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Firm's Employment Adjustment in Response to Labor Regulation

WooRam Park and Jisun Baek*

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Abstract

In this paper, we examine the impact of the labor regulation on firm's employment. South Korea's labor reform in 2007 restricted the duration of the specific types of temporary contract—fixed term and dispatched contract—to maximum two years and required those temporary contracts to be converted into permanent contracts after the maximum duration. We exploit the fact that the impact of the reform is larger for the establishments that used those temporary workers intensively and apply a difference-in-difference framework. Our empirical analysis shows that stronger employment protection reduces the establishment's labor use. Moreover, we find that businesses try to mitigate the impact of the employment protection by reducing the use of fixed-term and dispatched contracts and increasing the use of atypical temporary contract that are not restricted by the reform. We also find that this shift towards legally less burdensome contract workers becomes more prevalent when the labor union exists.

JEL classification: J21; J23

Keywords: Employment Protection; Temporary Workers; Difference-in-Differences; Establishment-Level; Labor Union

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1 Introduction

The incidence of temporary employment has increased during the past few decades in the U.S. and the majority of other OECD countries (Autor, 2003; Curci, Rani, and Sekerler Richiardi, 2012; OECD, 2014). Since temporary workers generally have lower job security and poorer working conditions than regular workers, the increase in temporary employment is considered problematic as it may lead to an increase in labor market segregation among workers. Stronger employment protection for temporary workers is often recommended to discourage the increase in the numbers of temporary employment contracts (OECD, 2014). In contrast, strict employment protection is frequently blamed for a high unemployment rates, especially in European countries (Bertola, 1990; Cahuc and Postel-Vinay, 2002). Due to this concern, many European countries relieved the restrictions regarding the use of temporary contracts during the late 1990s and the early 2000s (Kahn, 2010).

However, the theory does not provide a clear cut answer on the effect of employment protection legislation on overall levels of employment. The literature generally predicts that increasing employment protection would decrease job flow and job turnovers (Autor, Kerr, and Kugler, 2007; Bertola, 1990; Lazear, 1990; Kugler and Pica, 2008; Kugler and Paul, 2004). In particular, the effect of strengthening employment protection on overall employment level will depend on the relative size of the decrease in hiring and layoff which is theoretically unclear.¹ Similarly, the impact of the employment protection for temporary workers—by placing restrictions regarding the use of temporary employment contracts—on the employment is theoretically ambiguous (Kahn, 2010).²

¹Bertola (1992) shows that the presence of a positive firing cost—the employment protection for workers—has an ambiguous effect on a firm’s average employment level whereas Fella (2000) argues that the firing cost will unambiguously increase the aggregate employment level. However, some studies such as Hopenhayn and Rogerson (1993) show that a stringent employment protection— such as imposing a tax on job destruction—will have a negative impact on employment levels.

²Boeri and Garibaldi (2007) argue that removing some restrictions on the creation of temporary jobs will increase employment at least in the short-run. Similarly, Nunziata and Staffolani (2007) theoretically demonstrates that if the constraints on temporary employment contracts are strengthened, the total employment level will decrease. On the other hand, Blanchard and Landier (2002) show that weakening the

The goal of this paper is to empirically investigate the differential effect of employment protection for temporary workers on levels of different types of employment. Specifically, we attempt to contribute to the literature by focusing on the response of businesses to the introduction of employment protection legislation for temporary workers. Although a large number of the theoretical literature on employment protections illustrates the effects on employment at the level of business, how establishments adjust—either reduce or raise—their employment level in response to the employment protection legislation is not empirically well explored.³ Specifically, a panel structure of our data allows us to control for the time-invariant unobservable characteristics of a business, and to observe the change of the employment level of an establishment after the implementation of the employment protection for temporary workers. Furthermore, using the detailed establishment-level information, we provide empirical evidence that different level of employment protection for permanent workers leads to variations in the response to employment protection legislation for temporary workers.

We exploit South Korea’s labor reform which came into effect in 2007, to identify the impact of the employment protection at level of the establishment.⁴ In particular, the two laws regarding the protection of the temporary workers were passed in late 2006 and were brought in effect on July 1st, 2007. The major component of the reform is to mandate the employers to hire fixed-term contract and dispatched workers with more than two years of tenure at the establishment as permanent employees. Thus, under the new laws, employment protection level for fixed-term contract and dispatched workers is expected to

protection for temporary workers will lead to a higher unemployment rate. Likewise, Cahuc and Postel-Vinay (2002) argue that allowing firms to hire workers using temporary contracts will result in an increase of unemployment when there is a strict employment protection for permanent workers.

³There are several studies investigating the impact of employment protection legislation on the *rate* of employment adjustment and job flows at the business level (Adhvaryu, Chari, and Sharma, 2013; Autor, Kerr, and Kugler, 2007; Hunt, 2000; Kan and Lin, 2011; Kugler and Pica, 2008)

⁴Our paper is not the first to examine the effect of the South Korean labor reform in 2007. Most notably, Yoo and Kang (2012) exploits the fact that the restriction on the duration of use of fixed-term contracts and dispatched workers does not apply to workers older than 55. Combining the difference-in-differences and the regression discontinuity design, they find that employment protection for temporary workers has a negative impact on total employment levels, at least in the short-run.

increase discretely as they would benefit from the standard statutory employment protection that is provided for permanent workers after two years of tenure.

