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Adjustment Costs in the Japanese Banking Sector

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ABSTRACT

In this paper, we examine labor adjustment costs in the Japanese banking sector. In particular, we focus on firing costs in this sector. The existence of firing costs prevents quick employment adjustment in response to shocks. Therefore, if firing costs are particularly high, the impact of the financial crisis on the Japanese banking sector will not be alleviated quickly. We parameterized the labor adjustment costs—including firing costs—in the framework of the dynamic labor demand model, and their significance is checked by the estimation of the Euler equation. Using Japanese data for the sample period 2001–2012, we find that firing costs account for the largest portion of labor adjustment costs in the banking sector.

JEL Classifications: *G01, G21, J23*

Keywords: *banking sector; labor adjustment; firing costs; Euler equation*

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I. INTRODUCTION

The recent global financial crisis affected many firms and financial institutions throughout the world, including the Japanese banking sector. Table 1 indicates the data for three megabanks in Japan (Mitsubishi UFJ Financial Group, Mizuho Financial Group, and Sumitomo Mitsui Financial Group). After the financial crisis in 2007, the ordinary profits of the megabanks consistently decreased. The sum of the ordinary profits across the megabanks decreased by approximately 2.5 trillion yen, and its rate of change was –112%. Hence, it seems reasonable to suppose that the recent financial crisis has had a large negative impact on the Japanese banking sector.

Table 1
Profits and number of workers for megabanks

	Year		
	2007	2008	2009
(A) Ordinary profits (unit: 1 million yen)			
Mitsubishi UFJ Financial Group	1,457,080	1,029,013	82,807
Mizuho Financial Group	748,170	397,120	–395,131
Sumitomo Mitsui Financial Group	798,610	831,160	45,311
Sum	3,003,860	2,257,293	–267,013
Rate of change		–25%	–112%
(B) Number of workers (unit: 1 person)			
Mitsubishi UFJ Financial Group	78,282	78,302	84,780
Mizuho Financial Group	47,449	49,114	50,191
Sumitomo Mitsui Financial Group	41,428	46,429	48,079
Sum	167,159	173,845	183,050
Rate of change		4%	5%

Source: Nikkei Value Search

However, the number of workers in the megabanks hardly changed in this period. As indicated in Table 1, the number of workers did not decrease even when profits were strongly and negatively affected by the financial crisis. Assuming that capital stock is fixed in the short-run, it is likely that employers prefer to decrease the number of workers immediately when their firms are affected by negative shocks such as the financial crisis, since labor demand is decreased by the shocks. However, this theory does not apply to the case of the Japanese banking sector. Therefore, it seems to be important to examine the reasons for this in order to better understand the impact of the financial crisis on the Japanese banking sector.

The purpose of this paper is to examine firing costs (i.e., the costs of decreasing the number of workers) in the Japanese banking sector. It is widely accepted that employers must incur costs when adjusting labor inputs (e.g., Hamermesh and Pfann, 1996), and labor adjustment costs include firing costs. For example, employers are usually required to provide severance pay when they fire employees. Furthermore, negotiation costs may arise when employees are fired, since this adjustment implies a reduction in the salaries of employees. Several previous studies find that these firing costs are significantly high (e.g., Azetsu and Fukushige, 2009).

When negative shocks lead to a decrease in productivity of firms, a reduction in employment may improve productivity. However, the existence of firing costs prevents this employment adjustment, since a reduction in employment is extremely expensive. Therefore, if hiring costs in the Japanese banking sector are particularly high, the impact of the financial crisis on this sector is not likely to be alleviated quickly. Furthermore, an investigation of firing costs is also useful to assess the effects of government policies that aim to protect the banking sector since the effects depend, at least partly, on how quickly employers adjust labor inputs in response to shocks. However, hiring costs in the Japanese banking sector have not been fully examined econometrically.[1] Therefore, our investigation may provide useful interpretations of the impact of the financial crisis on the Japanese banking sector.

An important issue is how to analyze firing costs. As Hamermesh and Pfann (1996) point out, many labor adjustment costs are implicit, and their statistics are usually not available. For example, firing costs include disruptions in production that occur when hired workers spend time negotiating with fired workers. In this paper, we use a simple approach to examine firing costs in the Japanese banking sector. Our approach is based on the theory of dynamic labor demand. Labor adjustment costs—including firing costs—are parameterized in our model. This model has a theoretical foundation since it is derived as the solution to the optimization problem. Furthermore, this model is expressed as a linear regression model. Therefore, in the framework of our model, the size of labor adjustment costs is relatively easy to estimate.

