

**The Impact of Temporary Low-skilled Immigrants on Firm Performances:
Evidences from the Korean Small-Medium Business Sector**

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Using the Korean Workplace Panel Data collected by the Korea Labor Institute, we investigate the impact of temporary unskilled migrant workers on firm profitability in the Korean small-medium business sector. We also examine the sources of the profitability impact. We draw our statistical model on Borjas (1995) and estimate dynamic panel data models to control for a probable endogeneity in the model. The results indicate that the influx of unskilled migrant workers has a positive impact on firm profitability. The immigrant labor increases productivity, weakly lowers wages, and weakly reduce labor shortage. Finally we discuss the empirical results.

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I. Introduction

Traditionally Korea had a conservative stance toward low-skilled immigration, but it has been relaxing restrictions on immigration, facing with urgent calls for labor shortages of SMEs and also being concerned about the increasing number of unauthorized immigrants. As a result of the policy changes, the number of the low-skilled migrant workers has been increased to about 600,000 in 2013, whose proportion out of the total workforce is about 2.3 percent. Even though the proportion of migrant workers is not so high, as compared to other OECD countries, it is not a negligible portion of workforce in the low-skilled labor market which is more relevant to the issue studied in this paper, because its ratio to the low-skilled production workers is around 10 percent in 2013. Considering the increasing importance of migrant workers, the economic impacts of temporary immigration in Korea merits an examination.

The firm performance impacts of immigration are rarely examined in the previous studies, even if there are a fair amount of researches on its labor market outcomes effects. Exceptionally there are Quispe-Agnoli and Zavodny (2002) and Howland and Nguyen (2009), which investigated empirically the impacts of immigration on capital investment, output mix and productivity for the former, and employment growth of some labor intensive industries for the latter. However, both of the papers examined the topics at regional industry levels, not at the firm level. A big reason for the rare research is that it is very hard to separate out its firm performance effects from its labor market outcome effects when there is free mobility of migrant workers. Even if firm performance effects of immigration are closely related with its labor market impacts (Borjas 1995; Freeman 1998), it is a missing link to get an overall picture of the economic effects of immigration.

In this vein, Korean labor market will provide more fruitful opportunity for the research on the firm performance effects of migrant workers, because allocation of migrant employees across sectors are determined quite externally and their mobility is restricted pretty much. Utilizing the Korean institutional context, we will address the issues of how the influx of migrant workers affects the firm performance of migrant-using firms in the Korean small-medium business sector. We will employ firm-level data analysis, for the numbers of migrant workers are varied across firms in Korea. Besides, we will examine how the use of low-skilled migrant workers has impact on labor productivity, wages, and labor shortage as intermediary variables.

Methodologically this paper pays attention to an endogeneity problem, possibly involved in estimating the firm performance impacts of immigration. Employing migrant workers is determined through the two steps in Korea. Firstly, government determines the sector within which the firms can employ the low-skilled migrant workers, and secondly, individual firms decide whether to employ the low-skilled migrant workers. In both steps, the degree of labor shortage for the low-skilled workers at the industry level and at the firm level may be a determining factor. This being the case, the estimates of the firm performance effects may be biased negatively, since labor-short employers who are eligible to employ unskilled migrant workers are more likely to have lower performances initially. Labor shortage, which is the single most important criterion of determining whether to employ migrant workers in Korea, is so often associated with lower wages, longer working hours, and lower safety, and these inferior working conditions, in turn, can be attributed to lower firm performances. This paper will employ dynamic panel data analysis to account for the firm-specific initial status of firm performance, assuming that it is time-invariant.

The remainder of this paper is organized as follows. Section II will briefly introduce

the institutional background of immigration, and section III will present the analytical framework of this paper based on literature review of the economic effects of immigration. Section IV will describe data used in this paper and will discuss basic statistics of the main variables and the empirical results of this study. Finally section V will draw conclusions.

II. Institutional Background of Low-skilled Migration in Korea

The institutional arrangements of immigration in Korea have undergone two stages of development: the Industrial Trainee Program and the Employment Permit System. Additionally there is another program called Working Visit Program for the Korean ethnic foreigners.