We use the fact that the establishment-level impact of this employment protection reform depends on the level of the use of fixed-term contract and dispatched workers in each establishment. In particular, we construct the treatment intensity with the proportion of the fixed-term contract and dispatched workers among total workers prior to the reform. We then apply a difference-in-differences framework and compare the total employment level and the use of temporary workers by types of contracts across establishments with different degrees of treatment intensity.

Our empirical analysis provides evidence that employment protection for temporary workers has a small but statistically significant negative impact on total employment level. In particular, we find that an establishment with a high proportion of fixed-term contract and dispatched workers reduces their employment by a larger amount, compared to the establishments that use those temporary workers less intensively. Specifically, we find that the stronger employment protection for temporary workers decreases their number compared to permanent workers.

Moreover, our data shows that employment protection for specific types of temporary workers also has unintended consequences. That is, establishments respond to the stronger employment protection for fixed-term contract and dispatched workers by increasing the use of other types of temporary workers who are not protected by the labor reform. In particular, establishment's use of atypical temporary contract workers increased after the introduction of the protective measures for typical temporary contract workers. Furthermore, we show that this "balloon effect"—the increase in the incidence of other types of atypical temporary employment contracts—is more prominent among the establishments where the employment protection for permanent workers is more stringent. Specifically, the establishments with a labor union increase the number of other types of temporary workers by a larger amount than establishments without a labor

union. Moreover, we find that the degree of substitution of temporary workers for permanent workers is less among the establishments with a labor union. Overall, our results provide evidence that businesses respond to the employment protection legislation by replacing the workers that become legally burdensome due to the reform. Our findings are in line with Autor (2003) which finds that a stronger protection for regular workers increases a firm's use of temporary and outsourced workers. Furthermore, our results are consistent with recent evidence from Chaurey (2015), which shows that increase in employment protection induces firms to use temporary workers in order to circumvent labor laws.

We have organized the remainder of this paper as follows: Section 2 explains the detailed background information regarding the employment protection legislation on temporary employment contracts in Korea. Section 3 describes the establishment-level panel data used in this paper with summary statistics for key variables. Section 4 explains the empirical strategy adopted for the analysis, followed by a discussion of the results in Section 5. Section 6 offers a summary and concluding remarks.

2 Background

In this section, we provide background information regarding the definition of temporary workers in Korea and the labor market reform in 2007 which was intended to protect these workers.⁵ Temporary employment, as opposed to permanent employment, is usually defined as employment under contracts that are expected to end after a specific period. However, the detailed definition of temporary employment varies across countries. In Korea, temporary workers include not only fixed-term contract workers and dispatched (from a temporary work agency) workers but also part-time workers, contract workers as

⁵The details of the reform can be also found in Grubb, Lee, and Tergeist (2007) and Yoo and Kang (2012).

well as at-home and on-call workers.⁶

The number of temporary workers in Korea increased rapidly after the Asian Economic Crisis in the late 1990s. Specifically, the proportion of temporary workers in the workforce rose from 16.6% in 2001 to 28.8% in 2006 (Grubb, Lee, and Tergeist, 2007). Temporary workers are more likely to experience poor working conditions; therefore in order to protect these workers, two bills protecting temporary workers were passed by the Korean legislature in November 30, 2006 and entered into force on July 1st, 2007.⁷

Prior to 2007, there were few restrictions on the use of fixed-term contracts which were a major form of temporary employment in Korea. However, the reform restricted the maximum duration of fixed-term contracts to two years.⁸ Specifically, the law stipulates that after the two year contract period, a fixed-term contract worker should become a permanent employee unless the contract is terminated before two years. Moreover, the law obligates a user company to directly hire a dispatched worker as a permanent employee if the user company continues to use the dispatched worker for over two years. In short, the law requires an employer to hire fixed-term contract or dispatched workers as permanent employees if the employer wants to use them for more than two years. Thus, under the new law, fixed-term contract and dispatched workers become potential permanent workers as their employment protection level is expected to discretely increase after

⁶In Korea, non-regular workers are often used to indicate workers who cannot expect stable employment with their current employer and have a lower level of employment protection than permanent (regular) workers. In this paper, we use the two terms—temporary worker and non-regular worker—interchangeably. The difference between dispatched workers and contract workers is whether the user company (client) has the right to directly manage how workers function at their job. In particular, dispatched workers are employed by a temporary work agency but works under the supervision of the user company. However, contract workers work under the control of their own employer (contractor) that conducts the task requested by the client. Moreover, there is no direct legal relation between contract workers and the client whereas the relation between dispatched workers and the user company is regulated by the labor law. In particular, the contract for work, which is a specific form of commercial contract, only exists between a contractor and a client. Thus, from a legal standpoint using contract workers through outsourcing could be less burdensome for firms as clients of a contractor.

⁷The two separate laws, the Act on the Protection of Fixed-term and Part-time Workers and the Act on the Protection of Dispatched Workers, are combined and called the Act on the Protection of Temporary Workers.

⁸The restriction on the duration of fixed-term contracts applied to all fixed-term contracts with a few exceptions. Most notably, the restriction does not apply to workers older than 55 at the time of the contract.

two years of tenure.⁹

This empirical setting is contrary to the reduction of employment protection for temporary workers which occurred in the late 1990s in countries such as Germany and Netherlands where the regulations regarding the frequency of fixed-term contracts and the duration of the use of dispatched contracts were relieved (Kahn, 2010). Similar to the effects of relieving employment protection on overall employment levels, the effect of strengthening employment protection for temporary workers is not theoretically clear. Specifically, the number of temporary workers is likely to decrease and the number of permanent workers would increase. This is because the potential cost of hiring temporary workers increased while the cost of hiring permanent workers was unaffected by the labor reform. However, the effect of employment protection on the total employment level would depend on the relative size of the increase in permanent employment and the decrease in temporary employment, which is ambiguous. Moreover, the magnitude of the decrease in the numbers of temporary workers would depend on whether establishments can readily substitute fixed-term contract and dispatched workers with other types of temporary workers who are not protected by the reform.