This paper is organized as follows: Section II explains our model. Section III describes the data. Section IV reports our findings. Section V provides a discussion. Section VI presents the conclusions.

II. MODEL

Detailed explanations for hiring costs are provided in Section I. Examples of other labor adjustment costs include the following: (i) training costs for new employees and search costs (i.e., costs of advertising, screening, and processing new employees); (ii) extra pay for overtime; and (iii) negotiation costs. Search and training costs are included in hiring costs (i.e., costs of increasing the number of workers). Similar to the case of firing costs, negotiation costs may arise when the number of hours worked is decreased, since this adjustment implies a reduction in the salaries of employees.

To describe the labor adjustment costs in the banking sector, we use the dynamic labor demand model. Our model is based on that developed by Azetsu and Fukushige (2009). The specification of the labor adjustment costs is important since many of them are implicit and their statistics are usually not available (Hamermesh and Pfann, 1996). Therefore, we discuss this point first.

Let $C_N(n_t^+, n_t^-)$ and $C_H(h_t^+, h_t^-)$ represent the costs of adjusting the number of workers and the number of hours worked, respectively, where n_t^+ denotes an increase in the number of workers; n_t^-, a decrease in the number of workers; h_t^+, an increase in the number of hours worked; and h_t^-, a decrease in the number of hours worked. We assume that the labor adjustment costs have the following quadratic forms:

$$C_H(h_t^+, h_t^-) = \frac{c_H^+}{2}(h_t^+)^2 + \frac{c_H^-}{2}(h_t^-)^2 \qquad (1)$$

$$C_N(n_t^+, n_t^-) = \frac{c_N^+}{2}(n_t^+)^2 + \frac{c_N^-}{2}(n_t^-)^2 \qquad (2)$$

where c_H^+, c_H^-, c_N^+, and c_N^- are positive parameters.

A key advantage of this specification is that we can examine four types of labor adjustment costs. Specifically, the costs of adjusting the number of workers $C_N(n_t^+, n_t^-)$ are the sum of the costs of increasing and decreasing the number of workers (i.e., hiring and firing costs), and the parameters c_N^+ and c_N^- determine the size of the hiring and firing costs, respectively. Similarly, the costs of adjusting the number of hours worked $C_H(h_t^+, h_t^-)$ are the sum of the costs of increasing and decreasing the number of hours worked, and the sizes of these costs are determined by the parameters c_H^+ and c_H^-, respectively. Although these adjustment costs are usually unobservable, information about them is reflected in the parameters c_H^+, c_H^-, c_N^+, and c_N^-. Therefore, to examine the speed of labor adjustment in response to shocks, an estimation of these parameters is useful.

It is important to note that c_N^- determines the size of firing costs. Therefore, this parameter is the main focus of this paper. To estimate this parameter in the framework of the theoretical model, we derive the Euler equation.

Let $L_t = H_t N_t$ be the effective labor force, where H_t denotes the number of hours worked per worker and N_t denotes the number of workers. The production function may usually be given by $F(L_t, \varepsilon_t)$, where $\partial F/\partial L_t > 0$ and ε_t denotes a productivity shock observed at the beginning of period t.

A risk-neutral decision maker maximizes the present discounted value of profits (V). The optimization problem is defined as

$$\begin{aligned} V(H_{t-1}, N_{t-1}) = \max\ & F(L_t, \varepsilon_t) - w_t L_t \\ & - C_H(h_t^+, h_t^-) - C_N(n_t^+, n_t^-) + \delta E_t[V(H_t, N_t)] \end{aligned} \qquad (3)$$

where E_t denotes the expectations at the end of period t; β, the discount factor; and w_t, the real wage per hour worked. The following two transition equations are imposed as constraints.

