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Abstract
The authors investigate the effects of recent South Korean labor reform, which was designed to protect temporary workers, on the level of temporary, permanent, and overall employment in that country. Because the effects of employment protection legislation (EPL) on employment levels remain theoretically ambiguous, they must be determined by empirical analysis. The impacts of the reform on both temporary and overall employment are negative at first and fade away in two years after the reform, hence taking a U-shape in the post-reform period. The impact of the reform on permanent employment is, however, positive two years after the reform. At least in the short run, an increase in protection for workers comes at a cost of reduced levels of employment.

Keywords
Employment Protection, Temporary Workers, South Korea

Cover Page Footnote
We thank seminar participants at the 2010 Korea Labor Economic Association Conference for helpful comments and suggestions. We are also grateful to two anonymous referees and the editor whose comments substantially improved the paper.

THE EFFECT OF PROTECTION OF TEMPORARY WORKERS ON EMPLOYMENT LEVELS: EVIDENCE FROM THE 2007 REFORM OF SOUTH KOREA

GYEONGJOON YOO AND CHANGHUI KANG*

The authors investigate the effects of recent South Korean labor reform, which was designed to protect temporary workers, on the level of temporary, permanent, and overall employment in that country. Because the effects of employment protection legislation (EPL) on employment levels remain theoretically ambiguous, they must be determined by empirical analysis. The impacts of the reform on both temporary and overall employment are negative at first and fade away in two years after the reform, hence taking a U-shape in the post-reform period. The impact of the reform on permanent employment is, however, positive two years after the reform. At least in the short run, an increase in protection for workers comes at a cost of reduced levels of employment.

Interest in the relationship between employment protection and labor market performances of the economy continues. Although impacts of employment protection regulations on labor market flows are theoretically clear and empirically well-established (Kugler 2007), the effects of such regulations on the level of overall employment and unemployment remain much less conclusive empirically and theoretically (Lindbeck and Snower 1988; Bentolila and Bertola 1990; Bertola 1990, 1992; Pissarides 2001; Blanchard and Landier 2002; Cahuc and Postel-Vinay 2002). The situation can be understood by noting that the volume of overall employment (a stock variable) is affected by relative magnitudes of the amount of hiring and firing (flow variables). If a theory predicts that the introduction of an employment protection regulation decreases firing more (less) than it decreases hiring, then the size of overall employment is expected to increase (decrease). To the extent that varying theories predict varying magnitudes of the changes in hiring and firing, an impact of an employment protection regulation on the volume of overall employment remains theoretically inconclusive. Hence, this issue is left to be resolved by empirical analysis.

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We thank seminar participants at the 2010 Korea Labor Economic Association Conference for helpful comments and suggestions. We are also grateful to two anonymous referees and the editor whose comments substantially improved the paper. A data appendix with additional results and copies of the computer programs are available from the second author at ckang@cau.ac.kr.

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Earlier studies investigate employment consequences of employment protection legislation (EPL) using cross-country data (Bertola 1990; Lazear 1990; Booth, Dolado, and Frank 2002). As is the case of cross-country studies, however, they are limited in credibly disentangling the impact of EPL from that of other determinants on a country's overall employment. For example, countries that have strict employment protection regulations tend to have other institutional arrangements that are also likely to affect employment (e.g., generous unemployment insurances, high minimum wages and taxes). Unless an analysis sorts out all those (either observable or unobservable) confounding determinants, an estimate produced by it is subject to a bias. To overcome difficulties facing cross-country studies, recent research exploits within-country variation in the degree of employment protection to uncover a causal impact of EPL (e.g., Kugler, Jimeno, and Hernanz 2003; Autor, Donohue, and Schwab 2006; Kugler and Pica 2008; Marinescu 2009; Kahn 2010; Kan and Lin 2011).

We augment such within-country studies by investigating the effect of a recent labor reform in South Korea (Korea hereafter) deemed to protect temporary (fixed-term) workers on the level of employment. Implemented in 2007, the labor reform of Korea imposed a new regulation on temporary contracts by shortening the maximum duration of employing temporary workers from an unspecified length to two years, keeping the protection level of permanent workers intact. That is, under the new regulation, a temporary contract should be either converted into a permanent contract or dismissed with no costs within two years after it is signed. Discussions on a need to protect temporary workers had been under way for a few years before implementation; the relevant laws were finally passed in November 2006 and put into effect July 1, 2007, eight months afterward. Such an arguably sudden development of the situation provides a natural experimental event, which provides us the opportunity to study effects of employment protection on the level of employment. In the Korean case, some part of the post-reform period overlaps with the era of global economic recession that started from the end of 2007. To deal with macroeconomic effects on employment, our design exploits an age cut-off of the 2007 reform, which exempts individuals aged 55 and older from the two-year maximum duration. In the estimation we compare differences in employment between individuals just below and above age 55 across pre-reform and post-reform periods, combining an idea of a regression discontinuity design with a difference-in-differences method.

While providing a unique event, the 2007 reform of Korea offers an interesting case for exploring employment consequences of EPL in at least two additional respects. First, recent within-country research on employment protection largely examines changes in employment protection of permanent workers. Yet, policy options that affect (especially reduce) the protection level of permanent workers often confront practical and political difficulties. As a result, recent policies aiming to change the overall level of employment protection of a country have often relied on temporary con-

tracts subject to few, or lower, dismissal costs (Kahn 2007, 2010). Thus impacts of varying the protection level of temporary workers on the labor market are likely to be a more policy-relevant issue than those of varying the protection level of permanent workers. Given that existing literature that exploits within-country variation in the protection level of temporary workers is rare (e.g., Kahn 2010), within-country studies are now warranted to advance the research on a par with those of permanent workers. The case of Korea offers such an opportunity.

Second, previous empirical studies have examined the impacts of employment protection when a country lowers the overall protection level by introducing temporary contracts in the labor market. In contrast, the reform of Korea was designed to *raise* protection of temporary workers, with the protection level of permanent workers remaining nearly unchanged. If an impact is symmetric, we are deemed to find an opposite impact of those found in previous studies.

Literature Review

There is a considerable volume of theoretical and empirical literatures that examine impacts of employment protection in general on the labor market (Kugler 2007). While theoretical models predict a negative impact of increased employment protection on worker turnover and job flows, they predict an ambiguous effect on the size of total employment (or unemployment) in the labor market. While some researchers posit that stricter employment protection leads to a decrease in overall employment, others argue that the direction of the impacts remains uncertain. Another group of studies (Mortensen and Pissarides 1999; Fella 2000) raises a possibility that strictness of job security regulations may increase the size of overall employment.

In parallel with theoretical predictions, empirical studies are also divided as to how an increase in employment protection affects the size of overall employment. Given that excellent surveys, for example, Dolado, Garcia-Serrano, and Jimeno (2002), Kan and Lin (2011), Kahn (2007, 2010), and Kugler (2007), among others, are available for a broad literature on impacts of employment protection on the labor market, in this section we narrow our focus on studies that either theoretically or empirically deal with impacts of the presence of temporary contracts on the labor market.

Confronting political opposition to reducing the protection level of permanent workers, many countries introduced temporary contracts subject to few, or lower, dismissal costs as a means of fighting against rigidities of the labor market. While the rationale behind this trend is that liberalizing a part of the labor market enhances overall flexibility, hence leading to better labor market performances, economic theories formally analyzing such a policy are in general skeptical about that argument. These studies commonly predict that the introduction of temporary contracts in the labor market increases the size of employment in temporary jobs, whereas it

decreases the likelihood of workers being in permanent jobs because of a lower rate of conversion from temporary to permanent employment or a decrease in direct hiring in permanent jobs. As a result, the ultimate effect may not necessarily be an increase in the size of overall employment (Blanchard and Landier 2002; Cahuc and Postel-Vinay 2002; Boeri and Garibaldi 2007; Nunziata and Staffolani 2007).

Employing a dynamic model, Blanchard and Landier (2002) argue that a partial reform of employment protection that allows firms to hire workers on fixed-term contracts may lead to higher rather than lower unemployment. While increasing turnover rates of entry-level jobs, such a reform decreases more the rate of promotion of temporary workers to permanent positions. Likewise, based on a matching model, Cahuc and Postel-Vinay (2002) show that while the introduction of temporary jobs increases both job creation and job destruction, it is eventually likely to increase unemployment and to reduce labor market efficiency when firing costs of permanent workers are high. Employing a dynamic labor demand model, Nunziata and Staffolani (2007) examine how the level of temporary employment, permanent employment, and total employment as a sum of the two types is affected by a change in the protection level of temporary and permanent jobs. They show that while a marginal change in the protection level of temporary jobs increases temporary employment, it decreases permanent employment, hence the net impact on the total employment remains ambiguous. While the articles cited here deal with a long-run effect of introducing temporary jobs on the labor market, Boeri and Garibaldi (2007) focus on its short-run impacts. They argue that such a reform increases the total employment in the short run because it instantly enhances labor market flexibility and increases temporary employment, as a destruction of permanent jobs usually takes a while. Their analysis does not explicitly explore a long-run effect of the policy.

Provided that theoretical predictions remain ambiguous as to how a change in the protection level of temporary workers affects the size of overall employment, exploring the net impact becomes a matter of empirical analysis. Most of the existing empirical studies, however, draw only a partial picture of the impact of temporary contracts on employment. Using data on the labor market of a total of 14 EU countries in the 1980s and 1990s, Booth et al. (2002) examine the relationships between a country's degree of employment protection strictness for temporary and permanent employment and a share of temporary workers among all employees. They find that strictness of protection of permanent employment has a strong positive association with the incidence of temporary employment, but that protection of temporary employment has a weak positive correlation with it. Exploiting country panel data on 15 European countries in the period 1983 to 1999, Nunziata and Staffolani (2007) present that a higher protection level of permanent employment is related with a higher rate of temporary employment. Relying on U.S. data, Autor (2003) reports that a share of employment by

temporary help agencies rapidly increased after exceptions to the employment-at-will doctrine were recognized, namely, the level of permanent employment protection was increased.

While such studies present evidence on impacts of a change in policies toward temporary workers on the size of either temporary or permanent employment, they are in general silent as to how it affects the volume of total employment as a sum of the two types of employment arrangements. To the best of our knowledge, two articles explicitly explore such an issue. Employing Italian firm-level data in the period 1995 to 2000, Boeri and Garibaldi (2007) report that a short-run effect of the introduction of temporary employment is an increase in the size of total employment as is argued in the theoretical section of the article. They, however, remain unclear about its long-run effects. Drawing from EPL reforms concerning temporary employment in nine European countries from 1996 to 2001, Kahn (2010) shows that a reform that makes it easy to hire temporary workers raises the likelihood that workers will be in temporary jobs especially when the regional unemployment rate is relatively high. He finds no evidence that such reforms raise the size of overall employment. While both articles offer valuable insights into the impact of a change in employment protection of temporary workers on the level of overall employment, research is still needed for sufficient relevant evidence to be accumulated. A within-country study on employment consequences of temporary contract regulations contributes to the literature by taking stock of the research on a par with existing within-country studies on protection of permanent workers.