Thus, the impact of the labor reform on overall employment levels and the composition of the workforce warrants empirical analysis. In the following sections, we explain the data set and the identification strategy for empirical analysis.

⁹The other component of the reform includes prohibiting “discriminatory treatment” against temporary workers which was gradually introduced by establishment size from 2007 and 2009. To be specific, the Prohibition of Discriminatory Treatment was enforced first to the establishments with 300 or more workers in July 1, 2007, and then to the establishments with 100 or more workers in July 1, 2008 and finally to all establishments with five or more workers in July 1, 2009. However, it is not as binding as the restriction on the length of the contracts since it allows employers to treat temporary workers differently based on the justifiable reasons such as ability, types of task and performance.

3 Data

To examine the impact of the 2007 employment protection legislation, we use the Workplace Panel Survey (WPS) from 2005 and 2011 which has been collected biannually by Korea Labor Institute. The establishments in the WPS were randomly chosen from a nationally representative sample in the 2005 Census on Establishments collected by Statistics Korea. The WPS covers establishments with more than 30 regular employees, i.e., employees under contracts for one year or longer, in all sectors with the exception of agriculture, forestry, fishing, mining and quarrying.

The dataset consists of a panel of approximately 1730-1900 establishments per wave and includes detailed information on each establishment such as industry classification, the age of establishment, location, and the existence of a labor union. More importantly, the WPS shows the total number of workers used by each establishment including not only employees directly hired by the establishment such as permanent workers but also the various types of temporary workers such as dispatched workers, outsourced and sub-contracted workers even though they are not employees of the establishment from a strict legal viewpoint.¹⁰

Thus, the data allows us to examine the effects of employment protection on the overall employment levels of an establishment and the numbers of temporary workers. Moreover, the data has been collected since 2005 which is prior to the 2007 labor reform. Thus, we are able to identify establishments that were expected to be severely affected by the employment protection legislation by examining the use of fixed-term and dispatched workers in 2005 which has not been altered by the reform in 2007.

Table 1 summarizes the data used for our empirical analysis. Since the sample in the WPS is randomly selected from the establishments with 30 or more workers, the average size of the establishments in our sample, measured by total employment, is large. On

¹⁰In this paper, we use two terms, total workers and total employment, interchangeably to refer the sum of permanent and temporary workers used by an establishment although some types of temporary workers do not have a direct employment relationship with the establishment.

average, each establishment employed about 517 workers. This breaks down to an average number of permanent workers of 400 and average number of temporary worker of approximately 117 for each establishment. Among temporary workers, an average of 64 are fixed-term contract and dispatched workers whereas an average of 54 workers are employed under other types of temporary contracts including part-time, contract or at-home workers. The proportion of temporary worker among the total workers in each establishment is approximately 17 percent on average. Specifically, the proportion of fixed-term contract and dispatched workers is about 10 percent whereas the share of the other types of temporary employment is seven percent of the total workers for an average establishment in our dataset.

The age of establishment, defined as the difference between the year when it was established and the survey year, is 22 year for the average establishment in our sample. Labor unions are organized in about 42% of the establishments and about 18 percent of the establishments laid off permanent employees for managerial and other reasons in the past two years at the time of the survey. Moreover, about 47% of the establishments used a performance pay scheme as a compensation system for their permanent employees. More than half of the establishments are located in the seven metropolitan cities in South Korea and 40% are in the manufacturing sector.¹¹ Finally, the business entity of almost all of the establishments is a corporation as opposed to a sole proprietorship, and more than half of the establishments are single-unit firms—firms that have only one establishment.

4 Empirical Strategy

We apply a difference-in-differences framework to analyze how businesses adjust their employment patterns in response to changes in employment protection. Specifically, we compare the outcomes for establishments heavily affected by the labor reform with out-

¹¹The seven metropolitan cities are Seoul, Busan, Daegu, Incheon, Daejeon, Gwangju and Ulsan.

comes for establishments that were not substantially affected.

In particular, we use the proportion of fixed-term contract and dispatched workers among total workers in each establishment in 2005—prior to the implementation of the employment protection—as a continuous indicator for the treatment intensity.¹² We capture the effect of employment protection legislation by comparing the mean changes of outcome variables before and after the reform in 2007 across establishments with different degrees of treatment intensity. Thus, the causal effect of the labor reform on an outcome variable can be summarized by estimates derived from the following equation (1):

$$Y_{ijrt} = \beta \text{After}_t \cdot \text{Treat}_i + \mathbf{X}'_{ijrt} \Phi + \delta_i + \rho_j + \gamma_r + \tau_t + \epsilon_{ijrt} \quad (1)$$

where Y_{ijrt} indicates various outcome variables of an establishment i , in industry j , in region r at year t such as the number of total workers, the numbers of permanent and temporary workers and the proportion of temporary workers. After_t is a dummy variable which takes a value equal to one after the laws restricting the use of fixed-term contract and dispatched workers were enforced. Treat_i is the intensity of treatment which is defined as the proportion of fixed-term contract and dispatched workers among the total workers at each establishment in 2005. The coefficient of the interaction between After and Treat , β is the coefficient of interest and captures the causal effect of the employment protection on an outcome variable, Y_{ijrt} . \mathbf{X}_{ijrt} is timing-varying characteristics of an establishment such as the type of business entity, the existence of a labor union and the use of performance pay scheme for permanent workers. δ_i and ρ_j represent the set of dummy variables for an establishment and industry, and γ_r and τ_t indicate region and time-fixed effects, respectively.