$$H_t - H_{t-1} = h_t^+ - h_t^- \tag{4}$$

$$N_t - N_{t-1} = n_t^+ - n_t^- \tag{5}$$

The first-order conditions with respect to H_t and N_t yield the following Euler equations:

$$M_t N_t - (c_H^+ h_t^+ - c_H^- h_t^-) + \delta E_t [c_H^+ h_{t+1}^+ - c_H^- h_{t+1}^-] = 0 \tag{6}$$

$$M_t H_t - (c_N^+ n_t^+ - c_N^- n_t^-) + \delta E_t [c_N^+ n_{t+1}^+ - c_N^- n_{t+1}^-] = 0 \tag{7}$$

where $M_t = F'(t) - w_t$. To estimate this model, the actual values of h_{t+1}^+, h_{t+1}^-, n_{t+1}^+, and n_{t+1}^- are substituted into equations (6) and (7). Then, these equations are rewritten as

$$M_t N_t - c_H^+ (h_t^+ - \delta h_{t+1}^+) + c_H^- (h_t^- - \delta h_{t+1}^-) = u_{1t} \tag{8}$$

$$M_t H_t - c_N^+ (n_t^+ - \delta n_{t+1}^+) + c_N^- (n_t^- - \delta n_{t+1}^-) = u_{2t} \tag{9}$$

where u_{1t} and u_{2t} are the error terms. Combining equations (8) and (9) yields the following equation:

$$(\hat{h}_t^+ - \hat{h}_t^-) - \alpha(\hat{h}_t^+ + \hat{h}_t^-) - \beta \hat{n}_t^+ + \gamma \hat{n}_t^- = u_t , \tag{10}$$

where

$$\alpha = \frac{c_H^- - c_H^+}{c_H^- + c_H^+} , \tag{11}$$

$$\beta = \frac{c_N^+}{(c_H^- + c_H^+)/2} \tag{12}$$

$$\gamma = \frac{c_N^-}{(c_H^- + c_H^+)/2} \tag{13}$$

The time series variables are defined as $\hat{n}_t^+ = (n_t^+ - \delta n_{t+1}^+)/H_t$, $\hat{n}_t^- = (n_t^- - \delta n_{t+1}^-)/H_t$, $\hat{h}_t^+ = (h_t^+ - \delta h_{t+1}^+)/N_t$, and $\hat{h}_t^- = (h_t^- - \delta h_{t+1}^-)/N_t$. The composite error term is defined as $u_t = \{(c_H^- + c_H^+)/2\}^{-1}(u_{2t}/H_t - u_{1t}/N_t)$.

It is important to note that both c_H^+ and c_H^- are positive if and only if the condition $-1 < \alpha < 1$ is satisfied. Therefore, the conditions $-1 < \alpha < 1$, $\beta > 0$, and

$\gamma > 0$ mean that the structural parameters c_H^+, c_H^-, c_N^+, and c_N^- in equations (1) and (2) are positive. These conditions are required to support this model.

When a specific value is substituted into the discount factor δ, equation (10) is regarded as a linear regression model that includes the variables $\hat{n}_t^+$, $\hat{n}_t^-$, $\hat{h}_t^+$, and $\hat{h}_t^-$. Therefore, using time series data on these variables, we can estimate α, β, and γ. Information on the labor adjustment costs is reflected in these parameters.[2]

The parameter α measures the asymmetry between the costs of increasing and decreasing the number of hours worked. For example, the result that $-1 < \alpha < 0$ is equivalent to the condition $c_H^- < c_H^+$. Therefore, this result suggests that the costs of increasing the number of hours worked are higher than those of decreasing the number of hours worked.

The parameters β and γ measure the relative costs of adjusting the number of workers. For example, since $(c_H^- + c_H^+)/2$ is the average of c_H^- and c_H^+, the results that $\beta > 1$ and $\gamma > 1$ suggest that hiring and firing costs are higher than the average costs of adjusting the number of hours worked.

The estimation of these parameters enables us to examine the size of firing costs. As mentioned above, if γ is higher than 1, firing costs are higher than the average costs of adjusting the number of hours worked. In addition to this, if γ is higher than β, firing costs are higher than hiring costs. Therefore, in the framework of this model, the conditions that $\gamma > 1$ and $\gamma > \beta$ can be regarded as evidence suggesting that firing costs are the largest contributor to labor adjustment costs.

III. DATA

We use seasonally adjusted monthly data for the Japanese banking sector (Major Group 62 of the Japan Standard Industrial Classification).[3] The sample period is from January 2001 to June 2012, mainly because we are particularly concerned with labor adjustment in recent years.

The data consist of the increase and decrease in the number of workers (n_t^+ and n_t^-) and the number of total hours worked (total of scheduled and non-scheduled hours worked) per regular employee (H_t). The total number of workers in January 2001 is used as an initial observation (N_1); thereafter, it is calculated as $N_t = N_{t-1} + n_t^+ - n_t^-$. Following Azetsu and Fukushige (2009), we use the net change in the hours worked index as h_t^+ and h_t^- because of data availability issues. Since data units are different, these data are normalized. Specifically, the data on N_t, n_t^+, and n_t^- are divided by an initial observation of N_t, and the data on H_t, h_t^+, and h_t^- are divided by an initial observation of H_t.

