On the Relationship between Lemon Effect and Worker Characteristics: Evidence from Korea*

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Abstract

Layoffs can negatively affect a worker's wage in the presence of incomplete information on the worker's productivity ("lemon effect"). This study examines if such an effect presents in Korea by utilizing the Korea Labor and Income Panel Study (KLIPS) data from 1998 to 2021 with a two-way fixed effects model. We find supporting evidence for the lemon effect: The drop in wage is generally greater for workers who experience layoff than those displaced due to firm closure. This observation is more evident for those (1) who worked at a small-to-medium firm, (2) who got re-employed in a different industry and occupation, and (3) who were laid off during economic booms at which information asymmetry is more pronounced.

Keywords: Layoff, Wage, Korea, Two-way fixed effects

JEL Classification: J23, J24, J63

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I. INTRODUCTION

Information on a worker's productivity is asymmetric between a worker and a firm. It has long been argued that a firm tries to resolve this problem when hiring a worker using the information on how the worker was separated from a former employer: If the worker is laid-off or fired from the previous job, it may be a signal that a worker's productivity would not be high because the firm, which has learned about the worker's type while hiring her, would maintain the worker if her productivity is actually high ("lemon effect", Gibbons and Katz (1991)).

There is mixed evidence on the lemon effect. Gibbons and Katz (1991) provide supporting evidence for it. Hu and Taber (2011), however, found that such an effect is restricted to white males. Nakamura (2008) suggested that the (negative) signaling effect of layoffs becomes less evident during economic downturns. This paper aims to add to this large literature by particularly focusing on the Korean[1] labor market, which has several distinctive features to identify the lemon effect. For example, a dual labor market structure (large vs. small-to-medium firms) might relieve the concern on the worker's unknown productivity because a worker from a large firm is largely perceived as high-productivity workers.

For the empirical analysis, we utilize a two-way fixed effects model by using the Korea Labor and Income Panel Study (KLIPS) data from 1998 to 2021. Our findings indicate that the lemon effect exists in the Korean labor market: A wage decline of a displaced worker due to layoff is in general greater than that due to a firm closure. In addition, the difference is significant for a subset of workers who are more vulnerable to an information asymmetry problem; (i) who previously worked at small-to-medium firms, (ii) who are re-employed in different industries and/or occupations, and (iii) who are laid off during a boom. We further find that the lemon effect is more evident for workers (i) who are male and (ii) who worked for a relatively long tenure, suggesting that the level effect also works.

One of the main contributions of this paper is that we find some additional evidence supporting the lemon effect by identifying the groups that can experience greater information asymmetry between workers and firms. Also, we further find that Nakamura (2008)'s findings in

[1] We will call South Korea as Korea through this paper.

the U.S. is also observed in Korea. While Kim (2019) is similar to our work, our work is differentiated from his work mainly in three directions: First, our analysis uses 9 more years than what he used (1998-2012) so that we can accommodate more recent structural changes in the labor market such as automation. Second, the empirical strategy is different. While we employ the two-way fixed effects model for controlling the unobservable individual characteristics, Kim (2019) used propensity score matching method. Third, we consider more dimensions of worker heterogeneity by dividing workers into several groups based on gender, firm characteristics before and after displacement, and economic fluctuations so that we can further identify the underlying characteristics of the lemon effect than he did.

II. DATA AND EMPIRICAL METHODOLOGY

For the empirical analysis, we utilize the Korea Labor and Income Panel Study (KLIPS) data, which is the largest panel micro data in Korea. KLIPS is an annual survey that is designed to represent the population of Korea and was initiated in 1998. We restrict samples to employed workers aged between 20 and 60 between 1998 and 2021. The total observations amounts to 117,060, with 1,057 workers displaced due to firm closure and another 405 workers laid off. Table 1 provides key summary statistics of the sample.

[Table 1]

In order to estimate the subsequent wage changes of displaced workers, we employ a two-way fixed effects model (i) to control unobserved worker heterogeneity and (ii) to mitigate the concern of a selection bias. The regression model is given as follows.

$$Y_{it} = \beta_c D_{it}^c + \beta_l D_{it}^l + \gamma X_{it} + \delta_t + u_i + e_{it} \quad (1)$$

where *i*, *t*, *c*, and *l* denote individual, year, firm closure, and layoff, respectively. Y_{it} is the log real wage per hour[2], D_{it}^c and D_{it}^l are dummy variables indicating that the worker is displaced due to

[2] We divide nominal wage by Consumer Price Index (CPI, 2020=base year).

firm closure or layoff, X_{it} is a vector of controls, δ_t is a time fixed effect, u_i is an individual fixed effect, and e_{it} is an error term. X_{it} includes time-varying variables such as experience (and squared experience).