For the difference-in-differences framework to be valid, the trend in outcome variables across establishments with different degrees of treatment intensity should be similar in

¹²A more suitable measure for the treatment intensity would be the proportion of fixed-term contract and dispatched workers with more than two years of tenure in each establishment. Unfortunately, this is not a viable option as the WPS does not contain information about the average tenure of temporary workers.

the absence of the employment protection legislation. One way to support this common trend assumption is to show that the pre-legislation trends in outcome variables are similar across establishments. Unfortunately, this is not possible in this case as the WPS only contains one wave of data prior to the enforcement of the employment protection for temporary workers. In Section 5.3, we attempt to overcome this restriction by examining the equation (1) only for the establishments that reported their use of temporary workers had been stable in 2005. That is, we provide a robustness check for our main result, by examining the effect of the labor reform only in establishments for which the trend in one of the outcome variables—the use of temporary workers—was similar.

5 Results

5.1 Main Result

In this section, we present empirical evidence regarding the causal impact of the Act on the Protection for Temporary Workers. Table 2 summarizes the result for estimating equation (1) using the log of employment by various types of contracts as outcome variables. All specifications include establishment-, industry-, region- and year-fixed effects. We also control for the type of business entity, the existence of a labor union, the age of establishment and its squared term.

To begin with, Column (1) in Table 2 provides the result on the impact of employment protection legislation on the establishment-level employment measured by the sum of permanent and temporary workers at each establishment. The coefficient is small but negative and statistically significant, which implies that the businesses that are heavily affected by the reform are likely to reduce the labor use compared to those that are less intensively affected by the reform. In particular, an average establishment which employs 10% of their workers on fixed-term and dispatched contract experienced 3% decrease in total workers due to the labor reform, compared to an establishment using no fixed-term

contract and dispatched workers.

Moreover, employment protection legislation for temporary workers increased the permanent employment and decreased the temporary employment at the establishment level. Columns (2) and (3) show a statistically significant effect of labor reform on the level of permanent and temporary employment in opposite directions. In particular, the magnitude of the coefficient indicating the increase of permanent employment is smaller than the one describing the decrease of the temporary employment, consistent with the negative effect of the labor reform on overall employment.

The next set of results show that labor reform had heterogeneous effects on temporary workers across different types of temporary employment contracts. While Column (4) shows the effect of the labor reform on the incidence of fixed-term contract and dispatched workers, Column (5) exhibits the effect on the incidence of other temporary workers with atypical labor contracts separately. In particular, it shows that an establishment reduced the use of fixed-term contracts and dispatched workers but increased the use of other atypical labor contracts, which are not restricted by the new law. The result is similar to Autor (2003) documenting that the intent to protect the job security of permanent employees resulted in an increase of temporary employees who did not directly benefit from the policy. In our case, the intent to protect a specific type of temporary contract worker increased the use of other forms of temporary employment that are legally less burdensome to the employers.

As a result of the heterogeneous impact of labor reform across various types of employment, the proportion of temporary workers in the total workers decreased within an establishment. In addition, the proportion of fixed-term contract and dispatched workers for which the duration of contract is directly restricted by labor reform also decreased. However, the proportion of other forms of temporary employment increased due to the impact of the new regulations on the use of fixed-term contract and dispatched workers. These results are documented in Table 3, which summarizes the results from the estimat-

ing equation (1) the using proportion of different forms of temporary workers among the total employment in each establishment. In particular, Column (1) shows that the proportion of temporary workers decreased due to labor reform legislation. Columns (2) and (3) show that the decrease in the proportion of temporary workers is mainly driven by a decrease in the proportion of fixed-term contract and dispatched workers and partially offset by an increase in the proportion of other types of temporary employment.

Overall, the results show that the employment protection legislation has a negative effect on total labor use of establishment. This decrease in total employment is due to an insufficient increase of permanent employees to compensate for the sharp decrease of fixed-term contract and dispatched workers. We also document business's response to the new law in the ways that policy makers and legislators did not intend; increasing the use of certain types of temporary workers that are not protected by the law.

5.2 Labor Union and the effect of Employment Protection

In this subsection, we show that the pattern of business's adjustments of labor use in response to strengthening employment protection for fixed-term contract and dispatched workers depends on its employment protection level for permanent workers. In particular, we provide evidence that the reduction in the number of fixed-term contract and dispatched workers—potential permanent workers—is more prevalent among establishments with a labor union, where the employment protection for permanent workers is stronger. Furthermore, we show that the existence of a labor union in each establishment, which strengthens the employment protection level for permanent employees, dampens the substitution of permanent workers for temporary workers and amplifies the increase of the use of atypical temporary contracts that are not protected by the labor reform.