The Industrial Trainee Scheme was to allow the eligible firms to employ migrant workers as 'trainees', not employees. It was initially introduced in 1991 just for the Korean firms with direct investment overseas so that they could bring in and train foreign workers of their overseas subsidiaries for no longer than one year. In 1993 the program was extended to the SMEs, which employed less than 300 full-time employees in the manufacturing sector, and it was revised that migrant trainees could stay up to two years. Foreign industrial trainees were basically protected by the Korean labor laws, but as trainees they could be paid 80% of the minimum wage during the first three months. Thereafter it was modified several times. Its coverage had been extended to the industry of coastal fishery in 1996 and also to the construction industry in 1997. The maximum duration of stay for the migrant workers was lengthened to three years (one year for training and two years for employment) in 2002.

It started with a hope that it will help overcome labor shortages and also save labor

costs of SMEs without undermining the native labor market. To protect the native labor market and to help SMEs save labor costs appear to be two conflicting objectives, but the Korean government attempted to balance these two objectives by restricting annual trainee quota. However, since the demand for migrant workers was far higher than the supply, unexpected things came out. Many migrant workers quit their employers for higher wages and other better working conditions, and thus the number of unauthorized immigrants has been increasing drastically. At that point, unauthorized immigrants were estimated to earn 29.9%(male) and 22.8%(female) more than the industrial trainees in 2003 (Yoo et al 2002).

The Employment Permit System, which began to be effective in 2004, was conceived as a response to the criticism about the Industrial Trainee Program. It maintained the attribute of temporary immigration with the maximum period of stay being three years, but in this case as an employee, not as a trainee. It was revised several times such that currently the maximum duration of stay is 4 years and 10 months. The migrant workers have the right of not being discriminated in terms of wages. They are protected by the minimum wage rule. But an employment permit is granted conditional on being employed by a specific employer, and the migrant worker are allowed to transfer to another employer only in the case of justifiable reasons specified by the law such as the temporary or permanent closure or bankruptcy of the establishment, the employer's refusal to renew the employment contract or contract termination, and failure to pay wages or violence.

The Employment Permit System has a similar coverage of employers as before: firms with less than 300 full-time employees in the manufacturing sector, the agriculture and stockbreeding industry, the construction industry, and the business of collecting and

selling recyclable materials, refrigerated storage business and hotel business in the service sector. The ceiling of migrant workers employable to a firm depends on the size of the firm. Taking an example of the manufacturing sector, five migrant workers are the maximum for firms with 1-10 native workers, and ten migrant workers are for those with 11-50 natives. The magnitude of low-skilled foreign workers and their allocation across sectors are determined annually by Migrant Worker Policy Committee. The determination is based upon the degree of labor shortage in the sector and also the degree of skill requirements to be satisfied. The quotas of the foreign workers are distributed several times in a year, but it was exhausted very quickly, typically in a few days.

The Working Visit Program, a special program for the Korean-ethnic foreigners is more liberal than the program for the non-Korean ethnic group. According to the Working Visit Program, introduced in 2007, Korean-Chinese and Korean-Russians of the former Soviet Union Republics are granted five year visa, and once entered they can stay up to five years. They can be admitted before being employed and freely to enter and exit the country during the period of stay. They are also free to change their employer, and their scopes of employment allowed are wider than non-Korean ethnic migrant workers, including not only manufacturing, construction, agriculture and stockbreeding, but also the service sector such as restaurant business, nursing, cleaning, housekeeping, social welfare services, and business support services.