IV. RESULTS

It is likely that the composite error term u_t in equation (10) has a non-zero mean even if u_{1t} and u_{2t} have zero means since u_{1t} and u_{2t} are divided by N_t and H_t, respectively. In this case, the composite error term may be rewritten as $u_t = c + e_t$, where c is a constant term and $\mathbf{e_t}$ is a random variable with zero mean. Hence, the inclusion of a constant term in equation (10) seems to be useful for maintaining the econometric assumption that the error term in the regression model has zero mean. For this reason, equation (10) is modified as follows:

$$x_t - \alpha z_t - \beta \hat{n}_t^{+} + \gamma \hat{n}_t^{-} = c + e_t, \tag{11}$$

where $x_t = \hat{h}_t^{+} - \hat{h}_t^{-}$ and $z_t = \hat{h}_t^{+} + \hat{h}_t^{-}$.

Before estimating equation (11), it is necessary to examine the unit root properties of the variables included in equation (11) since we use time series data. In this paper, we use the unit root test developed by Phillips and Perron (1988).[4]

The results are reported in Table 2. To check the robustness of our results, the discount factor δ is set to 0.999, 0.950, and 0.900. The null hypothesis of a unit root is rejected for all the variables. Hence, we are not required to use cointegration techniques to estimate equation (11).

Since it is found that all the variables do not have a unit root, the next step is to estimate equation (11). For this purpose, we use the generalized method of moments (GMM) technique (Hansen, 1982), since it corrects for both endogeneity and serial correlation in equation (11). The set of instruments for the GMM estimation includes z_t, $\hat{n}_t^{+}$, and $\hat{n}_t^{-}$ with 1 and 2 lags and a constant term. Similar to the above case, the discount factor δ is set to 0.999, 0.950, and 0.900 to check the robustness of our estimation results.

The estimation results of equation (11) are reported in Table 3. All the parameters are significant, and the conditions $-1 < \alpha < 1$, $\beta > 0$, and $\gamma > 0$ are supported. The validity of overidentifying restrictions is not rejected. Furthermore, these results are not affected by the assumption of the discount factor. Therefore, there is evidence in favor of our model.

Table 2
Unit root test: Banking sector

	$\delta = 0.999$	$\delta = 0.950$	$\delta = 0.900$
x_t	–88.0778**	–91.6780**	–90.7595**
z_t	–28.5757**	–27.7955**	–24.8007**
$\hat{n}_t^{+}$	–93.9640**	–76.0301**	–80.1503**
$\hat{n}_t^{-}$	–39.4026**	–32.4071**	–27.8198**

The test includes a constant term. The spectral estimation method used is the Bartlett kernel. The bandwidth parameter is selected by the Newey and West (1994) procedure. ** indicates significance at the 1% level.

Table 3
Estimation results of equation (11): Banking sector

	$\delta = 0.999$	$\delta = 0.950$	$\delta = 0.900$
α	-0.7415^{**}	-0.7555^{**}	-0.7683^{**}
	[0.1504]	[0.1571]	[0.1765]
β	1.9122^{**}	1.8106^{*}	1.6272^{*}
	[0.7070]	[0.7375]	[0.7910]
γ	7.4533^{**}	7.5330^{**}	7.6231^{**}
	[0.7150]	[0.7596]	[0.8620]
c	0.0010^{*}	0.0069^{**}	0.0133^{**}
	[0.0004]	[0.0010]	[0.0022]
J-statistic	1.7477	1.6911	1.5975
	(0.6264)	(0.6389)	(0.6604)

Numbers within square brackets are heteroskedasticity and autocorrelation consistent (HAC) standard errors. The spectral estimation method used is the pre-whitened Bartlett kernel with a vector autoregression (VAR) model. The bandwidth parameter is selected by the Newey and West (1994) procedure. The J-statistic is the test for the validity of overidentifying restrictions. Numbers within parentheses are *p*-values. ** and * indicate significance at the 1% and 5% levels, respectively.