The effect of labor reform in relation to the existence of a labor union is shown in Tables 4 and 5. The Panel A of Table 4 and 5 describes the empirical results for the establishments with no labor union in 2005 and the Panel B summarizes the result for the

establishments with a labor union. The Panel C shows the result of testing the statistical difference between the coefficients for establishments with and without a labor union in 2005. Specifically, we include the interaction of *After, Treat* and an indicator variable for the existence of a labor union in 2005 in equation (1) and further allow other coefficients in the equation to vary across establishments with and without a labor union. Thus, the coefficient of the interaction of three variables, *After, Treat* and the indicator variable for the existence of a labor union in 2005, will capture the difference in the coefficients in the Panels A and B.

The coefficients in Column (1) of Table 4 show that the negative impact of employment protection legislation on total employment is larger among establishments with a labor union where the employment protection for permanent workers is stronger. However, the difference is not statistically significant. Columns (2) and (4) show that establishments which have a stronger protection for permanent workers, increased the number of permanent workers by a smaller amount and decreased fixed-term contract and dispatched workers by a larger amount in response to the labor reform. Column (5) shows that business's behavior to mitigate the impact of the labor reform by increasing the use of atypical labor contracts is readily observed for the establishments with labor unions.

The results for the proportion of different types of temporary employment among the total workers are consistent with the results using the log of temporary employment. Columns (1)-(3) of Table 5 summarize the impact of the labor reform on the proportion of temporary workers, fixed-term contract and dispatched workers and other atypical temporary contract workers among the total workers, for the establishments with and without labor union in 2005. Specifically, the increase in the proportion of other types of temporary contract workers and the decrease in the proportion of fixed-term contract and dispatched workers are larger among establishments with a labor union. These opposing forces result in a small net difference on impact of the labor reform on the proportion of temporary workers between establishments with and without a labor union in 2005.

In sum, the unintended consequences of the labor reform, which were intended to match the employment protection level for temporary workers to that of permanent workers, increased with the existing gap in the employment protection level between permanent and temporary workers. In particular, compared to establishments without a labor union, establishments with a labor union were reluctant to increase the number of permanent workers and drastically reduced the number of workers on types of contract that will be converted to permanent contracts after two years, in response to the labor reform.

5.3 Robustness Checks

In this subsection, we perform several robustness checks for our main results documented in Section 5.1. To begin with, we limit the sample to the establishments that are observed in all four waves. That is, we use a balanced panel to estimate the equation (1) for various outcomes.¹³ The results are summarized in the Panel A of Tables 6 and 7. Overall, the results are not only qualitatively similar but also quantitatively similar to the main results in Tables 2 and 3 that employ an unbalanced panel. Moreover, to explore the possibility of whether the main result is driven by heterogeneous trends in an outcome variable across establishments, we analyze the effect using establishments that reported stable numbers of temporary workers prior to the implementation of employment protection legislation.¹⁴ The results are summarized in the Panel B of Tables 6 and 7. The overall results are consistent with our main findings and suggest that our results do not merely reflect a difference in the existing employment trends by treatment intensity.

We also examine the mid-term effect of the employment protection legislation by restricting the sample to the first and fourth waves—observed in 2005 and 2011—of the

¹³Since the WPS does not have information regarding the detail reasons for attritions, it is not possible to examine the effect of the survival probability as an attrition from the sample could be simply due to the refusal to answer the survey by the establishment.

¹⁴In the wave observed in 2005, the WPS questionnaire asks respondents about the trend in their use of temporary workers which is categorized as follows: never used, declining, stable, increasing and other. We restrict our analysis to the sample to the establishments that reported their use of temporary workers was stable prior to 2005.

survey. The results based on the sample excluding the intermediate years are presented in the Panel C of Tables 6 and 7. These show that the effect of the employment protection is not driven by the initial response of establishments as the coefficients are fairly consistent with the main results even after exclusion of the intermediate years. In particular, the results document that establishment's behavior to substitute fixed-term contract and dispatched workers is still strongly observed even four years after the introduction of labor reform.

As a further robustness check of our main results, we include additional controls in equation (1) and attempt to formally address possibilities of omitted variable bias. To begin with, in order to explicitly control for the possible effect of other components of the reform in 2007—"Prohibition of Discriminatory Treatment"—we include the interaction terms between year-fixed effects and dummy variables for different sizes of establishments. Specifically, since the prohibition was gradually enforced by establishment size as described in Section 2, we create a set of dummy variables for the establishment size categories accordingly and interact each of those with a set of year-fixed effects. The estimated results are provided in the Panel A of Tables 8–9 and are qualitatively similar with the main result. Furthermore, we control for sector \times year fixed effects to allow heterogeneous time-series shocks to specific industries in a given year. The results are summarized in the Panel B of Tables 8 and 9 and show that our main results are qualitatively unaffected by the inclusion of sector \times year fixed effects.

Finally, we allow a macro shock or a business cycle to differentially affect establishments by the degree of the use of fixed-term contracts and dispatched workers. In particular, our main specification used in Tables 2 and 3 controls for the year-specific macro shock that is common across businesses. However, it is possible that the macro shock or the business cycle may have heterogeneous effects on establishments with different treatment intensities. If this is the case, the result could have been driven by the macro shock that is not causally related with labor reform. This could be potentially important as the

Global Financial Crisis occurred after labor reform in 2007. We explicitly control for this possibility by following the approach of Kugler and Pica (2008) and adding the interaction between the growth rate of GDP and treatment intensity in equation (1). The results for this estimation are reported in Panel C of Tables 8–9. The results are both qualitatively and quantitatively similar to the main result in Tables 2–3. Thus, this robustness check supports that the main results are not driven by the heterogeneous impacts of business cycle across establishments with different treatment intensities.