III. Models and Approaches for Empirical Analysis

We will estimate the following profit function at the firm level. We assume that the production function (Q) has three inputs, the skilled labor L_s , the unskilled labor L_u , and capital K . The unskilled labor is composed of unskilled native workers D_u and the

unskilled migrant workers F_u . It is also assumed the unskilled natives and the unskilled immigrants are substitutes, and that the skilled natives and the unskilled immigrants are complements. The price of the output is the numeraire and assumed to be unitary. Returns to capital and wages for the skilled and unskilled workers are indicated by r , w_s and w_u respectively. Let's disregard capital for a moment, for simplicity.

$$(1) \quad \pi = Q(F_u, D_u, L_s) - w_u(F_u + D_u) - w_s L_s - rK$$

By differentiating equation (1) with respect to the unskilled labor F_u , we can get a simple picture of the firm performance impact of employing migrant workers.

$$(2) \quad \frac{\partial \pi}{\partial F_u} = \frac{\partial Q}{\partial F_u} - w_u - \frac{\partial w_u}{\partial F_u} F_u - \frac{\partial w_u}{\partial F_u} D_u - \frac{\partial w_s}{\partial F_u} L_s$$

The left-hand side indicates the amount of changes in profit resulting from the influx of unskilled migrant workers. Here we can see that the profitability effect of migrant workers is affected by its productivity effect, its effect on wage of the unskilled workers, and its effect on wage of the skilled workers. Without any constraint, $\frac{\partial Q}{\partial F_u} - w_u = 0$. However, $\frac{\partial Q}{\partial F_u} - w_u$ can be greater than zero here, since the number of employable foreign workers is constrained for a specific employers in Korea. As the wages of the unskilled workers are affected negatively by inflow of immigrants, $\frac{\partial w_u}{\partial F_u}$ is smaller than zero. Thus the third term $\left(-\frac{\partial w_u}{\partial F_u} F_u\right)$ in the right-hand side of equation (2) implies is the immigration surplus, which is determined by the wage drops of the unskilled labor affected by the influx of migrant labor and the number of migrant workers employed. The fourth term $\left(-\frac{\partial w_u}{\partial F_u} D_u\right)$ in the right-hand side of equation (2) is the amount of

wealth transferred from the unskilled native workers to the employer. Because the number of the unskilled natives D_u is much greater than that of the unskilled immigrants F_u , the amount of wealth transferred is likely to be much greater than immigration surplus, implying that the impact of migrant workers on firm performance arises more out of wealth transfer from the unskilled native workers. The fifth term in the right-hand side of equation (2) is the amount of economic impact on the skilled workers. Since wages of the skilled workers will be raised with the inflow of migrant workers by assumption, $\frac{\partial W_s}{\partial F_u}$ is greater than zero, thereby leading to positive benefits to the skilled workers and imposing higher cost on their employers. However, the cost is likely to be smaller than the positive benefits transferred from the unskilled native workers, because the number of the skilled workers is much smaller than that of the unskilled labor in the small-medium business sector in Korea.

Thus equation (2) indicates that the profit gain of firms arises from cost saving due to the productivity gain and the lowered wage of the unskilled labor. Firms' profit gain hinges critically on how much the influx of migrant workers will improve productivity and lower wages of the unskilled labor. If labor shortage has been really large in the Korean SMEs as alleged, then migrant workers are likely to improve productivity and lower wages of the unskilled labor considerably, providing a large profit gain.

Approximating equation (1) with a linear function, we can obtain a linear regression equation as follows. It is assumed that capital return is a time-invariant variable, since information on capital cost r is not available here. Even if it varies over time, it will get into the error term.

$$(3) \text{Log} \left(\frac{\pi}{L} \right)_{it} = \mu_i + \alpha_0 \text{Log} \left(\frac{\pi}{L} \right)_{it-1} + \alpha_1 \text{Log}(L)_{it} + \alpha_2 \left(\frac{F_u}{L} \right)_{it} + \alpha_3 \text{Log} \left(\frac{K}{L} \right)_{it}$$

$$+ \alpha_4 \text{Log}(w)_{it} + \beta X_{it} + \varepsilon_{it},$$

where $L = F_u + D_u + L_s$.

Estimating these models, we may encounter a reverse or dual causality between firm performance and migrant worker employment. The number of migrant workers employed can vary across and within sectors. The variability of migrant workers across sectors is reasonably assumed to be exogenous, even though the labor shortage at the sector level is involved in determining the eligibility of the sector. In contrast, the number of migrant workers employed across individual firms within the sector allowed to employ migrant workers can be affected by the performance of individual firms, since labor shortage is probably correlated with firm performance. We will account for the time-invariant and the endogenous variables to affect the number of temporary immigrants by employing a dynamic panel data model with fixed effects. Because we use four-round panel data, we can estimate the model using GMM.