Institutional Background of the 2007 Reform

The recent history of employment protection reforms of Korea unfolds mainly from 1997. Before 1997, it was quite difficult for firms in Korea to terminate existing employment contracts even for economic reasons. Given that the economy had been rapidly growing since early 1980s, such strict protection of employees was not considered a serious problem. As economic growth slowed down in the mid-1990s, however, major reforms concerning existing employment protection regulations were called for and eventually took place in 1997.

First of all, the 1997 reform introduced the concept of *redundancy dismissal* of workers for *urgent managerial needs* and relaxed the strictness of protection of regular employment. Second, temporary work arrangements that included fixed-term contracts and temporary agency work were permitted in the labor market. In addition, the regulations concerning nonregular employment were eased. The legislation in 1997 was somewhat restrictive relative to international standards for temporary agency work by allowing temporary agencies to operate in only 26 specified occupational areas, but it remained liberal for fixed-term contracts by not explicitly specifying the maximum duration of fixed-term contracts and restrictions of contract renewal. As a result, the share of temporary workers among total waged

and salaried workers rapidly rose from 16.6% in 2001 to 28.8% in 2006 (Grubb, Lee, and Tergeist 2007, Table 2.4).

Under a pro-labor administration inaugurated in 2003, discussions as to how to fight against the prevalence of temporary workers started and persisted over years. Eventually, two bills on temporary employment (the Act on the Protection of Fixed-term and Part-time Employees and the Act on the Protection of Dispatched Employees) were passed in November 2006. They were put into effect eight months later on July 1, 2007. The primary change introduced in the 2007 reform was to restrict the maximum duration of employing temporary workers to two years.[1] Specifically, within two years after a temporary contract is formed, it should be converted into a permanent contract unless terminated with no costs beforehand. New temporary contracts signed in July 2007 and onward are subject to the new regulation of two-year maximum duration, while the contracts formed earlier are regarded as signed on July 1, 2007.

In theory, the 2007 reform of Korea is likely to affect the level of temporary and permanent employment in offsetting ways. Starting from July 2007, the new law raised an absolute cost of hiring a temporary worker while that of hiring a permanent worker was kept constant. As the relative cost of filling temporary positions rose, we would expect to find that the demand for them declined. In contrast, the demand for permanent employment was likely to increase given the substitutability between temporary and permanent employees in production. Overall, the ultimate direction of a change in total employment depends on relative magnitudes of the changes in temporary and permanent employment. As is the case of other theoretical models, the direction and extent to which the 2007 reform affects the size of total employment is indeterminate. According to Nunziata and Staffolani (2007, Remark 2), both employment at the firm level and at the aggregate national level will decrease if the real cost (wage plus firing cost) of a permanent worker is larger than the cost (wage plus hiring cost) of a temporary worker. Otherwise, both employment levels would increase. In practice, however, we are agnostic as to whether hiring a permanent worker costs more than employing a temporary worker prior to the reform, and if it does cost more, by how much. The net impact of the 2007 reform on overall employment is thus left to be resolved through empirical analysis.

Empirical Framework

In the estimation of the effect of the 2007 reform, we basically rely on a before-and-after comparison of the probability of employment (or the

[1]Other notable changes that accompanied a shortened duration of hiring temporary workers were that allowable jobs for temporary agency work would be set in a more flexible manner and that discriminatory treatment of non-regular workers (i.e., workers on a fixed-term contract, part-time workers, and temporary agency workers) was prohibited. The acts were to be in effect from July 2007; provisions on discrimination, however, were introduced gradually by firm size from 2007 to 2009. See Grubb, Lee, and Tergeist (2007, chap. 4) for further details of the 2007 labor reform of Korea.

employment–population ratio) across July 2007. Since some part of the post-reform period coincides with the era of global economic recession that started from the end of 2007, we require two groups of individuals who were subject to the same impacts of economic recession but to different treatments of the 2007 reform. To this end, we exploit an age restriction that was included in the 2007 reform.

In the new regulations of 2007, there are some exceptions of temporary contracts to which the two-year maximum duration does not apply: cases of employing workers aged 55 or older at the time of signing a temporary contract, workers holding doctoral degrees or other highly technical and professional qualifications, part-time instructors in tertiary education institutions, and workers subject to contract durations specified by other special laws. Among individuals affected by these exceptions, workers aged 55 or older occupy a major share, taking more than half of those exemptions, while each of the other groups of workers makes up a minor share (Korea Development Institute 2009). For empirical analysis, we rely on this 55 years of age cutoff to identify the impact of the reform on employment, applying the idea of regression discontinuity designs (RDD) (Imbens and Lemieux 2008; Lee and Lemieux 2010). By comparing differences in employment probability between individuals just below and above 55 across pre-reform and post-reform periods, we combine RDD with a difference-in-differences (DD) method in estimation.

Employing a repeated cross-sectional data set drawn from a national monthly labor force survey of Korea, we estimate the following model:

$$y_i = \gamma_0 + \gamma_1 d_i + \Sigma_{k=1}^{33}\{\gamma_{2k} T_{ik} + \gamma_{3k}(d_i \times T_{ik})\} + \gamma_4 X_i + \varepsilon_i \tag{1}$$

where y_i is an indicator for whether individual i is employed (under either permanent or temporary contract) as opposed to being self-employed, unemployed, or out-of-labor-force (OLF) at the time of the survey; d_i is an indicator for whether i is below 55 years of age, being subject to the maximum duration requirement; T_{ik} is an indicator for the time of the survey ($k = 1$ for April 2007, 2 for May 2007, 3 for June 2007, . . . , finally 33 for December 2009), while March 2007 is set as a reference period ($k = 0$).[2] X_i is a vector of i's characteristics that include age in month divided by 12 and its square, years of education, marital status, household head status, and residential regions; ε_i is the error term. An individual's age and its square are controlled for in order to consider the changes in the likelihood of employment over age that are independent of the reform. The key coefficients in (1) are γ_{3k}'s, which show an evolution of the impact of the reform on the probability of employment over time. A $\widehat{\gamma_{3k}}$ is interpreted as a difference-in-differences (DID) estimator, because, for a given k (= 1; 2; . . .; 33),

$$\begin{aligned}\widehat{\gamma_{3k}} = {} & [\widehat{E}(y_i \mid d_i = 1, T_{ik} = 1, X_i) - \widehat{E}(y_i \mid d_i = 0, T_{ik} = 1, X_i)] \\ & -[\widehat{E}(y_i \mid d_i = 1, T_{i0} = 1, X_i) - \widehat{E}(y_i \mid d_i = 0, T_{i0} = 1, X_i)]\end{aligned} \tag{2}$$

[2]In another estimation, results for which are suppressed but available, August 2006 is used as an alternative reference period. The results are qualitatively similar to those reported in this article.

For the estimation, we restrict the analysis sample to those whose exact ages fall close to 55 (for example, 54 years and 1 month to 55 years and 11 months), following an RDD approach. The exact age of the individual is calculated on the basis of the birth year and month reported in the data. A confounding influence of economic recession that has started from December 2007 is controlled for by an assumption that it equally affects individuals closely below and above the age-55 cutoff. We estimate Equation (1) by a linear probability model (LPM), restricting the sample to two different age groups: 54 to 55 and 53.5 to 56.5.[3,4]

We acknowledge that at least two concerns can be raised over the validity of our empirical strategy. First, the age 55 cutoff is likely to apply not only to the maximum duration of the 2007 reform but to other retirement and benefit arrangements in Korea. In such a case, a difference in the probability of employment between the two age groups is not due solely to the introduction of the new regulation because in Korea the age-55 cutoff is also applicable to other arrangements such as retirement in some occupations (e.g., manual workers in manufacturing), the eligibility of pension receipt, and so forth. Nonetheless, since our empirical strategy is based on under-55 and over-55 differences in the probability of employment between post- and pre-reform periods, our method is valid to the extent that there are no notable changes in the pre-existing arrangements associated with the 55 cutoff during the analysis period around July 2007. Although it is difficult to offer evidence with the current data, we know of no such changes in the period analyzed in this article. As long as the cutoff regulations of other arrangements remain unchanged between the pre- and post-reform periods, our empirical strategy is still suitable to disentangle the impact of the 2007 labor reform from the changes in the probability of employment across post- and pre-reform periods.

Second, as is the case for any RDD-based study, the causal effect estimated in this paper is locally relevant only for individuals aged close to 55. A stock of research should be accumulated from which to draw a conclusion

[3]A probit model can also be applied in the estimation. A disadvantage of the probit, however, is the difficulty to interpret the interaction coefficients $\widehat{\gamma_{3k}}$ and calculate difference-in-differences estimators. See Ai and Norton (2003) for details of such difficulties. For terse presentation of the estimation results, we chose an LPM over a probit.

[4]To deal with arbitrariness of the age restrictions of the analysis sample, we employ a method that nonparametrically estimates each of the expectations of Equation (2) (Imbens and Lemieux 2008; Lee and Lemieux 2010). Namely, we first estimate $\lim_{age\uparrow 55}\hat{E}(y_i|T_{ik}=1)$—a limiting value of $\hat{E}(y_i|T_{ik}=1)$ as age approaches 55 from below—as a measure of the expected probability of employment of an individual just below 55 who is subject to the maximum duration regulation of temporary contracts. In a similar way, we estimate $\lim_{age\downarrow 55}\hat{E}(y_i|T_{ik}=1)$—a limiting value of $\hat{E}(y_i|T_{ik}=1)$ as age approaches 55 from above—as a measure of the expected probability of employment of an individual just above 55 who is not affected by the maximum duration regulation. Next, we construct $Gap^k \equiv \lim_{age\uparrow 55}\widehat{E}(y_i \mid \widehat{T_{1k}}=1)-\lim_{age\downarrow 55}\widehat{E}(y_i \mid \widehat{T_{1k}}=1)$ for time $k(k=0,1,2,\ldots,33)$. A DD estimate for the impact of the reform on the employment level is given by $DD^k = Gap^k - Gap^0$. When estimating $\hat{E}(y_i|T_{ik}=1)$ above in the formula, an individual's observable characteristics (X_i) can be adjusted by first running an LPM of y_i against X_i alone and next getting a residual; that is, $\hat{E}(y_i \mid T_{1k}=1) \equiv y_i - \widehat{\Pr}(y_i=1 \mid X_i)$ for time k. The estimation results based on such a nonparametric method, which are suppressed but available upon request, are qualitatively similar to those reported in the article.

regarding the homogeneity of the effect; nevertheless, the work discussed in this article is an initial attempt to estimate a causal effect of the reform given constraints of the 2007 regulations.

To shed light on the generalization issue, Table 1 compares the distribution of temporary workers as of March 2007 (a pre-reform month) across different industries over two age groups—20 to 49 and 53.5 to 56.5—using official labor force survey data of Korea (Economically Active Population Survey, which will be explained later). If the industry distribution of temporary workers is similar between age groups 20 to 49 and 53.5 to 56.5, it is likely to suggest homogeneity of the employment impacts of the reform. Columns (1) and (2) [(5) and (6)] of Table 1 show the industry distribution of male [female] temporary workers of age groups 20 to 49 and 53.5 to 56.5, respectively.