6 Conclusion

In this paper, we empirically examined establishment’s adjustment of labor use in response to the employment protection legislation in Korea. We investigated the impact of the introduction of the Act on the Protection of Temporary Workers enacted in 2007 which restricted the maximum duration of specific types of temporary employment contracts. Specifically, the new laws mandated companies to directly hire fixed-term contract and dispatched workers with more than two years of tenure as permanent employees. The impact of the reform varied across establishments depending on their pre-reform use of fixed-term contract and dispatched workers. This allows us to set up a natural experiment research design. We apply a difference-in-differences framework to the establishment-level panel data and compare the mean change in outcome variables of businesses with different degrees of treatment intensity before and after the labor reform introduction in 2007.

Our empirical analyses showed that stronger employment protection led to a decrease in total employment at the establishment level. Moreover, the stronger employment protection for temporary workers decreased the relative proportion of temporary workers compared to permanent workers. Furthermore, we show that the reform had unintended consequences by increasing the use of temporary employment contracts that are not pro-

tected by the reform. Specifically, we observed that businesses sharply reduced the use of fixed-term contract and dispatched workers and increased the use of other types of atypical labor contract workers. Furthermore, we show that this pattern—the reduction in the use of temporary employment contracts that are potentially permanent after two years—is more prevalent among establishments with strict employment protection for their permanent workers.

Overall, our paper suggests that the increased employment protection for specific temporary labor contracts would induce employers to avoid using these employment contracts. Moreover, we further suggest that establishments will actively increase the use of alternative temporary contracts in the presence of strict employment protection for permanent employment. The implications of our paper are similar to Acemoglu and Angrist (2001) and Autor, Donohue, and Schwab (2006) in the sense that the policy which intended to protect the job security of workers actually reduced the employment. Moreover, consistent with Autor (2003), our findings provide suggestive evidence that labor unions which offer the employment protection for permanent employees, induce the increased use of certain types of temporary workers with poorer job security and working conditions.

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Table 1: Summary Statistics

Variable	N(obs) (1)	Mean (2)	SD (3)
Total Workers	5808	516.95	1273.42
Permanent Workers	5809	399.52	998.43
Temporary Workers	5808	117.37	457.4
Fixed-Term Contract & Dispatched Workers	5809	63.54	313.61
Other Types of Temporary Workers	5808	53.81	296.93
Proportion of Temporary Workers	5808	0.17	0.22
Proportion of Fixed-Term Contract & Dispatched Workers	5808	0.1	0.17
Proportion of Other Types of Temporary Workers	5808	0.07	0.14
Establishment Age	5809	22.92	17.15
Organized Labor Union	5809	0.42	0.49
Permanent Employees Laid off in the Past Two Years	5809	0.18	0.39
Performance-based Pay Used	5809	0.47	0.5
Located in Metropolitan Cities	5809	0.57	0.5
Manufacturing Sector	5809	0.39	0.49
Business Entity is a Corporation	5809	0.97	0.17
Single-unit Firm	5809	0.57	0.49

N(obs) is the number of observations and SD is standard deviation. Please refer to Section 3, for the detailed description of variables.

Table 2: The Effect of Employment Protection on Employment

Dependent Variable	ln(Total Workers)	ln(Permanent Workers)	ln(Temporary Workers)	ln(Fixed-Term Contract and Dispatched Workers)	ln(Other Types of Temporary Workers)
	(1)	(2)	(3)	(4)	(5)
<i>After · Treat</i>	-0.302*** (0.091)	0.935*** (0.130)	-2.767*** (0.240)	-4.572*** (0.282)	1.190*** (0.296)
adj. R-sq	0.896	0.867	0.620	0.662	0.400
N	5808	5809	5808	5809	5808

Standard errors in parentheses are clustered at the establishment level.

After · Treat is the interaction between *After* and *Treat* where *After* is a dummy variable indicating periods after the Act on the Protection of Temporary Workers was enforced in 2007 and *Treat* is the intensity of treatment defined as the proportion of fixed-term contract and dispatched workers among the total workers at each establishment in 2005. For all the dependent variables, we control for timing-varying characteristics of establishment such as the foreign share, the type of business entity, the existence of a labor union and the use of performance pay scheme for permanent workers. All the regressions include establishment-, industry-, region- and year-fixed effects.

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Table 3: The Effect of Employment Protection on the Proportion of Temporary Workers

Dependent Variable	Proportion of Temporary Workers	Proportion of Fixed-Term Contract and Dispatched Workers	Proportion of Other Types of Temporary Workers
	(1)	(2)	(3)
<i>After · Treat</i>	-0.480*** (0.032)	-0.638*** (0.030)	0.158*** (0.025)
adj. R-sq	0.549	0.584	0.401
N	5808	5808	5808

Standard errors in parentheses are clustered at the establishment level.

After · Treat is the interaction between *After* and *Treat* where *After* is a dummy variable indicating periods after the Act on the Protection of Temporary Workers was enforced in 2007 and *Treat* is the intensity of treatment defined as the proportion of fixed-term contract and dispatched workers among the total workers at each establishment in 2005. For all the dependent variables, we control for timing-varying characteristics of establishment such as the foreign share, the type of business entity, the existence of a labor union and the use of performance pay scheme for permanent workers. All the regressions include establishment-, industry-, region- and year-fixed effects.