Another remaining issue is concerned with crowding-out effect. The impact of immigration on wage, which is a major potential mediator between immigration and firm performance, occurs in its labor market, rather than at an individual firm level. Also low-skilled migrant workers may crowd out low-skilled native workers across sectors or among firms, thereby equalizing wage levels of the low-skilled workers. However, labor, especially foreign labor, is not perfectly movable across sectors due to skill and regulatory barriers. Anyway if wage-equalizing forces operate, then the economic benefits out of the low-skilled immigration may pass over to the non-users of migrant workers, yielding underestimates of firm performance impacts of immigration.

IV. Empirical Results

1. Data and descriptive statistics

The data set used in this paper is the first four round panels of the Korean Workplace Panel Survey, which has been administered by Korea Labor Institute every other year since 2006. The panel data set contains one year earlier information of human resources, employment relations, industrial relations, and working conditions at the establishment level. The respondents are HR specialist, IR specialist, and employee representative of union or joint consultation committee in each establishment.

The sample size in the first round panel comprises 1,900 establishments with 30 and more permanent employees in the private sector, which cover all the industry excluding agriculture, fisheries and mining. The sample sizes of the second through four rounds are 1,735, 1,737, and 1,329 establishments. Out of the samples, we will analyze just the SME samples a part of which are eligible to employ migrant workers. Finally we used 157 observations, after deleting the establishments which have missing values for the variables used in the current models. The large loss of sample size is partly due to low availability of financial performance information in the sample.

The data contain information on the number of the low-skilled migrant workers and various types of native workers in each round panel. The percentage proportion of migrant workers out of the total workforce in each firm is used for the variable of migrant workers. Here the number of the total workforce includes the permanent workers and the directly employed contingent workers such as temporary workers and part-timers, but excludes the leased workers and in-house contract workers. The data also provide information on the number of vacancy for the majority occupation workers in an establishment, by which the survey indicates the occupation that comprises the greatest portion of employees in the establishment. We obtain the percentage of labor

shortage rate by taking the ratio of the number of vacancy over the number of the incumbent workers in each establishment, multiplied by 100.

We use operating income per capita and sales per capita as indicators for firms' profitability and labor productivity respectively. Tangible fixed asset per capita is used for capital-labor ratio. We use the starting annual earnings of male high school graduates for the wage of the low-skilled native workers. In Korea, recently high school graduates are more likely to get low-skilled jobs, and wage levels in SMEs tend to be compressed, the starting annual earnings of high school graduate will be a good indicator for the wage of the low-skilled native workers, who compete with the low-skilled migrant workers.

We will also control for some characteristics and contexts of firms whose information is available in the data set. Those control variables are employment size, working hour, proportion of contingent workers, unionization, the degree of changes in output demand, and the degree of competition in its domestic output market. Out of the control variables, the degree of changes in output demand and the degree of competition are Likert-type variables measured subjectively. Finally we control for multi-factory status, because financial performances information at firm level and HR and IR information at establishment level do not match each other in those firms.

Insert <Table 1> around here.

Table 2 presents summary statistics of the variables used in this paper. To obtain a brief description of the firm performance impacts of employing migrant workers, we compare the statistics between the users and the non-users of migrant workers by year. The fractions of firms which employ migrant workers are 8.7% in 2005, 7.8% in 2007,

10.2% in 2009, and 9.5% in 2011. Not being reported in the table, the users of migrant workers are more heavily distributed in the manufacturing sector.

The financial state of the migrant worker users is consistently worse than those of the non-users. The users of migrant workers yield much lower sales per capita, and operating income per capita, as compared to their counterparts. However, note that capital-labor ratio of the user firms are also much lower than those of the non-users, so that the lower performances of the users may be partially attributed to their lower capital-labor ratios. All these basic statistics may also indicate that lower performers are more likely to employ migrant workers, raising the issue that the number of migrant workers employed can be determined endogenously.

