another state Y . All variables are filtered using the Hodrick-Prescott filter with smoothing parameter 1600.

find a job in boom. The counter-cyclicality of the IU transition rate implies that in a recession, an inactive person is more likely to search for a job. These cyclical patterns hold true at lead and lag of up to three quarters, except the transition rate from employment to inactivity, as seen in Table 4.

We look into the robustness of these findings to the options of business cycle indicator. We use the unemployment rate as a cyclical indicator. Following Baker (1992) and Gomes (2009), we estimate the cyclicity of work flows by running an ordinary least squares regression of the percentage deviation of each variable from its trend on a season dummy variables and the unemployment rate. The results are shown in Table 5.

The results confirm the preceding ones. Inflows and outflows of the unemployment pool are counter-cyclical. Flows from inactivity to employment status do not have any clear cyclical properties. The separation rate (p_t^{EU}) is counter-cyclical, while the job-finding rate (p_t^{UE}) is pro-cyclical. In terms of the size, the coefficient for the job-finding rate is approximately 4.8 times bigger than that of the separation rate. This implies that the job-finding rate fluctuates more than the separation rate. In order to investigate the relative importance of the job finding and the separation rate in driving unemployment dynamics, we conduct a more careful analysis in the next section.

Table 5 | Business Cycle Properties of Worker Flows and Transition Rates

	HP ($\lambda = 1600$)	HP ($\lambda = 10^5$)	BK
F_t^{EU}	10.88 (9.55)	19.92 (20.78)	8.97 (8.15)
F_t^{EI}	1.11 (1.98)	4.05 (4.50)	1.11 (3.01)
F_t^{UE}	8.44 (6.48)	17.49 (12.94)	6.78 (6.27)
F_t^{UI}	14.25 (5.84)	28.79 (13.88)	12.63 (6.47)
F_t^{IE}	-0.22 (-0.27)	1.85 (1.71)	0.10 (0.23)
F_t^{IU}	13.28 (7.43)	24.85 (15.56)	10.55 (7.21)
p_t^{EU}	0.12 (11.94)	0.19 (36.48)	0.10 (9.86)
p_t^{EI}	0.05 (3.25)	0.12 (5.69)	0.05 (5.34)
p_t^{UE}	-0.64 (-3.53)	-0.78 (-3.89)	-0.52 (-4.27)
p_t^{UI}	0.40 (3.52)	0.70 (5.75)	0.35 (5.18)
p_t^{IE}	-0.02 (-0.42)	0.04 (0.70)	0.00 (-0.02)
p_t^{IU}	0.17 (9.70)	0.26 (18.42)	0.14 (9.37)

Note: F^{XY} is the gross work flows from state $X \in \{E, U, I\}$ to another state Y . p^{xy} is the transition rate from state $X \in \{E, U, I\}$ to another state Y . All variables are filtered using the Hodrick-Prescott filter (with smoothing parameter 1600 or 10^5), or the Baxter-King filter. Standard errors are presented in parentheses.

CHAPTER 5

The Ins and Outs of Korean Unemployment

In this section, we study the contribution of inflow and outflow rates to variation in the unemployment rate. Recently, a number of studies quantified these contributions, assuming that the actual unemployment rate is closely approximated by its steady state value (Elsby *et al.*, 2009; Fujita and Ramey, 2009; Petrongolo and Pissarides, 2008). Under this assumption, contemporaneous variation in the unemployment rate is due to contemporaneous variation in inflow and outflow rates. The unemployment rate will be close to its steady state value when transition rates are high, which is true in the US. The steady state assumption may hold in Korea as well, since transition rates are relatively higher than any other countries such as Japan and the UK and as high as the US.

The evolution of the unemployment rate u_t over time can be obtained by

$$\frac{du_t}{dt} = s_t(1 - u_t) - f_t u_t,$$

where s_t is the rate of inflow into unemployment, and f_t is the rate of outflows from unemployment.

In conventional unemployment decomposition, we first approximate the unemployment rate with its steady state level. Consider the simple two-state case where workers are either employed or unemployed. Now f_t and s_t represent the job-finding and separation rates, respectively. We can approximate unemployment by

$$u_t \cong u_t^* = \frac{s_t}{s_t + f_t},$$

where u_t^* is the steady state unemployment rate.