Although the industry distribution of male and female temporary workers is not widely different between the two age groups in many industries, there are some industries in which the distribution varies between young and old workers. For example, male temporary workers aged 53.5 to 56.5 are found with a higher frequency in the construction industry. Male temporary workers aged 20 to 49 work with a higher frequency in the retail trade industry. In addition, the industry distribution of female temporary workers indicates that older female temporary workers are found more often in the industries of "business support services" and "private households with employees," whereas younger temporary workers are found with a higher frequency in retail trade. Given the current variations in the distribution of temporary workers between the two age groups in some industries, it is difficult to draw a firm conclusion about the degree of generalizability of the current findings to other age groups. It remains to be seen whether a new research design, which can identify impacts of the 2007 reform on a broader population, is feasible given the arrangements of the 2007 reform. In the meantime, our strategy is one conceivable effort to draw causal impacts of the reform in Korea.[5]

Data

The data of this study are drawn from the Economically Active Population Survey (EAPS), the official monthly labor force survey of Korea. Similar to

[5]An alternative method could compare employment performances of individuals holding doctoral degrees and those who do not, since those holding doctoral degrees or other highly technical and professional qualifications are also exempted from the two-year maximum duration. At least three concerns, however, make it difficult to implement such a method. First, the 2007 waves of our monthly labor force survey—the Economically Active Population Survey of Korea (EAPS)—do not separate workers holding a master's degree from those with a doctoral degree, while they are divided in the 2008 and 2009 waves. Second, the proportion of individuals holding doctoral degrees is too small to produce the sufficient number of individuals in the control group and an acceptable estimate. Third, a treatment-control classification of individuals by education level is vulnerable to endogeneity. Another advantage of using an RDD based on age is that age is a predetermined continuous variable, whereas education variables are usually discrete. The continuity of age helps us construct a more appropriate control group than education variables offer.

Table 1. Distribution of Temporary Workers: Their Tenure and Incidence of Short-Duration Contracts by 2-Digit Industries

Age window	*A. Employed Men*				*B. Employed Women*			
	20 to 49	*53.5 to 56.5*			*20 to 49*	*53.5 to 56.5*		
Industry classifications	*Share (%)*	*Share (%)*	*Average tenure (yr)*	*Pr(Ten<2)*	*Share (%)*	*Share (%)*	*Average tenure (yr)*	*Pr(Ten<2)*
	(1)	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*	*(7)*	*(8)*
A. Agriculture, forestry and fishing								
1. Agriculture	0.60	1.92	0.83	0.838	0.46	2.44	0.13	1.000
C. Manufacturing								
1. Manufacture of wearing apparel, Clothing and Fur Articles	1.09	0.00	—	—	3.55	2.23	1.85	0.855
F. Construction								
1. General Construction	6.85	14.92	0.27	0.964	0.26	0.46	0.38	1.000
2. Special Trade Construction	18.82	28.56	0.22	0.962	1.44	1.51	0.19	1.000
G. Wholesale and retail trade								
1. Wholesale Trade and Commission Trade	7.02	2.29	4.43	0.295	3.06	3.07	1.05	0.895
2. Retail Trade	8.88	1.65	2.91	0.615	17.14	10.99	1.67	0.789
H. Transportation								
1. Land Transport; Transport Via Pipelines	3.75	3.17	2.00	0.882	0.41	0.57	0.01	1.000
I. Accommodation and food service								
1. Accommodation and food service	6.41	3.74	1.41	0.900	19.39	24.90	1.20	0.860
K. Financial and insurance activities	1.65	0.00	—	—	4.43	1.96	5.80	0.271
1. Activities Auxiliary to Financial Service and Insurance Activities								
N. Business facilities management and business								
1. Business Support Services	4.94	9.45	1.46	0.745	2.83	12.77	1.57	0.774
O. Public administration and defense								
1. Public Administration and Defense	0.66	4.30	2.35	0.866	1.80	4.02	1.34	0.919
S. Membership organizations, repair and other personal services								
1. Other Personal Services Activities	2.02	2.72	0.25	1.000	3.97	3.50	2.21	0.700
T. Activities of households								
1. Private Households with Employees	0.02	0.00	—	—	1.68	8.10	1.30	0.812
Other industries not included above	37.29	27.28	3.69	0.594	39.58	23.48	2.39	0.651
Total sample	100.00	100.00	1.64	0.810	100.00	100.00	1.67	0.781
		(N = 142,226)				(N = 154,154)		

general labor force surveys of other countries, the EAPS collects a series of information on an individual's employment status in the previous week and other demographic characteristics for about 70,000 individuals in Korea. We use monthly waves from March 2007 to December 2009 for analysis. In the survey, an individual subjectively declares his or her employment status in the job by choosing from permanent, temporary, and daily contracts. Those who choose temporary and daily contracts are classified are temporary workers, while those who choose permanent contracts are permanent workers.[6] The waves of March, April, May, and June 2007 show changes in the employment size of those affected by the age-55 cutoff before the law became effective. Since they are a pre-reform period, we expect the impact of the reform to be marginal.

Using the sample weights, the raw data are inflated to reflect the relevant population as well as to avoid sampling differences across different waves of the EAPS. As such, we examine an impact of the reform on the volume of employment in the relevant population by estimating changes in employment probability (i.e., employment–population ratio). To consider the possibility that the effect of the reform may differ between men and women, we divide the analysis sample by gender.

Descriptive statistics of the analysis samples of individuals aged 53.5 to 56.5 are reported in Table 2. Panel A of the table itemizes that about 46% of men aged 53.5 to 56.5 remain employed as salaried workers in either temporary or permanent jobs in March 2007 prior to the reform. By the definition of being employed, it implies that the 54% are either self-employed, unemployed, or out-of-labor-force (OLF) at the time of the survey. As of March 2007, about 17.2% of men under examination (37.4% of salaried workers) are employed in temporary jobs; 28.8% of them (62.6% of salaried workers) in permanent jobs.[7] The proportion of those employed either way remains nearly constant from March 2007 to March 2008, with slight increases between August 2008 and August 2009. The proportion of those employed in temporary jobs falls from 17.2% in March 2007 to 16.1% in March 2008. Between March 2008 and March 2009, the proportion in temporary jobs increases. In contrast, the proportion of those employed in permanent jobs rises from 28.8% in March 2007 to 29.8% in August 2008.

While such patterns of changes in the proportion of those employed in each of temporary and permanent jobs do not directly show impacts of the 2007 reform on the relative occurrence of each employment type, they do

[6]In an earlier version of the article, we use only March and August waves of the survey from 2007 to 2009, since the EAPS collects very detailed information on the form of employment in March and August as a special supplement to the main survey. In these supplements, the survey asks a series of questions to more objectively identify the employment status of the worker. The estimation results based on March and August waves alone, which are also suppressed but available, do not alter the main findings that are reported in the article.

[7]As of March 2007, about 18.9% of the economically active male population aged 15 to 60 (35.9% of salaried workers) were employed in temporary jobs; 33.8% (64.1% of salaried workers) in permanent jobs.

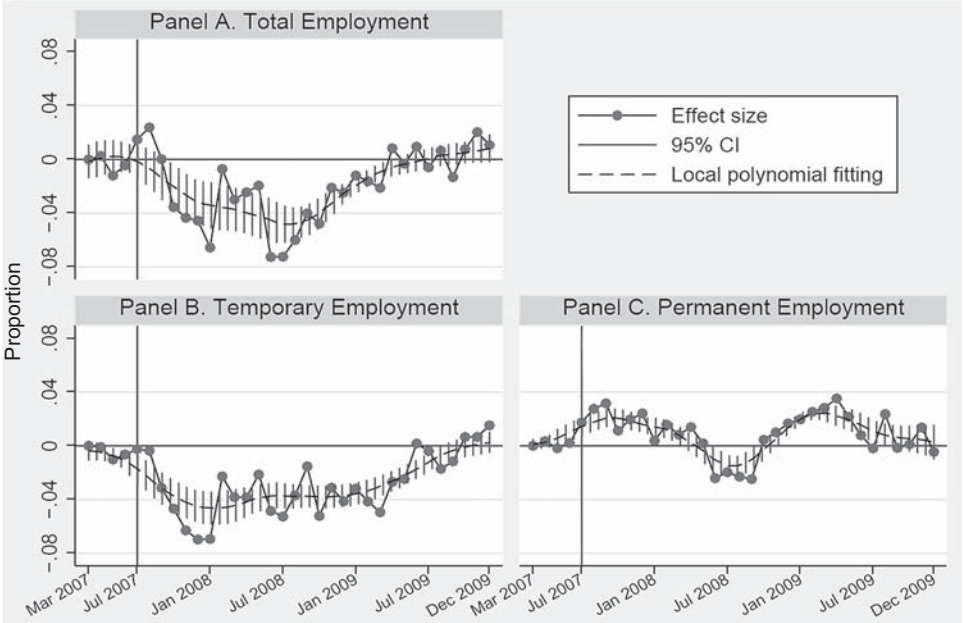
Table 2. Descriptive Statistics of the Analysis Samples

	Panel A. Men Aged 53.5 to 56.5											
	Mar 2007		*Aug 2007*		*Mar 2008*		*Aug 2008*		*Mar 2009*		*Aug 2009*	
Variables	*Mean*	*S.D.*	*Mean*	*S.D.*	*Mean*	*S.D.*	*Mean*	*S.D.*	*Mean*	*S.D.*	*Mean*	*S.D.*
Employed either way	0.460	0.498	0.466	0.499	0.463	0.499	0.472	0.499	0.481	0.500	0.486	0.500
Employed as temporary	0.172	0.377	0.169	0.374	0.161	0.367	0.174	0.379	0.174	0.379	0.159	0.366
Employed as permanent	0.288	0.453	0.298	0.457	0.302	0.459	0.298	0.457	0.307	0.461	0.327	0.469
Self-employed	0.390	0.488	0.397	0.489	0.374	0.484	0.381	0.486	0.375	0.484	0.368	0.482
Unemployed	0.021	0.142	0.016	0.126	0.028	0.164	0.027	0.163	0.018	0.133	0.024	0.153
Out-of-labor force	0.129	0.335	0.120	0.325	0.135	0.342	0.120	0.325	0.126	0.332	0.122	0.327
Age 54 or less (Yes = 1)	0.520	0.500	0.526	0.499	0.491	0.500	0.522	0.500	0.538	0.499	0.560	0.496
Age	54.960	0.832	54.892	0.821	54.927	0.869	54.916	0.918	54.910	0.883	54.851	0.852
Years of schooling	10.965	3.311	11.178	3.298	11.408	3.365	11.529	3.463	11.461	3.419	11.549	3.432
Married (Yes = 1)	0.891	0.311	0.889	0.314	0.891	0.312	0.894	0.308	0.899	0.301	0.901	0.299
Household head (Yes = 1)	0.928	0.259	0.928	0.258	0.929	0.257	0.924	0.265	0.929	0.257	0.928	0.258
Inflated sample size	826,785		826,632		859,244		906,901		904,547		944,953	
Raw sample size	1,540		1,468		1,464		1,576		1,587		1,654	