By contrast, the descriptive statistics indicate that the firms using migrant workers may perform better with respect to employment. Employment levels of the user firms are greater than those of the non-users. It is also worthy of noting that the labor shortage ratios of the user firms have become much lower since 2007. It is an interesting result because it was alleged that initially the user firms have suffered from higher labor shortage. The greater size of employment in the user firms seems related to the lower labor cost identified in those firms. We can see from the descriptive statistics that wage levels for the representative workers of high school graduates are just slightly different between the users and non-users.

Insert <Table 2> around here.

2. Regression Results

The regression results are presented as follows. The estimates of the impact of migrant workers on profitability are reported first, followed by its estimated impacts on

the intermediary variables of labor productivity and labor market outcomes (wage, labor shortage ratio). The regression models are dynamic panel data estimated by GMM. The first column in each table contains the estimates for the model without controlling for endogeneity of migrant worker ratio, and the second one contains the model with.

Table 3 shows the profitability impacts of employing migrant workers. The logarithmic value of operating income per capita is employed as the main dependent variable for the models. Because operating income per capita can have negative values, the logarithm of Z with its value smaller than 1 was smoothed out in this way; $-\log(-Z)$, if $Z < -1$, and 0 if $-1 \leq Z < 1$. The estimate results consistently indicate that the proportion of migrant workers have a positive impact on firm profitability. To check robustness of the results, we have estimated the models with differing specifications within the independent variables used here, but obtained consistently significant positive coefficient estimates for the migrant worker proportion.

However, the results do not indicate that the wages, an intermediary variable, affect firm profitability negatively. Furthermore, the sign of the coefficient estimate is positive. Other conditions being equal, the wages, a major component of cost of interest here, is supposed to have a negative effect on firm profitability. The results do not support the theoretical expectation in this study and thus they do not indicate a mediating role of wages. One reason for the unexpected result may lie in the fact that the estimated model does not control for employee characteristics such as skills and educational attainment. If the skilled workers produce more outputs than compensating for their wage differentials, then their higher wages will be associated with a higher profit.¹

1. When we included labor productivity in the models, then the signs of estimates for the wage variable turned negative, although they were not statistically significant.

Insert <Table 3> around here.

Tables 4 through 7 present the estimates for the impact of migrant workers on the intermediary variables of labor productivity, and labor market outcomes (wage and labor shortage rate). The dependent variables are logarithm of sales per capita, logarithm of the starting wage for male high school graduate, and vacancy rate for the majority occupation respectively. First, the estimates indicate that proportion of migrant workers has significantly positive effect on labor productivity consistently. Second, wage is affected insignificantly, but the signs of its coefficient estimates are negative. When we estimate with differing specification, the estimates become positive in some cases. Third, proportion of migrant workers has weakly positive on labor shortage.

Insert <Table 4>, <Table 5>, and <Table 6> around here.

V. Conclusions

Using the Korean Workplace Panel Data surveyed by the Korea Labor Institute, we investigated the firm performance impact of migrant workers in the Korean small-medium business sector. To control for a probable endogeneity in estimating the impacts, we employed dynamic panel data models estimated by GMM.

The results of this study indicate that temporary immigration has a positive impact on firm profitability. Its positive impact has been consistently identified over varying models and specifications. It was also found that migrant workers have more or less significant impact on some intermediary variables. First it has positive effect on labor productivity, and weak effects of lowering the wage of low-skilled native workers and of reducing labor shortage.

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<Table 1> Definition of variables

Variables	Definitions
Proportion of Migrant Workers	Percentage proportion of migrant workers to the total workforce (%)
Operating income per capita	Operating income per capita (million KRW)
Sales per capita	Sales per capita (million KRW)
Capital-labor ratio	Tangible fixed assets per capita (million KRW)
Labor shortage rate	100*vacancy/ the current number of workers for the major occupation (%)
Wages	The starting yearly earnings of male high school graduates
# of Employees	The number of total employees, including permanent workers, contingent workers and migrant workers
Weekly Working Hour	Average working hours per week over the employees in an establishment
Proportion of Contingent Workers	The proportion of contingent workers out of the total employees
Labor Union	A categorical variable for unionization: 1= unionized, 0= not unionized
Market competition	A subjective measure of the intensity of output market competition: 1= very low, 2= somewhat low, 3= neither, 4=somewhat high, 5= very high
Demand changes	A subjective measure of changes in output demand: 1= much decreased, 2= somewhat decreased, 3= neither, 4=somewhat increased, 5= much increased
Multi-Factory Firms	A categorical variable for multiple factories within a firm