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Table 4: The Effect of Employment Protection Legislation on Employment by the Presence of a Labor Union

Dependent Variable	ln(Total Workers)	ln(Permanent Workers)	ln(Temporary Workers)	ln(Fixed-Term Contract and Dispatched Workers)	ln(Other Types of Temporary Workers)
	(1)	(2)	(3)	(4)	(5)
Panel A: Establishments without Labor Union					
<i>After · Treat</i>	-0.267** (0.109)	1.123*** (0.164)	-2.475*** (0.282)	-4.022*** (0.323)	0.626** (0.316)
adj. R-sq	0.849	0.804	0.563	0.609	0.398
N	3402	3403	3402	3403	3402
Panel B: Establishments with Labor Union					
<i>After · Treat</i>	-0.328* (0.168)	0.548*** (0.192)	-3.382*** (0.443)	-5.624*** (0.496)	2.225*** (0.587)
adj. R-sq	0.902	0.881	0.622	0.668	0.390
N	2406	2406	2406	2406	2406
Panel C: Testing					
<i>After · Treat · LaborUnion</i>	-0.0610 (0.200)	-0.576** (0.253)	-0.907* (0.525)	-1.602*** (0.592)	1.600** (0.667)
adj. R-sq	0.894	0.867	0.619	0.663	0.405
N	5808	5809	5808	5809	5808

Standard errors in parentheses are clustered at the establishment level.

After · Treat is the interaction between *After* and *Treat* where *After* is a dummy variable indicating periods after the Act on the Protection of Temporary Workers was enforced in 2007 and *Treat* is the intensity of treatment defined as the proportion of fixed-term contract and dispatched workers among the total workers at each establishment in 2005. *After · Treat · LaborUnion* is the interaction between *After*, *Treat* and *LaborUnion* where *LaborUnion* is a dummy variable indicating establishments with a labor union in 2005. For all the dependent variables, we control for timing-varying characteristics of establishment such as the foreign share, the type of business entity, the existence of a labor union and the use of performance pay scheme for permanent workers with their interactions with *LaborUnion*. All the regressions include establishment-, industry-, region- and year-fixed effects.

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Table 5: The Effect of Employment Protection on the Proportion of Temporary Workers by the Presence of a Labor Union

Dependent Variable	Proportion of Temporary Workers	Proportion of Fixed-Term Contract and Dispatched Workers	Proportion of Other Types of Temporary Workers
	(1)	(2)	(3)
Panel A: Establishments without Labor Union			
<i>After · Treat</i>	-0.497*** (0.041)	-0.616*** (0.039)	0.119*** (0.029)
adj. R-sq	0.539	0.559	0.392
N	3402	3402	3402
Panel B: Establishments with Labor Union			
<i>After · Treat</i>	-0.441*** (0.051)	-0.677*** (0.043)	0.236*** (0.047)
adj. R-sq	0.567	0.638	0.422
N	2406	2406	2406
Panel C: Testing			
<i>After · Treat · LaborUnion</i>	0.0559 (0.066)	-0.0615 (0.058)	0.117** (0.056)
adj. R-sq	0.548	0.583	0.403
N	5808	5808	5808

Standard errors in parentheses are clustered at the establishment level.

After · Treat is the interaction between *After* and *Treat* where *After* is a dummy variable indicating periods after the Act on the Protection of Temporary Workers was enforced in 2007 and *Treat* is the intensity of treatment defined as the proportion of fixed-term contract and dispatched workers among the total workers at each establishment in 2005. *After · Treat · LaborUnion* is the interaction between *After*, *Treat* and *LaborUnion* where *LaborUnion* is a dummy variable indicating establishments with a labor union in 2005. For all the dependent variables, we control for timing-varying characteristics of establishments such as the foreign share, the type of business entity, the existence of a labor union and the use of performance pay scheme for permanent workers with their interactions with *LaborUnion*. All the regressions include establishment, industry, region and year fixed effects.

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Table 6: The Effect of Employment Protection Legislation on Employment for Various Samples

Dependent Variable	ln(Total Workers)	ln(Permanent Workers)	ln(Temporary Workers)	ln(Fixed-Term Contract and Dispatched Workers)	ln(Other Types of Temporary Workers)
	(1)	(2)	(3)	(4)	(5)
Panel A: Balanced Panel					
<i>After · Treat</i>	-0.342*** (0.103)	0.797*** (0.126)	-2.868*** (0.265)	-4.827*** (0.317)	1.307*** (0.337)
adj. R-sq	0.899	0.874	0.622	0.653	0.421
N	4363	4364	4363	4364	4363
Panel B: Establishments Reporting Their Use of Temporary Workers Were Stable					
<i>After · Treat</i>	-0.450*** (0.143)	0.755*** (0.172)	-1.103*** (0.318)	-3.464*** (0.424)	1.469*** (0.432)
adj. R-sq	0.892	0.895	0.589	0.624	0.362
N	2219	2219	2219	2219	2219
Panel C: Using the first and the fourth waves of WPS					
<i>After · Treat</i>	-0.237* (0.128)	0.912*** (0.169)	-3.163*** (0.352)	-4.939*** (0.394)	1.625*** (0.366)
adj. R-sq	0.870	0.846	0.539	0.583	0.287
N	3096	3096	3096	3096	3096

Standard errors in parentheses are clustered at the establishment level.

After · Treat is the interaction between *After* and *Treat* where *After* is a dummy variable indicating periods after the Act on the Protection of Temporary Workers was enforced in 2007 and *Treat* is the intensity of treatment defined as the proportion of fixed-term contract and dispatched workers among the total workers at each establishment in 2005. For all the dependent variables, we control for timing-varying characteristics of establishment such as the foreign share, the type of business entity, the existence of a labor union and the use of performance pay scheme for permanent workers. All the regressions include establishment-, industry-, region- and year-fixed effects.