Our main findings are summarized as follows. First, we find that in the Japanese banking sector, firing costs account for the largest portion of the labor adjustment costs. For example, let us focus on the case where the discount factor is set to 0.999. The t-statistic for the hypothesis that $\gamma > 1$ is 9.025, and the associated p-value is 0.000. As mentioned in Section II, this result indicates that firing costs are significantly higher than the costs of adjusting the number of hours worked. In addition to this, the t-statistic for the hypothesis that $\gamma > \beta$ is 5.333, and its associated p-value is 0.000. This result indicates that firing costs are significantly higher than hiring costs. Therefore, firing costs are the highest of the labor adjustment costs in the Japanese banking sector. In other words, it is difficult for employers in the banking sector to decrease the number of workers immediately, since this employment adjustment is extremely expensive. This implies that the impact of negative shocks such as the financial crisis on this sector is not alleviated quickly, as explained in Section I.

Second, there is weak evidence that hiring costs are significantly higher than the average costs of adjusting the number of hours worked. For example, in the case where the discount factor is set to 0.999, the t-statistic for the hypothesis that $\beta > 1$ is 1.291 and the associated p-value is 0.099. Therefore, hiring costs are significantly higher than the average costs of adjusting the number of hours worked at the 10% level. However, in the case where the discount factor is set to 0.900, the t-statistic for the hypothesis that $\beta > 1$ is 0.793 and the associated p-value is 0.215. Although the t-test results depend on the assumption of the discount factor, it is likely that the discount factor is close to 1 since we use monthly data. From this viewpoint, hiring costs appear to be somewhat higher than the average costs of adjusting the number of hours worked in the case of the Japanese banking sector.

Third, we find that the parameter α is negative and significant. This result suggests that the costs of increasing the number of hours worked are significantly higher than those of decreasing the number of hours worked. Therefore, the costs of adjusting the number of hours worked are asymmetric in the Japanese banking sector. This result is different from those reported in several previous studies. For example, using the data for the manufacturing and health care sectors in Japan, Azetsu and Fukushige (2009) and Inagaki (2012) find that the costs of adjusting the number of hours worked are symmetric.

V. DISCUSSION

To interpret the structure of labor adjustment costs in the banking sector in greater detail, we compare the results for the banking sector with those for all sectors. For this purpose, we use seasonally adjusted monthly data for all sectors. The definition and source of the data are the same as in Section III.

To examine the stationarity of the data for all sectors, the unit root test developed by Phillips and Perron (1988) is used.[5] The results are reported in Table 4. Similar to the case of the banking sector, we find that no variables have a unit root.

The GMM estimation results of equation (11) for all sectors are reported in Table 5. The set of instruments is the same as that used in the case of the banking sector. We find that firing costs are not particularly high in the case of all sectors. This result is different from that for the banking sector. Specifically, although γ is higher than 1, there is not a substantial difference between γ and β. Therefore, firing costs are roughly the same as hiring costs in the recent Japanese economy.

For the Japanese banking sector, firing costs are the largest component of labor adjustment costs; however, this is not the case for all sectors. Therefore, the banking sector is characterized by labor adjustment costs in which firing costs are particularly high. In the recent Japanese economy, the speed of employment adjustment in response to negative shocks may be slower in the banking sector than in other major sectors, such as manufacturing and service.

Table 4
Unit root test: All sectors

	$\delta = 0.999$	$\delta = 0.950$	$\delta = 0.900$
x_t	–71.1571**	–71.5977**	–71.8178**
z_t	–39.5300**	–37.4694**	–37.1161**
$\hat{n}_t^+$	–30.3226**	–28.4723**	–23.7943**
$\hat{n}_t^-$	–58.0535**	–46.8806**	–31.0148**

The test includes a constant term. The spectral estimation method used is the Bartlett kernel. The bandwidth parameter is selected by the Newey and West (1994) procedure. ** indicates significance at the 1% level.

Table 5
Estimation results of equation (11): All sectors

	$\delta = 0.999$	$\delta = 0.950$	$\delta = 0.900$
α	0.2010	0.1653	0.1674
	[0.1149]	[0.1199]	[0.1219]
β	4.0460**	4.0885**	3.3871**
	[1.2886]	[1.1262]	[1.0167]
γ	4.2459**	5.6977**	4.7297**
	[0.8213]	[0.8369]	[0.7970]
c	–0.0001	0.0020	0.0036
	[0.0001]	[0.0012]	[0.0025]
J-statistic	2.5763	1.9767	2.3287
	(0.4617)	(0.5773)	(0.5071)

Numbers within square brackets are HAC standard errors. The spectral estimation method used is the pre-whitened Bartlett kernel with a VAR model. The bandwidth parameter is selected by the Newey and West (1994) procedure. The J-statistic is the test for the validity of overidentifying restrictions. Numbers within parentheses are *p*-values. ** and * indicate significance at the 1% and 5% levels, respectively.