<Table 2> Descriptive statistics

Variables	2005		2007		2009		2011	
	Non-user (N=118)	User (N=39)	Non-user (N=108)	User (N=49)	Non-user (N=126)	User (N=31)	Non-user (N=118)	User (N=39)
Proportion of Migrant Workers	-	8.70 (3.68)	-	7.81 (4.78)	-	10.2 (7.20)	-	9.52 (6.52)
Operating income per capita	13.0 (61.2)	10.8 (12.8)	21.9 (75.2)	10.9 (20.2)	20.2 (52.3)	14.9 (23.3)	63.5 (384)	12.5 (33.1)
Sales per capita	412 (1021)	258 (160)	537 (1736)	291 (196)	455 (556)	279 (218)	587 (967)	397 (330)
Capital-labor ratio	132 (200)	85.6 (86.5)	144 (205)	90.6 (66.4)	268 (941)	93.5 (101)	303 (850)	114 (120)
Labor shortage rate	1.79 (4.80)	6.33 (24.7)	2.75 (13.5)	1.16 (3.35)	3.17 (16.7)	1.49 (3.11)	1.58 (5.65)	1.88 (4.62)
Wages	1737 (358)	1635 (297)	1955 (447)	1792 (227)	1983 (345)	1944 (283)	2131 (351)	2063 (348)
# of Employees	97.4 (59.4)	130.9 (71.1)	102.4 (66.4)	132.6 (61.2)	102.2 (66.0)	134.4 (62.5)	102.6 (64.2)	128.8 (64.4)
Weekly Working Hour	48.9 (5.4)	50.4 (4.5)	48.4 (5.3)	49.0 (6.1)	47.7 (4.9)	47.5 (6.2)	47.1 (5.7)	48.3 (4.9)
Proportion of Contingent Workers	12.2 (18.8)	5.09 (9.93)	9.06 (19.5)	3.43 (9.31)	7.06 (15.7)	5.20 (13.1)	7.75 (16.5)	5.59 (9.17)
Labor Union	.186 (.391)	.179 (.389)	.185 (.390)	.184 (.391)	.190 (.394)	.258 (.445)	.212 (.410)	.179 (.389)
Market Competition	3.85 (1.00)	3.85 (.84)	3.85 (1.02)	3.92 (.81)	3.77 (.86)	3.74 (.86)	3.97 (.86)	3.90 (.79)
Demand Changes	3.29 (.93)	3.62 (.88)	3.21 (.95)	3.22 (.96)	3.24 (.92)	3.55 (.85)	3.06 (.95)	3.31 (1.10)
Multi-Factory Firms	.331 (.472)	.359 (.486)	.361 (.483)	.347 (.481)	.325 (.470)	.323 (.475)	.347 (.478)	.308 (.468)

Notes: 1) The numbers in parentheses are standard deviations.

<Table 3> Impact of migrant workers on operating income per capita

Independent variables	Dependent variable = Log(Operating Income per capita)	
	(1)	(2)
Constant	3.364(7.439)	3.827(7.204)
Lagged Dep. Var.	.248*(.141)	.246*(.142)
Proportion of Migrant Workers	.067**(.033)	.137(.214)
Labor Shortage Rate	-.001(.007)	.001(.009)
Log(Capital-labor ratio)	-.302**(.137)	-.327**(.152)
Log(Employment)	-.625(.509)	-.773^(.600)
Log(Wages)	.260(.861)	.271(.853)
Weekly Working Hour	-.005(.022)	-.003(.023)
Proportion of Contingent Workers	-.012^(.008)	-.011^(.008)
Labor Union	-.658***(.234)	-.722***(.272)
Multi-Factory Firms	.267(.820)	.294(.813)
Market Competition	-.250(.247)	-.250(.247)
Demand Changes	.303*(.172)	.290^(.179)
Year 2009	.078(.222)	.107(.244)
Year 2011	.396*(.231)	.399*(.231)
Control for Endogeneity of Migrant Worker	No	Yes

Notes: 1) ^ p<0.10(one-tailed) * p<0.10(two tailed) ** p<0.05(two tailed) *** p<0.01(two tailed).