To identify which worker characteristics potentially amplify the lemon effect from a layoff, we divide samples into several groups: gender, pre-displacement firm or worker characteristics (including tenure of workers, size, and industry of the firm that the worker was displaced from), whether the displaced worker remains in the same industry/occupation or not, and the business cycle at the time of displacement (Nakamura, 2008). We do not classify workers based on union participation because we are not interested in white-blue collar difference and the union membership rate of displaced worker at their previous job is only 4-8% (Table1).[3] For each group, we introduce interaction terms by multiplying the group dummy variables with the displacement indicator (D_{it}^c, D_{it}^l). For instance, we transform the two dummy variables into four variables: LD_{it}^c , LD_{it}^l, SD_{it}^c , SD_{it}^l where L, S indicate a large-sized firm and a small-to-medium sized firm respectively.

III. EMPIRICAL FINDINGS

The main results from estimating Equation (1) are reported in Table 2. There really exists a lemon effect in the Korean labor market, a finding consistent with Kim (2019): While the workers who lose their jobs due to firm closure suffer from about 5% of wage loss after reemployment, wage loss is about 9% for workers who are laid off and the difference between the two groups is significant at the 10% level. More interestingly, such an effect is not homogenously observed across workers: The difference is significant for displaced workers (i) who are male, (ii) who worked relatively a long time at the previous firm, (iii) who worked at small-sized firms, (iv) who moved to new industry or occupation, and (v) who were displaced when the economy was in the boom.

[Table 2]

[3] According to Ministry of Employment and Labor in Korea, the union organization rate stood was 14.2% in 2021, which is comparable to our entire sample. See Kim (2019) for related discussions.

Why is the lemon effect significant for some particular groups? Given that the information asymmetry between the firm and (displaced) workers plays the key role in determining the wage of the displaced workers (Gibbons and Katz, 1991), uncertainty on the unobserved ability of displaced workers from the perspective of the firms might be more severe for a subset of workers. For instance, a firm trying to hire workers who have switched industries and/or occupations would not be able to accurately predict the ability of such workers when compared to workers who have worked in the same industry. Such an information asymmetry would also be evident for workers who are displaced from small-to-medium sized firms[4]. In addition, layoff might provide important information on why the worker is separated from the firm during the boom because layoffs can occur more frequently and easily during the recessions regardless of the worker's productivity (Nakamura, 2008).

Why is then the lemon effect more evident for male workers and workers with longer tenures? We argue that this is a level effect: Risk of hiring such workers can be large when considering their wage levels. In Table 3, we report average wage and wage dispersion of each group. The average wage is about 40% lower for female workers than male workers and the wage dispersion is also smaller for female workers. These facts together pose smaller costs of hiring female workers so that lemon effect can be less significant. One can also easily observe that a worker with a relatively long-tenure earns more than that with short-tenure, implying that the layoff can give more information on the worker.

[Table 3]

As a robustness check, we further estimate Equation (1) by adding more control variables (firm sizes and industry (1-digit) to control for possible wage premium based on firm and industry) and report the results in Table 4; we find that the main finding that there exists a lemon effect in the Korean labor market is preserved.

[4] Krashinsky (2002) showed that, when controlling for the size of the previous workplace, the wage loss difference due to layoffs and firm closures is almost reduced. Our results contradict his findings.

[Table 4]

IV. CONCLUDING REMARK

Utilizing the KLIPS data, this paper shows that the lemon effect really exists in the Korean labor market and is generally evident for groups of workers who may suffer greater information asymmetry problem between them and firms. Using detailed information on workers, we further show that wage level itself can also play a role in determining the level effect, which sheds new light on the direction of future research.

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Table 1. Summary Statistics

	Employed	Displaced	
		Firm closure	Layoff
Observation	117,060	1,057	405
Age	40.2	41.5	41.3
Experience	20.0	22.5	22.1
<*proportion*>			
Female	0.41	0.41	0.34
High school	0.49	0.69	0.65
Union membership	0.15	0.04	0.08

Note: Observations pertain to employed workers aged between 20 and 60 years old. The proportions of each group have been calculated excluding missing values. High school includes workers whose education level is at or below high school graduation. The union membership for the displaced refers to participation in a union at the pre-displacement firm.