	Panel B. Women Aged 53.5 to 56.5											
	Mar 2007		*Aug 2007*		*Mar 2008*		*Aug 2008*		*Mar 2009*		*Aug 2009*	
Variables	*Mean*	*S.D.*	*Mean*	*S.D.*	*Mean*	*S.D.*	*Mean*	*S.D.*	*Mean*	*S.D.*	*Mean*	*S.D.*
Employed either way	0.265	0.441	0.292	0.455	0.293	0.455	0.296	0.456	0.316	0.465	0.323	0.468
Employed as temporary	0.191	0.393	0.220	0.414	0.218	0.413	0.214	0.410	0.234	0.423	0.209	0.407
Employed as permanent	0.074	0.262	0.072	0.258	0.075	0.264	0.082	0.275	0.082	0.275	0.114	0.318
Self-employed	0.256	0.437	0.249	0.432	0.230	0.421	0.250	0.433	0.217	0.412	0.226	0.418
Unemployed	0.007	0.082	0.009	0.095	0.003	0.054	0.007	0.085	0.011	0.104	0.010	0.100
Out-of-labor force	0.472	0.499	0.450	0.498	0.474	0.499	0.447	0.497	0.457	0.498	0.441	0.497
Age 54 or less (Yes = 1)	0.539	0.498	0.526	0.499	0.510	0.500	0.534	0.499	0.554	0.497	0.561	0.496
Age	54.920	0.851	54.896	0.839	54.934	0.877	54.902	0.914	54.854	0.845	54.865	0.833
Years of schooling	9.251	2.997	9.352	3.013	9.568	3.341	9.676	3.391	9.737	3.319	9.945	3.398
Married (Yes = 1)	0.787	0.410	0.770	0.421	0.795	0.404	0.799	0.401	0.797	0.402	0.815	0.388
Household head (Yes = 1)	0.292	0.454	0.310	0.463	0.286	0.452	0.301	0.459	0.303	0.459	0.285	0.452
Inflated sample size	812,292		802,201		879,912		929,804		930,316		997,016	
Raw sample size	1,574		1,517		1,609		1,708		1,745		1,832	

Sources: Economically Active Population Survey (EAPS), various waves.

Figure 1. Impacts of the Reform on the Probability of Employment: Men Aged 54 to 55



shed some light on the effects, as will be revealed in the analysis that follows. Other variables do not show substantial changes across time points.

As for women in Panel B of Table 2, about 26.5% are employed in either temporary or permanent jobs as of March 2007. About 19.1% of women (72.1% of salaried workers) are employed in temporary jobs; 7.4% of them (27.9% of salaried workers) in permanent jobs.[8] Note that the majority (72.1%) of salaried female workers are employed in temporary jobs, whereas the majority (62.6%) of salaried male workers are employed in permanent jobs. The proportions of women employed either way and those employed in temporary jobs increase after the reform. The proportions of those employed in permanent jobs also slightly increases after the reform.

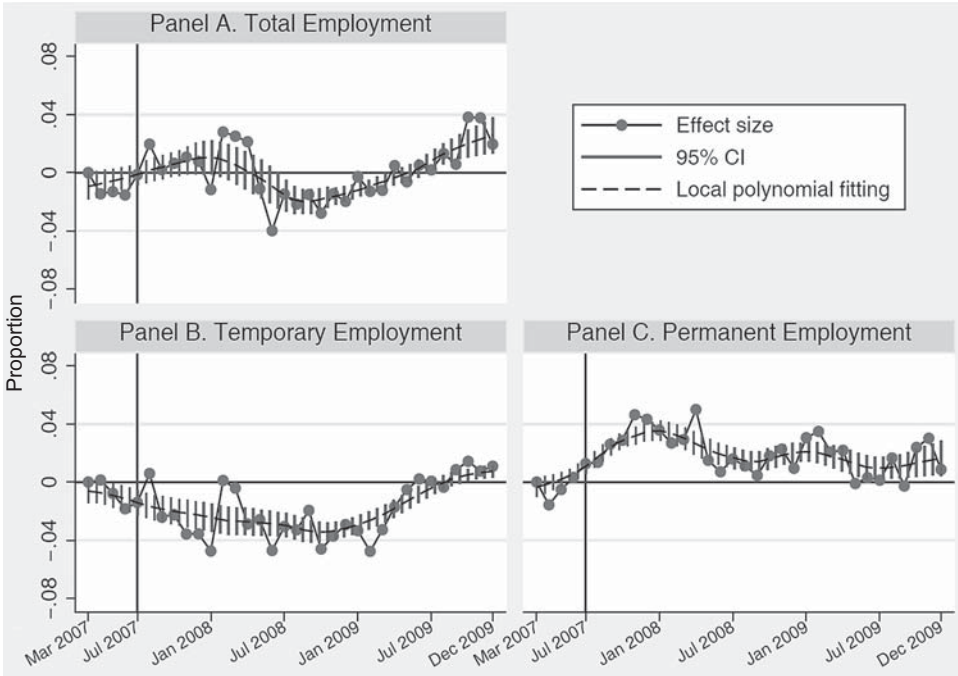
Estimation Results

Findings for Men

Figures 1 and 2 show the estimation results of Equation (1) for men aged 54 to 55 and aged 53.5 to 56.5, respectively. Estimates that support Figures 1 and 2 are reported in Appendix Table 1. In the figures, the dependent variable of Panel A is an indicator of employment in either a permanent or a temporary job. The dependent variable of Panel B (or Panel C) is an indicator of being employed in a temporary (or permanent) job as opposed to not

[8]As of March 2007, about 21.7% of the economically active female population aged 15 to 60 (56.5% of salaried workers) were employed in temporary jobs; 16.7% (43.5% of salaried workers) in permanent jobs.

Figure 2. Impacts of the Reform on the Probability of Employment: Men Aged 53.5 to 56.5



being so. A vertical line is drawn in each panel to indicate July 2007, the point at which the reform was put into effect. A dotted line shows a nonparametric local polynomial fitting of the estimate $\widehat{\gamma_{3k}}$'s from March 2007 to December 2009 (Fan and Gijbels 1996).

To the extent that the reform increased the cost of firms hiring a temporary worker while that of hiring a permanent worker was kept constant, we first expect temporary employment decreases in the post-reform period. Panel B of Figure 1 reveals significant negative impacts of the reform in accordance with the theoretical prediction as well as previous empirical studies on the impact of protection on employment sizes (e.g., Kugler et al. 2003). Relative to the probability of temporary employment in the relevant population in March 2007 (i.e., 0.172), the 2007 reform decreased the probability of temporary employment by 0.0037, 0.0382, 0.0370, 0.0494, and 0.0171 in August 2007, March 2008, August 2008, March 2009, and August 2009, respectively. The negative impact was felt most strongly around December 2007, six months after the reform kicked off. The probability of temporary employment in December 2007 is 0.0697 lower than that in March 2007. A negative impact remains in August 2009, two years after the reform began. Overall, the impact of the 2007 reform on temporary employment shows a U-shape over time, the trough located around December 2007.

If the sample is expanded to ages 53.5 to 56.5 as in Figure 2, impacts are not as dramatic. Nonetheless, negative impacts of the reform on temporary employment are still shown for the period between September 2007 and

May 2009. Similar to the observation in Figure 1, the negative impact of the reform was felt most strongly around January 2008, seven months after the reform was put into effect. The effect of the reform, however, becomes marginal in July 2009, two years after the reform. Overall, the impact of the 2007 reform on temporary employment shows a U-shape over time, while the negative impacts seem to have been strongest around December 2007 and January 2008.

In contrast to the results for temporary employment, the effects of the reform on permanent employment are less clear during the post-reform period. Panel C of Figure 1 highlights that within a year after the reform, the probability of permanent employment increased by up to 0.0316 relative to the corresponding probability in March 2007 (i.e., 0.288). The impacts become negative between June and September 2008, however, about one year after the reform was put into effect. After September 2008, the impacts turn positive. If the sample is expanded to ages 53.5 to 56.5, as in Figure 2, negative impacts that are observed for a period between June and September 2008 disappear. Effects of the reform on permanent employment turn positive in this period. Although the impact is less clear about one year after the reform was put in place, a less ambiguous observation in Figures 1 and 2 is that the reform increased permanent employment during the first several months after the reform, suggesting that a substitution effect appeared in the initial period of the reform as an immediate response to a decrease in a relative cost of hiring permanent workers. Such a substitution, however, seems to have weakened as time passes. Toward June 2009, two years after the reform, the impacts of the reform on permanent employment become marginal.

By the design of the variables, the effect of the reform on the size of overall employment is a sum of the two effects on temporary and permanent employments. Panel A of Figure 1 displays that the initial effect of the reform on the size of overall employment is slightly positive from July 2007 to September 2007, since the magnitude of positive effects on permanent employment exceeds that of negative effects on temporary employment during this period. The effects on the overall employment, however, turn negative during October 2007, remaining negative until March 2009 with ups and downs. The temporal patterns of the impacts of the reform on overall employment are U-shaped, while the strongest negative effect on the size of overall employment is shown around November 2008, a year and half after the reform began. In November 2008, the reform decreased the probability of employment by up to 0.0726 relative to the corresponding probability in March 2007 (i.e., 0.460). Toward March 2009, however, the impacts of the reform on overall employment become marginal.

If the sample is expanded to ages 53.5 to 56.5 as in Figure 2, impacts on overall employment become less clear. Nonetheless, negative impacts of the reform are still shown for the period between May 2008 and December 2008. The negative impact of the reform was felt most strongly around June 2008 to October 2008, about one year after the reform was put into effect. Toward

April 2009, the impacts on overall employment become marginal. In sum, the effects of the 2007 reform on overall employment show a U-shape over time, while the negative impacts seem to have been strongest between one year and one and a half years after the reform was put into effect.

The Sample Restriction of Industries

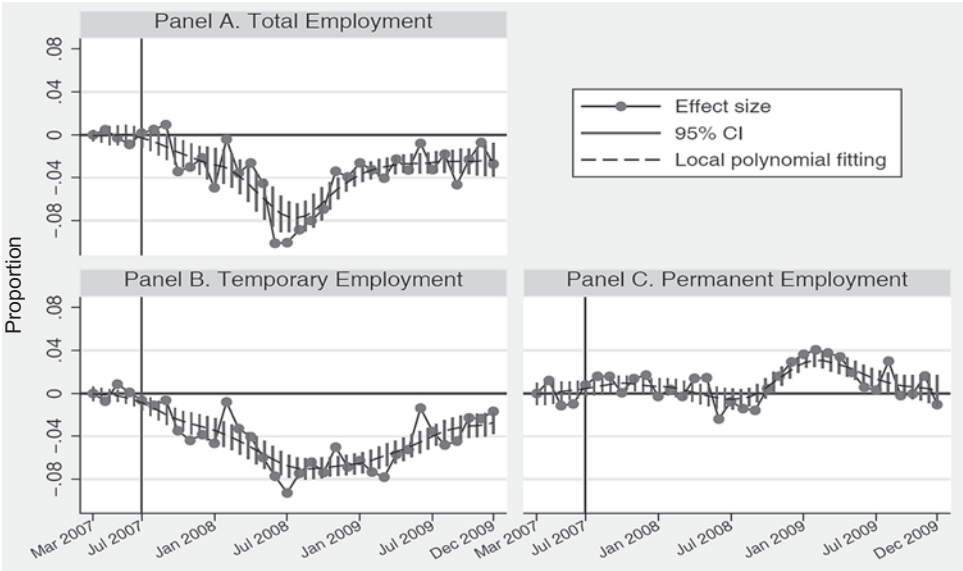
While the results of Figures 1 and 2 demonstrate the impacts of the 2007 reform on each type of employment, they are likely to understate the true effects of the reform. It is possible that some portions of the labor market are not affected by the 2007 reform, because typical temporary contracts in them can last for less than two years even prior to July 2007 due to the nature of production. For example, in some industries that experience large seasonal fluctuations in output (e.g., agriculture and construction), the two-year maximum duration of temporary contracts may not be binding, hence exerting little impact on employment.