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Table 7: The Effect of Employment Protection on the Proportion of Temporary Workers for Various Samples

Dependent Variable	Proportion of Temporary Workers	Proportion of Fixed-Term Contract and Dispatched Workers	Proportion of Other Types of Temporary Workers
	(1)	(2)	(3)
Panel A: Balanced Panel			
<i>After · Treat</i>	-0.483*** (0.034)	-0.659*** (0.033)	0.175*** (0.029)
adj. R-sq	0.536	0.555	0.407
N	4363	4363	4363
Panel B: Establishments Reporting Their Use of Temporary Workers Were Stable			
<i>After · Treat</i>	-0.376*** (0.046)	-0.567*** (0.046)	0.191*** (0.038)
adj. R-sq	0.592	0.655	0.392
N	2219	2219	2219
Panel C: Using the first and the fourth waves of WPS			
<i>After · Treat</i>	-0.513*** (0.048)	-0.697*** (0.043)	0.184*** (0.035)
adj. R-sq	0.494	0.589	0.253
N	3096	3096	3096

Standard errors in parentheses are clustered at the establishment level.

After · Treat is the interaction between *After* and *Treat* where *After* is a dummy variable indicating periods after the Act on the Protection of Temporary Workers was enforced in 2007 and *Treat* is the intensity of treatment defined as the proportion of fixed-term contract and dispatched workers among the total workers at each establishment in 2005. For all the dependent variables, we control for timing-varying characteristics of establishment such as the foreign share, the type of business entity, the existence of a labor union and the use of performance pay scheme for permanent workers. All the regressions include establishment-, industry-, region- and year-fixed effects.

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Table 8: The Effect of Employment Protection on the Employment with Various Specifications

Dependent Variable	ln(Total Workers)	ln(Permanent Workers)	ln(Temporary Workers)	ln(Fixed-Term Contract and Dispatched Workers)	ln(Other Types of Temporary Workers)
	(1)	(2)	(3)	(4)	(5)
Panel A: Control for the Possible Effects of the Prohibition of Discriminatory Treatment					
<i>After · Treat</i>	-0.322*** (0.100)	1.149*** (0.152)	-3.390*** (0.292)	-5.331*** (0.329)	1.011*** (0.329)
adj. R-sq	0.897	0.870	0.627	0.679	0.408
N	5808	5809	5808	5809	5808
Panel B: Control for the Industry × Year Fixed Effects					
<i>After · Treat</i>	-0.359*** (0.101)	1.112*** (0.150)	-3.455*** (0.289)	-5.368*** (0.326)	1.010*** (0.327)
adj. R-sq	0.896	0.870	0.627	0.679	0.407
N	5808	5809	5808	5809	5808
Panel C: Control for the Year-specific Macro Shock					
<i>After · Treat</i>	-0.283*** (0.088)	0.920*** (0.133)	-2.709*** (0.238)	-4.508*** (0.283)	1.224*** (0.299)
adj. R-sq	0.896	0.867	0.621	0.662	0.400
N	5808	5809	5808	5809	5808

Standard errors in parentheses are clustered at the establishment level.

After · Treat is the interaction between *After* and *Treat* where *After* is a dummy variable indicating periods after the Act on the Protection of Temporary Workers was enforced in 2007 and *Treat* is the intensity of treatment defined as the proportion of fixed-term contract and dispatched workers among the total workers at each establishment in 2005. For all the dependent variables, we control for timing-varying characteristics of establishment such as the foreign share, the type of business entity, the existence of a labor union and the use of performance pay scheme for permanent workers. All the regressions include establishment-, industry-, region- and year-fixed effects.

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Table 9: The Effect of Employment Protection on the Proportion of Temporary Workers with Various Specifications

Dependent Variable	Proportion of Temporary Workers	Proportion of Fixed-Term Contract and Dispatched Workers	Proportion of Other Types of Temporary Workers
	(1)	(2)	(3)
Panel A: Control for the Possible Effects of the Prohibition of Discriminatory Treatment			
<i>After · Treat</i>	-0.572*** (0.038)	-0.707*** (0.032)	0.134*** (0.026)
adj. R-sq	0.564	0.612	0.407
N	5808	5808	5808
Panel B: Control for the Industry × Year Fixed Effects			
<i>After · Treat</i>	-0.575*** (0.038)	-0.705*** (0.032)	0.129*** (0.026)
adj. R-sq	0.564	0.613	0.406
N	5808	5808	5808
Panel C: Control for the Year-specific Macro Shock			
<i>After · Treat</i>	-0.471*** (0.033)	-0.631*** (0.030)	0.160*** (0.026)
adj. R-sq	0.550	0.585	0.401
N	5808	5808	5808

Standard errors in parentheses are clustered at the establishment level.

After · Treat is the interaction between *After* and *Treat* where *After* is a dummy variable indicating periods after the Act on the Protection of Temporary Workers was enforced in 2007 and *Treat* is the intensity of treatment defined as the proportion of fixed-term contract and dispatched workers among the total workers at each establishment in 2005. For all the dependent variables, we control for timing-varying characteristics of establishment such as the foreign share, the type of business entity, the existence of a labor union and the use of performance pay scheme for permanent workers. All the regressions include establishment-, industry-, region- and year-fixed effects.

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

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