Table 2. Wage changes of displaced workers by group

	Change of log real wage per hour			
	Firm closure	Layoff	Equality test (p-value)	Observation
Entire group	-0.0491***	-0.0923***	0.037**	115,963
	(0.011)	(0.018)		
<*Worker characteristics*>				
Male(√)	-0.0660***	-0.118***	0.050*	69,144
	(0.014)	(0.023)		
Female	-0.0273	-0.0415	0.654	46,819
	(0.017)	(0.027)		
<*Pre-displacement characteristics*>				
Tenure (≥3 year) (√)	-0.0293	-0.111***	0.016**	115,963
	(0.016)	(0.030)		
Tenure (<3 year)	-0.0678***	-0.110***	0.234	115,963
	(0.014)	(0.033)		
Large-sized Firm(≥100 employee)	-0.0571*	-0.0666	0.840	115,963
	(0.027)	(0.039)		
Small-sized Firm(<100) (√)	-0.0455***	-0.114***	0.008***	115,963
	(0.013)	(0.023)		
Manufacturing Industry(√)	-0.0557**	-0.133***	0.036**	115,963
	(0.020)	(0.032)		
Service Industry(√)	-0.0299	-0.0969**	0.096*	115,963
	(0.016)	(0.037)		
<*Post-displacement characteristics*>				
Stay in Industry	-0.0199	-0.0179	0.966	115,963
	(0.019)	(0.044)		
Switch Industry(√)	-0.0567***	-0.137***	0.004***	115,963
	(0.013)	(0.025)		
Stay in Occupation	-0.0340*	-0.0323	0.969	115,963
	(0.016)	(0.042)		
Switch Occupation (√)	-0.0505***	-0.134***	0.004***	115,963
	(0.014)	(0.026)		
<*Business Cycle at displacement*>				
Boom(√)	-0.0538**	-0.129***	0.0208**	115,963
	(0.019)	(0.027)		
Recession	-0.0470***	-0.0732**	0.3239	115,963
	(0.024)	(0.024)		

Note: Clustered standard errors are reported in parentheses. ***p< 0.01, **p< 0.05, *p< 0.1
(√) indicates the groups that exhibit the lemon effect.

Table 3. Real wage per hour by group

Dependent Variable	Mean	Std. Dev.
Male	1.60	1.16
Female	1.04	0.74
Tenure >=3 year	1.49	1.09
Tenure<3 year	1.09	0.91

Note: The unit of measurement is 10,000 won.

Table 4. Wage changes of displaced workers by group, controlling for firm size and industry

	Change of log real wage per hour			Observation
	Firm closure	Layoff	Equality test (p-value)	
Entire group	-0.0380***	-0.0770***	0.062*	95,955
	(0.011)	(0.018)		
<*Worker characteristics*>				
Male(√)	-0.0519***	-0.102***	0.0577*	57,598
	(0.013)	(0.023)		
Female	-0.0206	-0.029	0.7906	38,357
	(0.016)	(0.028)		
<*Pre-displacement characteristics*>				
Tenure (>=3 year) (√)	-0.021	-0.0941**	0.0386**	95,955
	(0.016)	(0.032)		
Tenure (<3 year)	-0.0544***	-0.0815*	0.4392	95,955
	(0.014)	(0.032)		
Large-sized Firm	-0.0555*	-0.0596	0.9344	95,955
	(0.028)	(0.041)		
Small-sized Firm(√)	-0.0342**	-0.0915***	0.0218**	95,955
	(0.013)	(0.022)		
Manufacture Industry(√)	-0.0381	-0.138***	0.0102**	95,955
	(0.021)	(0.034)		
Service Industry	-0.0228	-0.041	0.6504	95,955
	(0.015)	(0.037)		
<*Post-displacement characteristics*>				
Stay in Industry	-0.0177	0.00485	0.6666	95,955
	(0.019)	(0.050)		
Switch Industry(√)	-0.0477***	-0.116***	0.0136**	95,955
	(0.013)	(0.025)		
Stay in Occupation	-0.0373*	-0.0183	0.6754	95,955
	(0.017)	(0.043)		
Switch Occupation (√)	-0.0383**	-0.114***	0.0099***	95,955
	(0.014)	(0.026)		
<*Business Cycle at displacement*>				
Boom(√)	-0.0472**	-0.115***	0.04**	95,955
	(0.018)	(0.028)		
Recession	-0.0335**	-0.0568*	0.3799	95,955
	(0.013)	(0.024)		

Note: Clustered standard errors are reported in parentheses. ***p< 0.01, **p< 0.05, *p< 0.1
(√) indicates the groups that exhibit the lemon effect.