To investigate whether excluding such industries from the analysis gives rise to a change in results, we at first calculate the average length of job tenure of temporary employees as of March 2007 by 2-digit industries in Table 1. The industries whose length of job tenure was short in the pre-reform period are likely to be those in which the 2007 reform is not binding. The sample of columns (2) to (4) of Table 1 pertain to men aged 53.5 to 56.5 who were employed in a temporary job as of March 2007. An industry's share of employment is shown in column (2); the average length of job tenure in column (3); the proportion of individuals (among those employed in temporary jobs) whose tenure is less than 2 years as of March 2007 in column (4). The table lists only 2-digit industries whose employment share is non-negligible, classifying the remaining small industries as "other industries not included above."

According to column (2), the construction industry is the biggest employer of men aged 53.5 to 56.5 under temporary contracts. A total of 43.5% of temporarily employed men work in the general construction (14.9%) or the special trade construction (28.6%) industries. In these industries, the average length of tenure is very short (0.27 in general construction; 0.22 in special trade construction), while the corresponding figure for all industries is 1.64 years. Moreover, the proportion of temporary employees with less than 2 years of tenure (as opposed to at least 2 years) is very high: 0.964 in general construction; 0.962 in special trade construction, with the corresponding figure for all industries being 0.81. Another industry that seems to have a short duration for temporary contracts is agriculture in which the average length of tenure is 0.83 years, and the proportion of temporary employees with less than 2 years of tenure is 0.838. Temporary contracts also have a short duration in the "other personal services activities" industry.[9] In

[9]This industry includes jobs of personal care services (e.g., hair, nail, and skin care; saunas; massage) and other personal services (e.g., washing and dry cleaning, funeral homes).

Figure 3. Impacts of the Reform on the Probability of Employment: Men Aged 54 to 55 and Industries Restricted



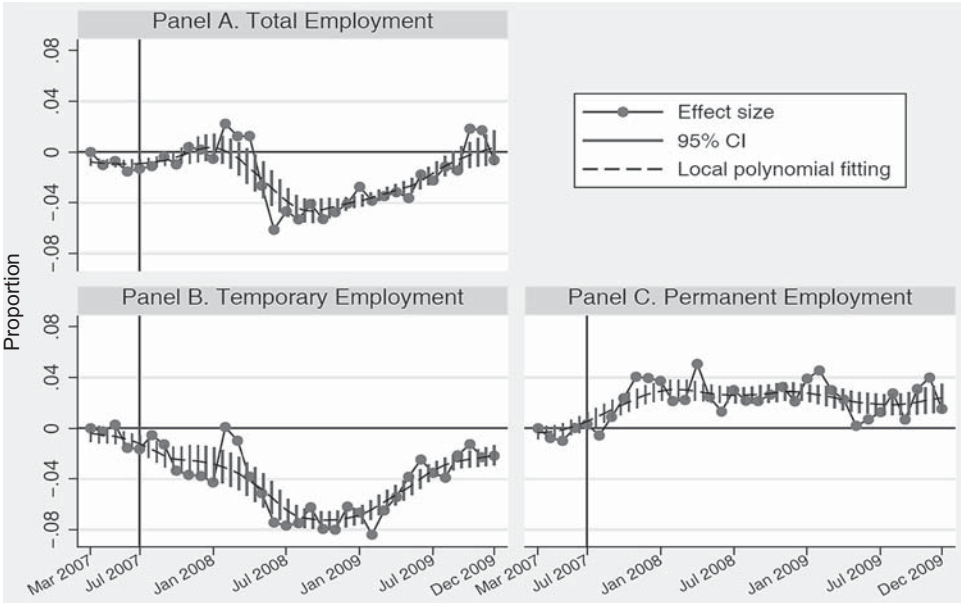
this industry, the average length of tenure is 0.25 years, and the proportion of temporary employees with less than 2 years of tenure is 1 in the sample. Given that the average tenure is less than 1 year and the proportion of temporary employees with less than 2 years of tenure is higher than 0.8 in agriculture, general and special trade construction, and "other personal services" industries, we estimate Equation (1), excluding these four 2-digit industries from the analysis. The new sets of the results are shown in Figures 3 and 4.[10]

If the analysis sample is restricted to industries for which the 2007 reform is likely to be binding, the estimated impacts on employment become clearer, and they are more robust to the age windows of the sample.[11] Impacts on temporary employment remain negative from July 2007 to December 2009. The temporal patterns of the impacts of the reform on temporary employment are U-shaped, while the strongest negative effect is shown between June 2008 and December 2008, a period of one year to one and a half years since the reform began. Relative to the probability of temporary employment in March 2007, the reform decreased the probability of temporary employment by 0.0406 to 0.0927 between June and December 2008.

[10]Estimates that support Figures 3 and 4 are available upon request.

[11]Instead of excluding some industries from the analysis, an alternative strategy may use the whole sample and control for industry dummies to take industry-specific attributes into account. Such a specification, however, does not consider a possibility that mobility of workers between industries is affected by the 2007 reform and that employment compositions in industries may consequently change. Nonetheless, estimation results based on the specifications that control for 2-digit industry dummies do not alter conclusions of this article qualitatively. Estimates are also available upon request.

Figure 4. Impacts of the Reform on the Probability of Employment: Men Aged 53.5 to 56.5 and Industries Restricted



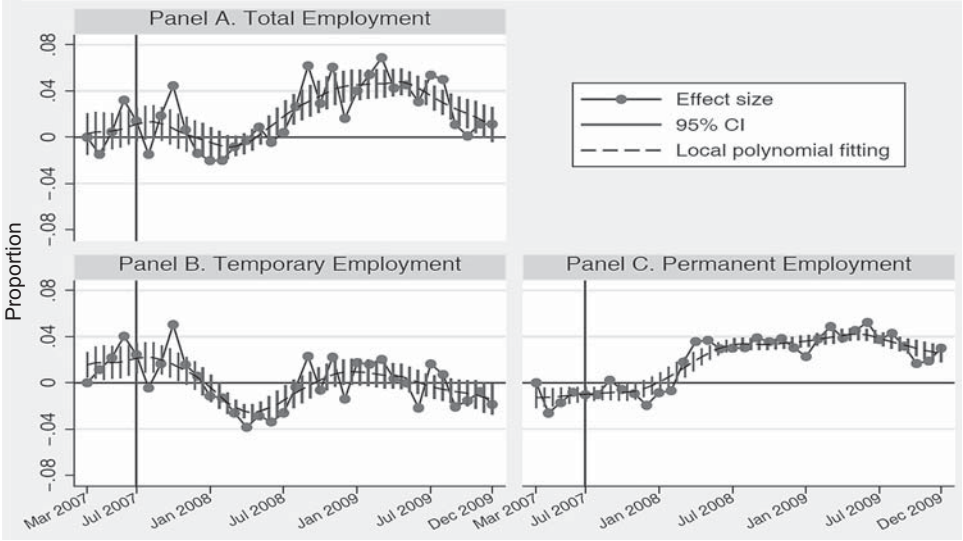
In contrast, impacts on permanent employment remain positive from July 2007 to December 2009, while some occasions of small negative impacts can be seen between June and September 2008. Overall, relative to the probability of permanent employment in March 2007, the reform increased the probability of permanent employment by 0.02 to 0.04 in the post-reform period.

As a sum of these two effects, the impacts on total employment also take a U-shape. The strongest negative effects are observed in the period between June 2008 and September 2008, approximately a year after the reform began. Relative to the probability of employment in March 2007, the reform decreased the probability of employment by 0.05 to 0.1 between June 2008 and September 2008. Toward June 2009, two years after the reform, however, the negative impacts of the reform on the total size of employment seem to fade away.

Findings for Women

Figures 5 and 6 diagram the probability of employment results for women aged 54 to 55 and 53.5 to 56.5, respectively. Linear probability model estimates that support Figures 5 and 6 are reported in Appendix Table 2. Compared with the results for men, the estimated impacts of the 2007 reform on employment are less clear for women. Although negative impacts on temporary employment are found for the period between January 2008 and July 2008 if the age window is narrow, the disemployment effects disappear if the

Figure 5. Impacts of the Reform on the Probability of Employment: Women Aged 54 to 55



age window is expanded to 53.5 to 56.5. In contrast, although impacts on permanent employment are negative for the first few months after the 2007 reform, the effects turn positive after March 2008. They remain positive until December 2009. As a sum of the two effects, impacts of the reform on overall employment is close to zero at first and up until July 2008 but turn positive afterward, taking an inverted U-shape in the period between August 2008 and December 2009. Because the reform is not likely to be binding in some industries, however, the results shown in Figures 5 and 6 may understate the true effects of the reform on women's employment.