Let $C_{s,t}^*$ represent the contribution of changes in the inflow rate to changes in the steady state unemployment rate. Similarly, Let $C_{f,t}^*$ denote the contribution of changes in the outflow rates to changes in the steady state unemployment rate. By taking the first difference of (2),

$$\Delta u_t^* = (1 - u_t^*)u_{t-1}^* \frac{\Delta s_t}{s_{t-1}} - u_t^*(1 - u_{t-1}^*) \frac{\Delta f_t}{f_{t-1}} = C_{s,t}^* + C_{f,t}^*,$$

where $\Delta x_t = x_t - x_{t-1}$. The first term on the right hand side records the contribution of changes in the separation rate s_t to changes in the steady state unemployment rate. Similarly, the second term measures the contribution of changes in the job finding rate f_t to the variation in unemployment.

In three-state case, where workers are either employed (E), unemployed (U), or inactive (I), the dynamics of employment, unemployment, and inactivity are described by

$$\dot{E}_t = p_t^{UE} U_t + p_t^{IE} I_t - (p_t^{EU} + p_t^{EI}) E_t,$$

$$\dot{U}_t = p_t^{EU} E_t + p_t^{IU} I_t - (p_t^{UE} + p_t^{UI}) U_t,$$

$$\dot{I}_t = p_t^{EI} E_t + p_t^{UI} U_t - (p_t^{IE} + p_t^{IU}) I_t,$$

where p_t^{XY} is an instantaneous transition rate from state $X \in \{E, U, I\}$ to state $Y \neq X$ at time t .

In the steady state, flows in and out of employment are equal by assumption. Similarly, flow in and out of unemployment are equal. Thus, the steady-state conditions for employment and unemployment are

$$p_t^{UE} U_t + p_t^{IE} I_t = (p_t^{EU} + p_t^{EI}) E_t, \quad (4)$$

$$p_t^{EU} E_t + p_t^{IU} I_t = (p_t^{UE} + p_t^{UI}) U_t, \quad (5)$$

By rearranging (4) and (5), we can express the steady state unemployment rate as a function of all six transition rates:

$$u_t^* \equiv \frac{p_t^{EU} + \frac{p_t^{IU}}{p_t^{IU} + p_t^{IE}} p_t^{EI}}{p_t^{EU} + \frac{p_t^{IU}}{p_t^{IU} + p_t^{IE}} p_t^{EI} + p_t^{UE} + \frac{p_t^{IE}}{p_t^{IU} + p_t^{IE}} p_t^{UI}}. \quad (6)$$

The second term in the numerator is the transition rate from employment to unemployment through inactivity. The first and second terms together are the overall inflow rate from employment to unemployment, which includes the direct transition from employment to unemployment and the transition rate working through inactivity. Similarly, the sum of the third and fourth terms in the denominator is the transition rate from unemployment to employment, directly and working through inactivity.

Let $s_t \equiv p_t^{EU} + \frac{p_t^{IU}}{p_t^{IU} + p_t^{IE}} \cdot p_t^{EI}$, and $f_t \equiv p_t^{UE} + \frac{p_t^{IE}}{p_t^{IU} + p_t^{IE}} \cdot p_t^{UI}$. Then

(6) becomes identical to (2), and so the decomposition in (3) holds. The contributions of total inflow and outflow rates can be further divided into terms attributed to the flows between employment and unemployment and the flows between employment and inactivity. From (6), we obtain

$$\begin{aligned} \frac{\Delta s_t}{s_{t-1}} &= \frac{1}{s_{t-1}} \left[\Delta p_t^{EU} + \Delta \left(\frac{p_t^{IU}}{p_t^{IU} + p_t^{IE}} \cdot p_t^{EI} \right) \right], \\ \frac{\Delta f_t}{f_{t-1}} &= \frac{1}{f_{t-1}} \left[\Delta p_t^{UE} + \Delta \left(\frac{p_t^{IE}}{p_t^{IU} + p_t^{IE}} \cdot p_t^{UI} \right) \right], \end{aligned}$$

Then the contributions of the separation rate $C_{EU,t}^*$ and the job finding rate $C_{UE,t}^*$ to unemployment variability are respectively

$$\begin{aligned} C_{EU,t}^* &= (1 - u_t^*) u_{t-1}^* \frac{\Delta p_t^{EU}}{s_{t-1}}, \\ C_{UE,t}^* &= -u_t^* (1 - u_{t-1}^*) \frac{\Delta p_t^{UE}}{f_{t-1}}. \end{aligned}$$

Similarly, the contributions of the transition rate from employment to unemployment working through inactivity $C_{EIU,t}^*$ and the contributions of the transition rate from unemployment to employment working through inactivity $C_{UIE,t}^*$ can be obtained by

$$C_{EIU,t}^* = \frac{(1 - u_t^*)u_{t-1}^*}{s_{t-1}} \cdot \Delta \left(\frac{p_t^{IU}}{p_t^{IU} + p_t^{IE}} \cdot p_t^{EI} \right),$$

$$C_{UIE,t}^* = \frac{-u_t^*(1 - u_{t-1}^*)}{f_{t-1}} \cdot \Delta \left(\frac{p_t^{IE}}{p_t^{IU} + p_t^{IE}} \cdot p_t^{UI} \right).$$