Table 6
Educational attainment in Japanese sectors

Sector	Data (%)
All	43.41
Construction	28.61
Manufacturing	35.21
Wholesale and retail trade	40.75
Transport and postal activities	25.95
Medical, health care and welfare	68.59
Banking	70.56

For each sector, educational attainment is measured as the ratio of the number of workers whose highest level of education is vocational school, junior college, college or university, or graduate school (i.e., whose educational level is higher than high school) to the total number of workers. The data source is the 2007 Employment Status Survey.

To provide a possible explanation for this difference, we focus on the data on educational attainment in each sector. As indicated in Table 6, educational attainment in the banking sector is high. Therefore, firing costs such as severance pay are likely to be high in the banking sector. This result seems to be consistent with our estimation results.

Although the results reported in Table 5 indicate that α is insignificant, this is consistent with our theoretical model. As explained in Section II, the insignificance of α indicates symmetry between the costs of increasing and decreasing the number of hours worked. The other cost parameters, β and γ, are positive and significant. Therefore, our model is supported in this case as well.

VI. CONCLUSION

This paper examines labor adjustment costs in the Japanese banking sector. The novel contribution of this paper is the application of the dynamic labor demand model to the empirical investigation of firing costs. Labor adjustment costs, including firing costs, are parameterized in the framework of the dynamic labor demand model, and the cost parameters are estimated by the GMM method. Our model has a theoretical foundation since it is derived as the solution to the optimization problem. Furthermore, this model is expressed as a linear regression model. Therefore, in the framework of our model, the estimation of the size of firing costs is relatively easy to implement.

Using the data for the sample period 2001–2012, we find that firing costs are the largest component of labor adjustment costs in the case of the Japanese banking sector. However, this does not apply to all sectors for the same period. Therefore, our results suggest that, at least in the recent Japanese economy, the banking sector can be characterized by a cost structure in which firing costs are higher than in other major sectors.

The existence of high firing costs prevents a quick reduction in employment in response to negative shocks, and consequently, a long time is required to improve labor productivity. In fact, as indicated in Table 1, the number of workers in the banking sector hardly changed even when profits were strongly and negatively affected by the financial crisis. Our finding suggests that the existence of high firing costs is one of the causes for this. On these grounds, we conclude that the impact of negative shocks such as the recent global financial crisis on the Japanese banking sector is not alleviated quickly.

Finally, we discuss some policy implications. As mentioned above, high costs are required to adjust employment in the banking sector. Hence, government policies that aim to protect the banking sector seem to be effective, since the recent financial crisis has had a large negative impact on the banking sector and a long time and high costs are required to reduce this impact by employment adjustment in the banking sector. In addition, we find that the costs of decreasing the number of hours worked are relatively small in the Japanese banking sector. Therefore, a reduction in the number of hours worked may be a useful shock absorber in the Japanese banking sector.

ENDNOTES

1. Several previous studies examined the cost structure and economies of scale in the banking sector (e.g., Karafolas and Mantakas, 1996; Rezvaniana and Mehdianb, 2002; Rezvaniana and Mehdianb, 2002).
2. Using this model, we can examine labor adjustment costs without specifying $F(L_t, \varepsilon_t)$, which is a usual positive relationship between the labor force and output. In other words, this procedure does not require output data in examining labor adjustment costs. This seems to be helpful for empirical researchers who are particularly interested in labor adjustment costs, since it is difficult for them to determine the appropriate measure of output in the banking sector (e.g., Goldschmidt, 1981).
3. In this paper, we use aggregate data for the banking sector because of data

availability issues. However, it is interesting to examine firing costs for the megabanks and regional banks separately. We leave this issue for future research.

4. If we use the augmented Dickey-Fuller (ADF) test developed by Dickey and Fuller (1979), the results remain unchanged. The ADF test results are not reported in this paper, but are available from the authors upon request.
5. If we use the augmented Dickey-Fuller (ADF) test developed by Dickey and Fuller (1979), the results remain unchanged. The ADF test results are not reported in this paper, but are available from the authors upon request.

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