Figure 6. Impacts of the Reform on the Probability of Employment: Women Aged 53.5 to 56.5

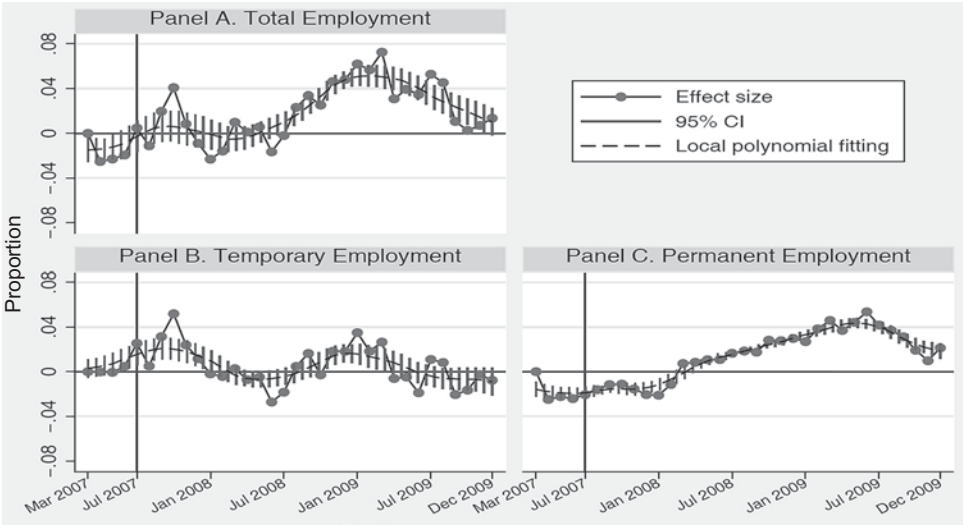
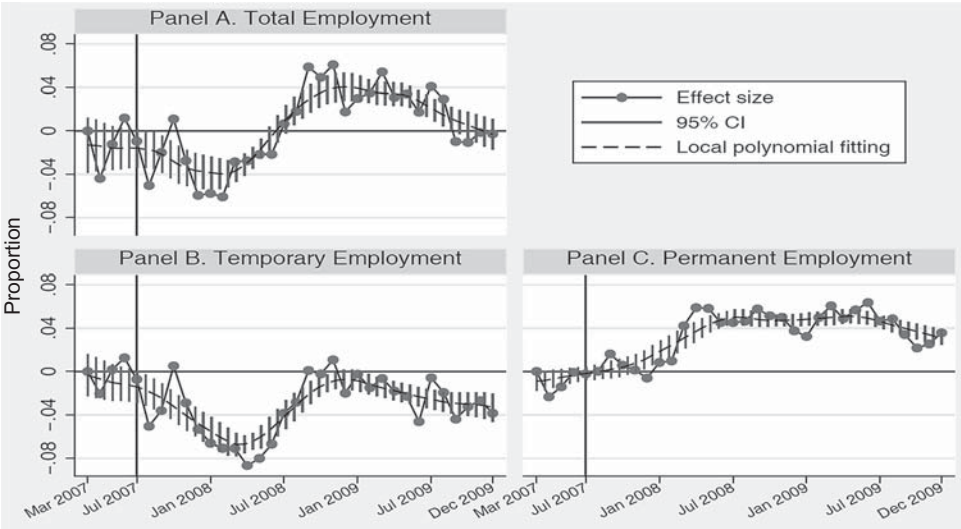


Figure 7. Impacts of the Reform on the Probability of Employment: Women Aged 54 to 55 and Industries Restricted

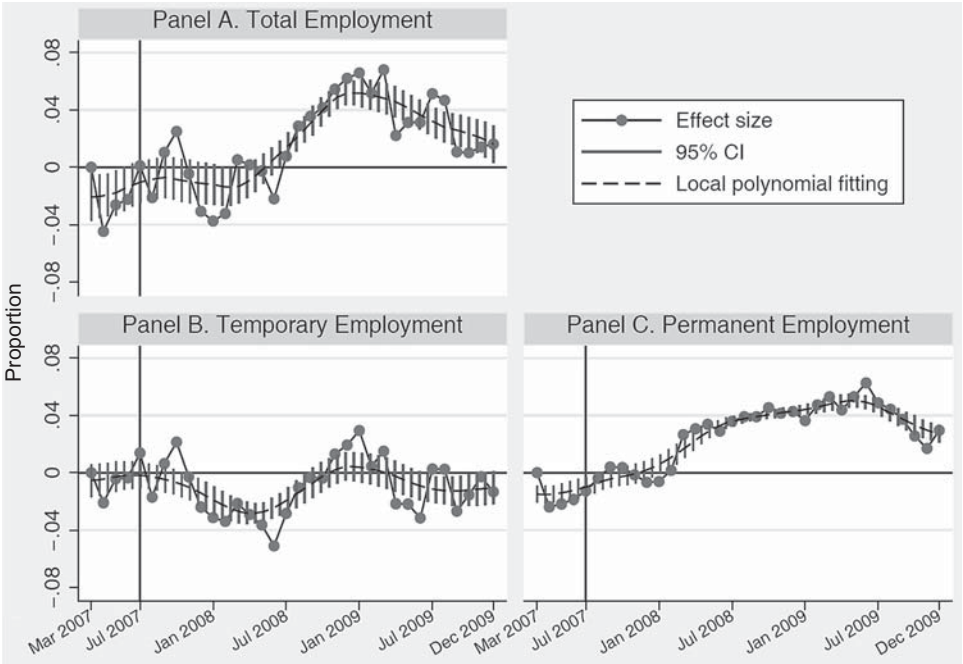


Statistics in columns (6) to (8) of Table 1 show that temporary jobs of women aged 53.5 to 56.5 tend to have a short duration in construction and agriculture, as is the case for men. In contrast, temporary jobs in the "other personal services activities" seem to have a longer duration than for men. Although small in the share of employment, the "land transport" industry offers a short duration of temporary jobs for women. While women aged 53.5 to 56.5 are less concentrated in construction than men are, industries in which a high share of women work and women's temporary jobs are of short duration include the "wholesale trade and commission trade," and "accommodation and food service activities" industries.[12] In these two industries, the average length of tenure is shorter than 1.2 years, and the proportion of temporary employees with less than 2 years of tenure is greater than 0.86. Therefore, for the analysis of women, we exclude industries of agriculture, general and special trade construction, wholesale trade and commission trade, and accommodation and food service activities. The new sets of the results with restricted industries are shown in Figures 7 and 8.

If the analysis sample is restricted to industries for which the 2007 reform is likely to be binding, the estimated impacts on women's employment become clearer. Impacts on temporary employment are shown to be negative from July 2007 to July 2008. As is the case for men, the temporal patterns of the impacts of the reform on temporary employment are U-shaped for both of the age windows. The strongest negative effect is shown in the period between January 2008 and May 2008. By August 2008, the negative impacts of the reform seem to disappear. Such temporal patterns for women differ

[12]The "accommodation and food service activities" industry includes jobs in various kinds of accommodation facilities, restaurants, bars, canteens, drinking places, and non-alcoholic beverage places.

Figure 8. Impacts of the Reform on the Probability of Employment: Women Aged 53.5 to 56.5 and Industries Restricted



from the estimated impacts of the reform on men's temporary employment, since the disemployment effects on men are strongest between June 2008 and December 2008, and persist until December 2009.

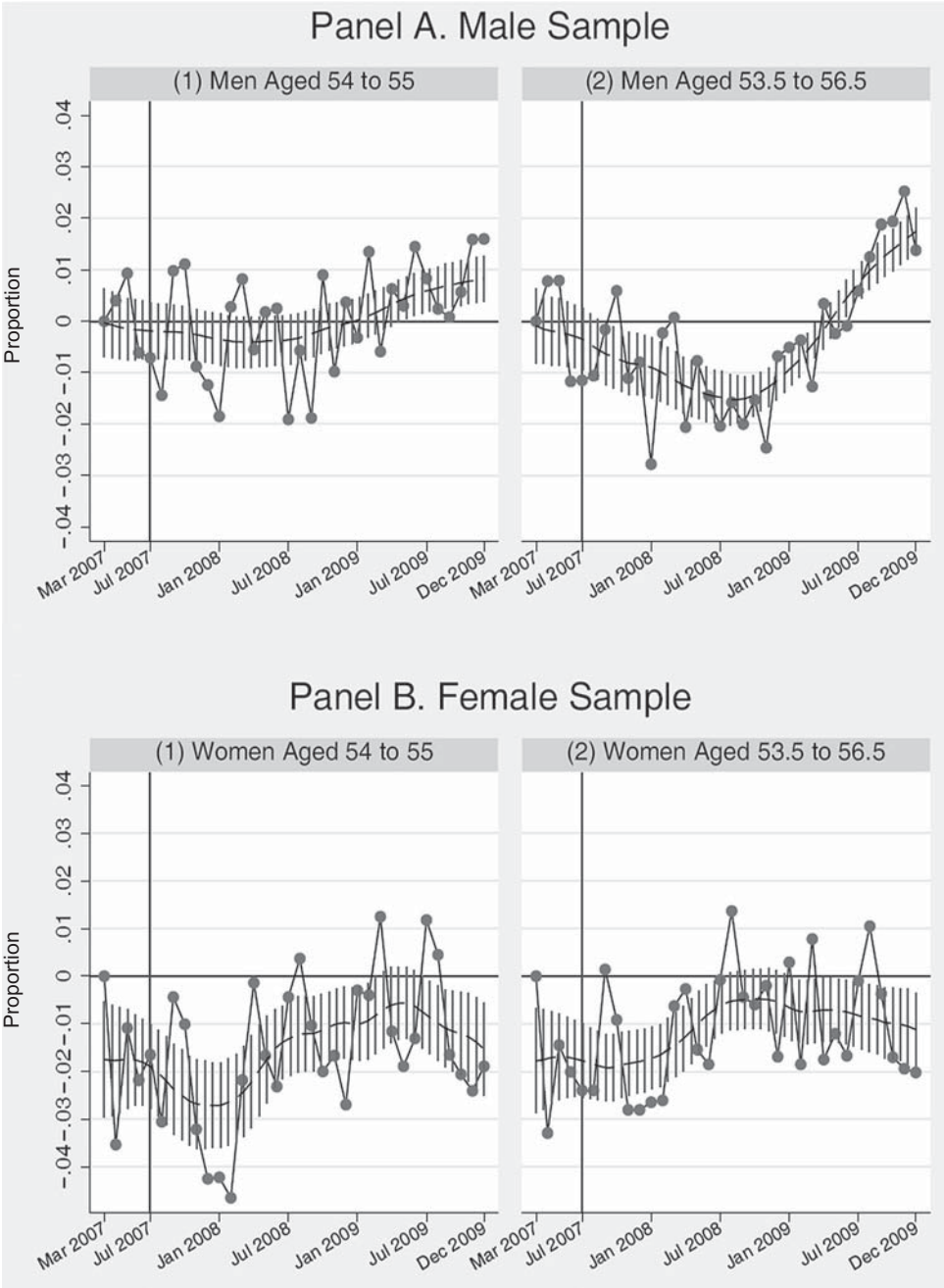
The estimated effects of the reform on temporary employment are subject to change as we exclude some industries from the analysis; the estimated impacts on permanent employment are not largely affected. Impacts on permanent employment are negative for the first few months after the 2007 reform, then the effects turn positive after March 2008 and remain positive until December 2009.

As a sum of the two effects, the impact on women's total employment takes a U-shape for the first year after the reform kicked off. The strongest disemployment effects are observed in the period between January 2008 and February 2008, around seven to eight months after the reform was put into effect. The strongest negative effects of the reform on women's employment occurred four to ten months earlier than those on men's employment. In contrast to the effects on men's employment, the estimated impacts of the reform on women's total employment turn positive after July 2008, taking an inverted-U shape in the period between August 2008 and December 2009.

Impacts on the Probability of New Hiring

Impacts of the 2007 reform on employment levels remain inconclusive in theory; its theoretical implications for worker flows are less ambiguous. Pro-

Figure 9. Impacts of the Reform on the Probability of New Hiring in Temporary Jobs



vided that the 2007 reform of Korea increases a protection level of temporary workers, it is likely to decrease the amount of employment flows in temporary jobs. In this section we investigate how the 2007 reform has affected employment flows by looking into a change in the probability of new hiring in temporary jobs between the post- and pre-reform periods. For this

estimation, we rely on Equation (1), replacing y_i by a dummy variable for whether or not individual i is hired in a temporary job within one month prior to the survey date. While this estimation aims to empirically verify theoretical implications of the 2007 reform for employment flows, it also checks the validity of our empirical specification based on Equation (1). The results of a new estimation are reported in Figure 9. Both analysis samples include only the industries in which the 2007 reform is likely to be binding as explained in preceding sections.