Following Fujita and Ramey (2009) and Petongolo and Pissarides (2008), we quantify the contribution of inflow and outflow rates by calculating the “beta values” in finance. Thus, we compute

$$\beta_i^* = \frac{cov(\Delta u^*, C_i^*)}{var(\Delta u^*)}$$

where $i = s, f, EU, UE, EIU, UIE$, as measures of the contributions of fluctuations in the relevant transition rate to overall fluctuations in the unemployment rates. Since $\Delta u^* = C_{EU}^* + C_{EIU}^* + C_{UE}^* + C_{UIE}^*$, $\beta_{EU}^* + \beta_{EIU}^* + \beta_{UE}^* + \beta_{UIE}^* = 1$.

Table 6 reports the results of this decomposition for the full sample and for five sub-samples. For the full sample, the inflow and outflow rates account for around 53% and 48% of employment variability, respectively. Within the contribution of the inflow, changes in separation rate account for 11% of steady-state unemployment fluctuations, while the transition rate working through inactivity explains most of this, since they account for 41% of unemployment dynamics. The job-finding rate plays a important role in explaining unemployment volatility, accounting for 32% of it. It is interesting to see that although the contribution of the job finding rate to overall unemployment fluctuations (32%) is larger than that of the separation rate (11%), the contribution of inflow rate is larger than that of the outflow rate. This is due to the inflow through inactivity is the largest factor in explaining unemployment dynamics in Korea. The result suggests that not only both separation rate and job-finding rate but also the inflow rate through inactivity are the important to explain unemployment fluctuations, considering the case in Japan in the last row of Table 6.

In order to examine whether there exists a relationship between the direction of unemployment dynamics and the inflow and outflow rates, we divide the sample period into 5 sub-samples, based on the movement

Table 6 | Decompositions of Unemployment Fluctuations

Period	Feature	Steady-state decomposition					
		β_s^*	β_f^*	β_{EU}^*	β_{EIU}^*	β_{UE}^*	β_{UIE}^*
2000Q1~ 2011Q4	Whole sample	0.52	0.48	0.11	0.41	0.32	0.16
2000Q1~ 2002Q4	Decline in u	0.15	0.85	-0.14	0.29	0.53	0.32
2003Q1~ 2005Q2	Recession	0.27	0.73	-0.02	0.29	0.57	0.16
2005Q3~ 2008Q2	Decline in u	0.79	0.21	0.38	0.40	0.11	0.10
2008Q3~ 2010Q1	Global recession	0.52	0.48	0.20	0.32	0.51	-0.03
2010Q2~ 2011Q4	Decline in u	0.93	0.07	0.30	0.64	-0.04	0.11
1996Q1~ 2007Q4	UK	0.51	0.49				
1980Q1~ 2009Q4	Japan	0.54	0.45	0.44	0.10	0.53	-0.07

Note: values for the UK and Japan are obtained from Gomes (2009) and Lin and Miyamoto (2012).

of unemployment. From 2000 to 2002, the unemployment rate was declining steadily. During this period, outflow rate accounted for 85% of unemployment fluctuations with the job-finding rate explaining 53% of overall unemployment dynamics. This pattern continued during the recession from 2003 to 2005 and most of its fluctuations is accounted for by inflow rate (73%). Since 2005, the role of outflow rate, however, become more important in explaining unemployment variability. From 2005 to 2008 and from 2010 to 2011, the outflow rates accounted for 79% and 93% of unemployment dynamics respectively.

CHAPTER 6

Conclusion

This paper studies work flow dynamics in Korea over the last decade. By using data from Economically Active Population Survey (EAPS), this paper provides a number of key facts on work flow and unemployment dynamics.

We examine the size and cyclicity of both the gross work flows and associated transition rates between the states of employment, unemployment, and inactivity. There are large gross work flows across labor market status. We find that about 5% of the working age population changes labor market status in each month. Inflows and outflows of unemployment are counter-cyclical, while flows between employment and inactivity are procyclical. These findings are broadly consistent with results for the US and European countries. We also find that job-finding and separation rates in Korea are little smaller but comparable with those in the US.

We also decompose unemployment fluctuations into the parts due to changes in inflow and outflow rates. Conventional decomposition method finds that both inflow and outflow rates contribute substantially to unemployment fluctuations in Korea and particularly inflow through inactivity plays a relatively larger role in unemployment dynamics in Korea.

We still have not solved out the potential problem from time-aggregation bias. We would like to postpone this matter for the future research.

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