2) The numbers in parentheses are standard errors.

<Table 4> Impact of migrant workers on sales per capita

Independent variables	Dependent variable = Log(Sales per capita)	
	(1)	(2)
Constant	5.584(.832)	6.168(1.051)
Lagged Dep. Var.	-.044(.108)	-.017(.129)
Proportion of Migrant Workers	.014***(.005)	.112*(.056)
Labor Shortage Rate	.001(.003)	.004(.003)
Log(Capital-labor ratio)	.023(.061)	-.011(.069)
Log(Employment)	-.141^(.110)	-.347^(.256)
Weekly Working Hour	.010*(.005)	.013*(.007)
Proportion of Contingent Workers	-.001(.001)	-.0003(.002)
Labor Union	-.171*(.094)	-.247^(.159)
Multi-Factory Firms	.772^(.556)	.819^(.559)
Market Competition	-.043(.034)	-.043(.043)
Demand Changes	.032(.036)	.018(.050)
Year 2009	.070^(.044)	.109**(.053)
Year 2011	.189***(.053)	.194***(.062)
Control for Endogeneity of Migrant Workers	No	Yes

Notes: 1) ^ p<0.10(one-tailed) * p<0.10(two tailed) ** p<0.05(two tailed) *** p<0.01(two tailed).

2) The numbers in parentheses are standard errors.

<Table 5> Impact of migrant workers on wage

Independent variables	Dependent variable = Log(starting wage of male high school graduates)	
	(1)	(2)
Constant	4.856(.709)	4.702(.742)
Lagged Dep. Var.	.335***(.085)	.346***(.086)
Proportion of Migrant Workers	-.001(.003)	-.016(.020)
Labor Shortage Rate	-.001(.001)	-.001 [^] (.001)
Log(Employment)	.037(.032)	.061(.052)
Weekly Working Hour	.0003(.002)	.00004(.002)
Proportion of Contingent Workers	.001 [*] (.001)	.001 [^] (.001)
Labor Union	-.021(.054)	-.006(.054)
Multi-Factory Firms	.039(.060)	.030(.061)
Market Competition	-.009(.013)	-.008(.013)
Demand Changes	.009(.012)	.011(.014)
Year 2009	.008(.019)	.001(.021)
Year 2011	.065***(.020)	.063***(.021)
Control for Endogeneity of Migrant Workers	No	Yes

Notes: 1) [^] p<0.10(one-tailed) * p<0.10(two tailed) ** p<0.05(two tailed) *** p<0.01(two tailed).

2) The numbers in parentheses are standard errors.

<Table 6> Impact of migrant workers on labor shortage

Independent variables	Dependent variable = Log(vacancy rate)	
	(1)	(2)
Constant	-5.160(5.953)	1.090(11.655)
Lagged Dep. Var.	-.034(.052)	-.020(.052)
Proportion of Migrant Workers	-.334 [^] (.257)	-2.336(2.045)
Weekly Working Hour	.077(.124)	.021(.179)
Proportion of Contingent Workers	-.069(.084)	-.083(.097)
Labor Union	.488(2.212)	1.664(2.029)
Multi-Factory Firms	-1.201(1.075)	-1.914 [^] (1.391)
Market Competition	.731 [^] (.535)	.788(.807)
Demand Changes	.810 [^] (.623)	1.190(1.37)
Year 2009	.413(1.300)	-.540(1.200)
Year 2011	-.561(.785)	-.775(1.089)
Control for Endogeneity of Migrant Workers	No	Yes

Notes: 1) [^] p<0.10(one-tailed) * p<0.10(two tailed) ** p<0.05(two tailed) *** p<0.01(two tailed).

2) The numbers in parentheses are standard errors.