As for men, the 2007 reform had negative impacts on new hiring in temporary jobs at least until January 2009. Although the negative impacts are estimated to be small if the age window is narrow, they become more pronounced if the age window is expanded to ages 53.5 to 56.5. The negative impact on new hiring seemed to be strongest around July 2008 to September 2008, about one year after the reform was put into effect. This period by and large coincides with the period in which the disemployment impact of the reform was most strongly felt. After January 2009, however, the probability of new hiring in temporary jobs is larger than the corresponding probability at March 2007. Such a U-shaped pattern of the impact on new hiring is consistent with a recovery of the size of temporary employment and U-shape impacts of the reform on temporary employment as found in Figure 4. Overall, the results shown in Figure 9 for men support theoretical predictions of the 2007 reform for worker flows as well as the validity of our empirical specification.

In contrast, cause for concern arises in the results for women. Whereas the amount of new hiring did not start to fall until June 2007 for men, it seems to have started to fall much earlier for women. The estimates of the impact on the probability of new hiring in temporary jobs are negative even three months prior to the implementation of the 2007 reform for women. Whether such a decline arose in anticipation of the reform, however, is not clear. Nonetheless, the effects of the 2007 reform on new hiring for women remain negative throughout the sample period until December 2009.

Potential Explanations

Our empirical findings in Figures 1 to 8 are generally consistent with theoretical predictions that the 2007 reform of Korea decreases the size of temporary employment while having positive effects on permanent employment. A new finding that comes out of this study is a U-shaped pattern of the disemployment effects of the reform on temporary employment over time. Namely, for the initial several months after the reform was put into effect, it decreases the size of temporary employment but after that disemployment effects decay and eventually disappear. What could explain such U-shaped impacts of the reform on temporary employment, hence on total employment?

In an earlier study with findings similar to our own, Autor et al. (2006) report a result that the disemployment effect of wrongful discharge laws in

the United States reaches a maximum at two to three years following adoption and then gradually decays. To this they offer an *overreaction hypothesis*, proposing that employers originally overestimated the costs of the laws and over time learned how to minimize them. Given looming concerns over negative impacts of the new law by the popular press of Korea in the first half of 2007, such an overreaction hypothesis may be an explanation about the U-shaped impacts of the 2007 reform in Korea.

Another explanation relies on the *evasion hypothesis*.[13] After the implementation of the new regulation, Korean employers were likely to gradually learn how to evade the law by taking advantage of outsourcing and subcontracts. Since these forms of contracts were not explicitly covered and were not considered temporary contracts deemed to be protected by the 2007 laws, employers were likely to recognize them as a loophole in the law. Instead of directly hiring individual workers under temporary contracts, employers might have started to hand part of the internal jobs to subcontractors outside the firm. As time passed, the use of such subcontracts was likely to increase, giving rise to employment. Individuals could be hired as either a temporary or a permanent worker by the subcontractors. If individuals were employed as temporary employees, which we believe was more plausible, the size of temporary employment was likely to rise again. As such, we see a U-shaped pattern of the impact on temporary employment.

Supporting this scenario by a formal empirical analysis is challenging; nonetheless, statistics of Korea Development Institute (2010) seem informative. They show that while 36.4% (238/653) of sampled large establishments with at least 500 employees used subcontractors in 2004, the corresponding ratio had dramatically increased to 60.7% (630/1038) in 2008. Unfortunately, similar statistics based on the number of employees do not exist.[14] While these statistics can be only remotely related to the evasion hypothesis, further research is warranted to answer more definitively what causes a U-shaped pattern of the impacts of an employment protection legislation on the labor market.

Conclusion

Exploiting a recent reform on employment protection of temporary workers in Korea, we examine the impacts of the reform on the size of temporary, permanent, and total employment. Employing an official monthly labor force survey of Korea, we show that the 2007 reform reduced the size of temporary employment in the post-reform period. The pattern of the impact is U-shaped over time. In contrast to the results for temporary employment, impacts of the reform on the size of permanent employment

[13]We thank a referee for suggesting this hypothesis.

[14]The proportion of individuals working under subcontracts among all employees hired in the sampled large establishments remained 16% (320,533/2,000,117) in 2008. Unfortunately, however, these data were not collected for 2004.

seem to be positive, as the substitution of permanent for temporary workers is greater than a decrease in permanent employment that may arise from an adjustment of the scale of production.

As a sum of the two effects, the impacts on total employment also take a U-shape. For men, the strongest negative effects are observed in the period between June 2008 and September 2008, approximately a year after the reform began. For women, the strongest disemployment effects are observed in the period between January 2008 and February 2008, around seven to eight months after the reform was put into effect. To explain the U-shaped patterns of the 2007 reform of Korea, we offer overreaction and evasion hypotheses.

The findings of this article add to a group of studies showing that an increase in the protection level of workers is likely to come at a cost of the reduced size of employment at least in the short run. Concerning empirical analyses of employment protection in general, U-shape effects of the reform on employment imply that one might not be able to identify an effect if the post- and pre-treatment periods are too long. In Korea the impact of the reform strongly appeared within one year but seemed to fade away by two years after the reform. An alternative interpretation of the current findings may be that the intensity of EPL is weak, hence short-lived in Korea. In such a case, whether stronger EPL shows a more durable effect remains to be explored.

Appendix

Appendix Table 1. Results of the Linear Probability Model for Men

Age restrictions	*54 to 55*			*53.5 to 56.5*		
Dependent variable	*Employed (1)*	*Employed Temporary (2)*	*Employed Permanent (3)*	*Employed (4)*	*Employed Temporary (5)*	*Employed Permanent (6)*
d_i interacted with:						
April 2007	0.0026	–0.0009	0.0035*	–0.0144**	0.0014	–0.0157**
	(0.0018)	(0.0014)	(0.0016)	(0.0015)	(0.0011)	(0.0013)
May 2007	–0.0120**	–0.0102**	–0.0018	–0.0129**	–0.0078**	–0.0051**
	(0.0018)	(0.0014)	(0.0016)	(0.0015)	(0.0011)	(0.0013)
June 2007	–0.0044**	–0.0065**	0.0021	–0.0152**	–0.0184**	0.0032*
	(0.0018)	(0.0014)	(0.0016)	(0.0015)	(0.0012)	(0.0013)
July 2007	0.0149**	–0.0025	0.0174**	–0.0013	–0.0140**	0.0127**
	(0.0018)	(0.0014)	(0.0016)	(0.0015)	(0.0011)	(0.0013)
Aug 2007	0.0238**	–0.0037**	0.0275**	0.0196**	0.0059**	0.0137**
	(0.0018)	(0.0014)	(0.0016)	(0.0015)	(0.0011)	(0.0013)
Sept 2007	0.0002	–0.0313**	0.0316**	0.0020**	–0.0240**	0.0260**
	(0.0018)	(0.0014)	(0.0016)	(0.0015)	(0.0011)	(0.0013)
Oct 2007	–0.0355**	–0.0468**	0.0113**	0.0064**	–0.0224**	0.0288**
	(0.0018)	(0.0014)	(0.0016)	(0.0015)	(0.0011)	(0.0013)
Nov 2007	–0.0434**	–0.0629**	0.0196**	0.0107**	–0.0356**	0.0464**
	(0.0018)	(0.0014)	(0.0016)	(0.0015)	(0.0011)	(0.0013)
Dec 2007	–0.0456**	–0.0697**	0.0241**	0.0078**	–0.0355**	0.0433**
	(0.0018)	(0.0014)	(0.0016)	(0.0015)	(0.0011)	(0.0013)
Jan 2008	–0.0656**	–0.0693**	0.0038*	–0.0115**	–0.0473**	0.0359**
	(0.0018)	(0.0014)	(0.0016)	(0.0015)	(0.0012)	(0.0013)

continued

Appendix Table 1. Continued

Age restrictions	*54 to 55*			*53.5 to 56.5*		
Dependent variable	*Employed (1)*	*Employed Temporary (2)*	*Employed Permanent (3)*	*Employed (4)*	*Employed Temporary (5)*	*Employed Permanent (6)*
d_i interacted with:						
Feb 2008	–0.0071**	–0.0228**	0.0157**	0.0280**	0.0011	0.0269**
	(0.0018)	(0.0014)	(0.0016)	(0.0015)	(0.0011)	(0.0013)
Mar 2008	–0.0299**	–0.0382**	0.0083**	0.0251**	–0.0042**	0.0293**
	(0.0018)	(0.0014)	(0.0016)	(0.0015)	(0.0011)	(0.0013)
April 2008	–0.0244**	–0.0383**	0.0139**	0.0213**	–0.0287**	0.0500**
	(0.0018)	(0.0014)	(0.0016)	(0.0015)	(0.0011)	(0.0013)
May 2008	–0.0195**	–0.0214**	0.0018	–0.0110**	–0.0259**	0.0150**
	(0.0018)	(0.0014)	(0.0016)	(0.0015)	(0.0011)	(0.0013)
June 2008	–0.0726**	–0.0485**	–0.0241**	–0.0398**	–0.0469**	0.0071**
	(0.0018)	(0.0014)	(0.0016)	(0.0015)	(0.0011)	(0.0013)
July 2008	–0.0724**	–0.0527**	–0.0197**	–0.0145**	–0.0304**	0.0159**
	(0.0018)	(0.0014)	(0.0016)	(0.0015)	(0.0011)	(0.0013)
Aug 2008	–0.0600**	–0.0370**	–0.0230**	–0.0215**	–0.0327**	0.0112**
	(0.0018)	(0.0014)	(0.0016)	(0.0015)	(0.0011)	(0.0013)
Sept 2008	–0.0401**	–0.0153**	–0.0248**	–0.0149**	–0.0195**	0.0046**
	(0.0018)	(0.0014)	(0.0016)	(0.0015)	(0.0011)	(0.0013)
Oct 2008	–0.0478**	–0.0522**	0.0044**	–0.0277**	–0.0459**	0.0181**
	(0.0018)	(0.0014)	(0.0016)	(0.0015)	(0.0011)	(0.0013)
Nov 2008	–0.0210**	–0.0311**	0.0100**	–0.0143**	–0.0370**	0.0227**
	(0.0018)	(0.0014)	(0.0016)	(0.0015)	(0.0011)	(0.0013)
Dec 2008	–0.0247**	–0.0413**	0.0166**	–0.0196**	–0.0291**	0.0095**
	(0.0018)	(0.0014)	(0.0016)	(0.0015)	(0.0011)	(0.0013)
Jan 2009	–0.0120**	–0.0318**	0.0197**	–0.0027	–0.0333**	0.0306**
	(0.0018)	(0.0014)	(0.0016)	(0.0015)	(0.0011)	(0.0013)
Feb 2009	–0.0162**	–0.0415**	0.0253**	–0.0127**	–0.0475**	0.0349**
	(0.0018)	(0.0014)	(0.0016)	(0.0015)	(0.0011)	(0.0013)
Mar 2009	–0.0212**	–0.0494**	0.0282**	–0.0120**	–0.0326**	0.0207**
	(0.0018)	(0.0014)	(0.0016)	(0.0015)	(0.0011)	(0.0013)
April 2009	0.0083**	–0.0269**	0.0352**	0.0048**	–0.0171**	0.0219**
	(0.0018)	(0.0014)	(0.0016)	(0.0015)	(0.0011)	(0.0013)
May 2009	–0.0032	–0.0247**	0.0215**	–0.0061**	–0.0052**	–0.0010
	(0.0018)	(0.0014)	(0.0016)	(0.0015)	(0.0011)	(0.0013)
June 2009	0.0095**	0.0017	0.0078**	0.0051**	0.0021	0.0030**
	(0.0018)	(0.0013)	(0.0016)	(0.0015)	(0.0011)	(0.0013)
July 2009	–0.0059**	–0.0040**	–0.0019	0.0019	0.0006	0.0013
	(0.0018)	(0.0013)	(0.0016)	(0.0015)	(0.0011)	(0.0013)
Aug 2009	0.0065**	–0.0171**	0.0236**	0.0131**	–0.0035**	0.0166**
	(0.0018)	(0.0013)	(0.0016)	(0.0015)	(0.0011)	(0.0013)
Sept 2009	–0.0132**	–0.0116**	–0.0016	0.0058**	0.0085**	–0.0027*
	(0.0018)	(0.0013)	(0.0016)	(0.0015)	(0.0011)	(0.0013)
Nov 2009	0.0076**	0.0065**	0.0011	0.0382**	0.0143**	0.0239**
	(0.0018)	(0.0013)	(0.0016)	(0.0015)	(0.0011)	(0.0013)
Oct 2009	0.0203**	0.0066**	0.0136**	0.0378**	0.0076**	0.0302**
	(0.0018)	(0.0013)	(0.0016)	(0.0015)	(0.0011)	(0.0013)
Dec 2009	0.0107**	0.0152**	–0.0045**	0.0196**	0.0109**	0.0087**
	(0.0017)	(0.0013)	(0.0016)	(0.0015)	(0.0011)	(0.0013)
Weighted sample size	19,909,808	19,909,808	19,909,808	29,999,407	29,999,407	29,999,407
Raw sample size	35,333	35,333	35,333	52,973	52,973	52,973
Adjusted R-square	0.061	0.043	0.141	0.054	0.043	0.134

Notes: Standard errors are reported in parentheses. * and ** indicate that the estimate is significant at the 0.05 and 0.01 levels, respectively. Other explanatory variables are a dummy for age less than 55, dummies for a month from April 2007 to December 2009, age in month divided by 12 and its square, years of education, marital status, household head status, and residential regions.

Appendix Table 2. Results of the Linear Probability Model for Women

Age restrictions	*54 to 55*			*53.5 to 56.5*		
Dependent variable	*Employed (1)*	*Employed Temporary (2)*	*Employed Permanent (3)*	*Employed (4)*	*Employed Temporary (5)*	*Employed Permanent (6)*
d_i interacted with:						
April 2007	–0.0147**	0.0114**	–0.0261**	–0.0252**	–0.0002	–0.0249**
	(0.0017)	(0.0015)	(0.0010)	(0.0013)	(0.0012)	(0.0008)
May 2007	0.0044**	0.0217**	–0.0173**	–0.0229**	–0.0006	–0.0223**
	(0.0017)	(0.0015)	(0.0010)	(0.0014)	(0.0012)	(0.0008)
June 2007	0.0320**	0.0403**	–0.0083**	–0.0193**	0.0047**	–0.0241**
	(0.0017)	(0.0015)	(0.0010)	(0.0014)	(0.0012)	(0.0008)
July 2007	0.0140**	0.0244**	–0.0104**	0.0048**	0.0254**	–0.0206**
	(0.0017)	(0.0015)	(0.0010)	(0.0014)	(0.0012)	(0.0008)
Aug 2007	–0.0147**	–0.0045**	–0.0103**	–0.0111**	0.0050**	–0.0161**
	(0.0017)	(0.0015)	(0.0010)	(0.0014)	(0.0012)	(0.0008)
Sept 2007	0.0185**	0.0164**	0.0022*	0.0198**	0.0314**	–0.0116**
	(0.0017)	(0.0015)	(0.0010)	(0.0014)	(0.0013)	(0.0008)
Oct 2007	0.0445**	0.0504**	–0.0059**	0.0407**	0.0519**	–0.0112**
	(0.0017)	(0.0015)	(0.0010)	(0.0014)	(0.0013)	(0.0008)
Nov 2007	0.0062**	0.0156**	–0.0094**	0.0085**	0.0240**	–0.0155**
	(0.0017)	(0.0015)	(0.0010)	(0.0014)	(0.0013)	(0.0008
Dec 2007	–0.0138**	0.0057**	–0.0195**	–0.0089**	0.0116**	–0.0205**
	(0.0017)	(0.0015)	(0.0010)	(0.0014)	(0.0013)	(0.0008)
Jan 2008	–0.0201**	–0.0115**	–0.0086**	–0.0231**	–0.0020	–0.0211**
	(0.0017)	(0.0015)	(0.0010)	(0.0014)	(0.0012)	(0.0008)
Feb 2008	–0.0200**	–0.0131**	–0.0069**	–0.0158**	–0.0043**	–0.0115**
	(0.0016)	(0.0015)	(0.0009)	(0.0013)	(0.0012)	(0.0008)
Mar 2008	–0.0081**	–0.0260**	0.0179**	0.0100**	0.0027*	0.0073**
	(0.0016)	(0.0015)	(0.0010)	(0.0013)	(0.0012)	(0.0008)
April 2008	–0.0026	–0.0383**	0.0357**	0.0012	–0.0071**	0.0084**
	(0.0017)	(0.0015)	(0.0010)	(0.0013)	(0.0012)	(0.0008)
May 2008	0.0086**	–0.0282**	0.0368**	0.0058**	–0.0049**	0.0107**
	(0.0017)	(0.0015)	(0.0010)	(0.0013)	(0.0012)	(0.0008)
June 2008	–0.0043**	–0.0337**	0.0294**	–0.0165**	–0.0272**	0.0108**
	(0.0017)	(0.0015)	(0.0010)	(0.0013)	(0.0012)	(0.0008)
July 2008	0.0040*	–0.0260**	0.0300**	–0.0019	–0.0184**	0.0165**
	(0.0017)	(0.0015)	(0.0010)	(0.0013)	(0.0012)	(0.0008)
Aug 2008	0.0265**	–0.0039**	0.0304**	0.0233**	0.0047**	0.0185**
	(0.0016)	(0.0015)	(0.0010)	(0.0013)	(0.0012)	(0.0008)
Sept 2008	0.0618**	0.0229**	0.0389**	0.0338**	0.0163**	0.0175**
	(0.0016)	(0.0015)	(0.0010)	(0.0013)	(0.0012)	(0.0008)
Oct 2008	0.0292**	–0.0064**	0.0356**	0.0254**	–0.0028*	0.0282**
	(0.0017)	(0.0015)	(0.0010)	(0.0013)	(0.0012)	(0.0008)
Nov 2008	0.0606**	0.0222**	0.0383**	0.0462**	0.0183**	0.0278**
	(0.0016)	(0.0015)	(0.0010)	(0.0013)	(0.0012)	(0.0008)
Dec 2008	0.0162**	–0.0141**	0.0303**	0.0480**	0.0182**	0.0298**
	(0.0016)	(0.0015)	(0.0010)	(0.0013)	(0.0012)	(0.0008)
Jan 2009	0.0401**	0.0174**	0.0227**	0.0619**	0.0350**	0.0269**
	(0.0016)	(0.0015)	(0.0010)	(0.0013)	(0.0012)	(0.0008)
Feb 2009	0.0541**	0.0160**	0.0381**	0.0567**	0.0183**	0.0384**
	(0.0016)	(0.0015)	(0.0010)	(0.0013)	(0.0012)	(0.0008)
Mar 2009	0.0688**	0.0202**	0.0487**	0.0725**	0.0265**	0.0459**
	(0.0016)	(0.0015)	(0.0010)	(0.0013)	(0.0012)	(0.0008)
April 2009	0.0425**	0.0036*	0.0389**	0.0310**	–0.0061**	0.0370**
	(0.0016)	(0.0015)	(0.0010)	(0.0013)	(0.0012)	(0.0008)

continued

Appendix Table 2. Continued

Age restrictions	*54 to 55*			*53.5 to 56.5*		
Dependent variable	*Employed (1)*	*Employed Temporary (2)*	*Employed Permanent (3)*	*Employed (4)*	*Employed Temporary (5)*	*Employed Permanent (6)*
d_i interacted with:						
May 2009	0.0452**	–0.0001	0.0453**	0.0394**	–0.0048**	0.0442**
	(0.0016)	(0.0015)	(0.0010)	(0.0013)	(0.0012)	(0.0008)
June 2009	0.0306**	–0.0217**	0.0523**	0.0348**	–0.0189**	0.0536**
	(0.0016)	(0.0015)	(0.0010)	(0.0013)	(0.0012)	(0.0008)
July 2009	0.0537**	0.0163**	0.0374**	0.0527**	0.0109**	0.0418**
	(0.0016)	(0.0014)	(0.0010)	(0.0013)	(0.0012)	(0.0008)
Aug 2009	0.0499**	0.0071**	0.0428**	0.0452**	0.0082**	0.0370**
	(0.0016)	(0.0014)	(0.0010)	(0.0013)	(0.0012)	(0.0008)
Sept 2009	0.0108**	–0.0208**	0.0317**	0.0107**	–0.0205**	0.0312**
	(0.0016)	(0.0014)	(0.0010)	(0.0013)	(0.0012)	(0.0008)
Oct 2009	0.0011	–0.0156**	0.0167**	0.0027*	–0.0165**	0.0192**
	(0.0016)	(0.0014)	(0.0010)	(0.0013)	(0.0012)	(0.0008)
Nov 2009	0.0113**	–0.0076**	0.0189**	0.0072**	–0.0026*	0.0098**
	(0.0016)	(0.0015)	(0.0010)	(0.0013)	(0.0012)	(0.0008)
Dec 2009	0.0112**	–0.0188**	0.0300**	0.0136**	–0.0077**	0.0213**
	(0.0016)	(0.0014)	(0.0010)	(0.0013)	(0.0012)	(0.0008)
Weighted sample size	20,529,108	20,529,108	20,529,108	30,472,940	30,472,940	30,472,940
Raw sample size	38,210	38,210	38,210	56,936	56,936	56,936
Adjusted R-square	0.067	0.048	0.056	0.064	0.046	0.051

Notes: Standard errors are reported in parentheses. * and ** indicate that the estimate is significant at the 0.05 and 0.01 levels, respectively. Other explanatory variables are a dummy for age less than 55, dummies for a month from April 2007 to December 2009, age in month divided by 12 and its square, years of education, marital status, household head status, and residential regions.

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