Had the Affirmative Action in South Korea Improved Women Representation in Management? An Empirical Analysis of Korea's Affirmative Action

By

KWON, Yoobin

THESIS

Submitted to

KDI School of Public Policy and Management

In Partial Fulfillment of the Requirements

For the Degree of

MASTER OF DEVELOPMENT POLICY

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Committee in charge:

Professor Baek, Ji Sun, Supervisor

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Approval as of December, 2021

ABSTRACT

This research aims to empirically evaluate whether the affirmative action in Korea has contributed to improving women representation in management at a workplace-level, utilizing the data collected from Workplace Panel Survey (WPS) from 2005 to 2015 by every other year. To verify the causality, this study basically follows the same logic as a difference-in-differences model, exploiting the fact that only workplaces of which total number of workers exceeds the policy criterion are subject to the affirmative action.

In addition, this study takes into account and addresses two critical issues, which may lead to endogeneity problems, stemming from the way the policy was introduced and intrinsic features of workplaces: (a) variation in treatment timing between the two treated groups and (b) variation in total number of workers over time at some workplaces. The empirical results were mixed and not robust to the analysis methods, measures of employment of female managers, suggesting the affirmative action had been ineffective in expanding employment of female managers.

1. INTRODUCTION

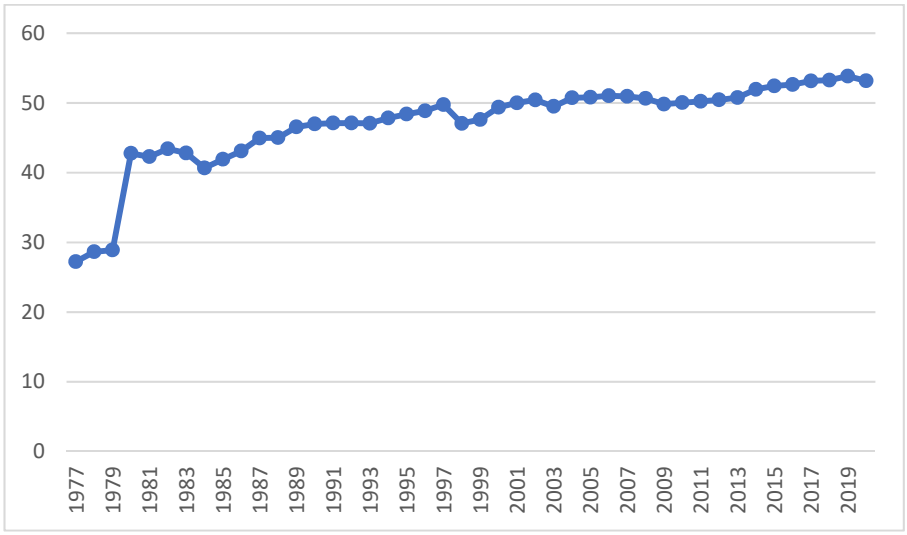
This research aims to evaluate the efficacy of Korea's affirmative action in terms of its contributions to employment of female managers at a workplace-level. As Korea's economy has significantly developed in the last several decades, more females started to engage in economic activities as well as to attain higher education. Nonetheless, the under-representation of women in management has persisted in most workplaces, and accordingly, closing the gender gap in manager-level occupations has consistently been a critical social and policy concern.

A host of data also reveal such matters. According to Education at a Glance 2021: OECD Indicators (OECD, 2021), the percentage of women in Korea who accomplished 'below upper secondary', 'upper secondary or post-secondary non-tertiary', or 'tertiary' education as the highest level attained respectively is higher than not only the corresponding figures of men in Sweden as well as in Korea but also the averages across G20 countries both in 2010 and 2020.

However, when it comes to the glass-ceiling index from The Economist, which tracks and ranks where women have the best chance of equal treatment at work within 29 OECD countries considering average performance across ten indicators including women representation in senior jobs (in managerial positions, on company boards, and in parliament), Korea has bottomed out for ten consecutive years since 2011. Score-wise, Korea received 25 out of 100 in 2020, less than half the average for the OECD countries and the mark of Sweden[1].

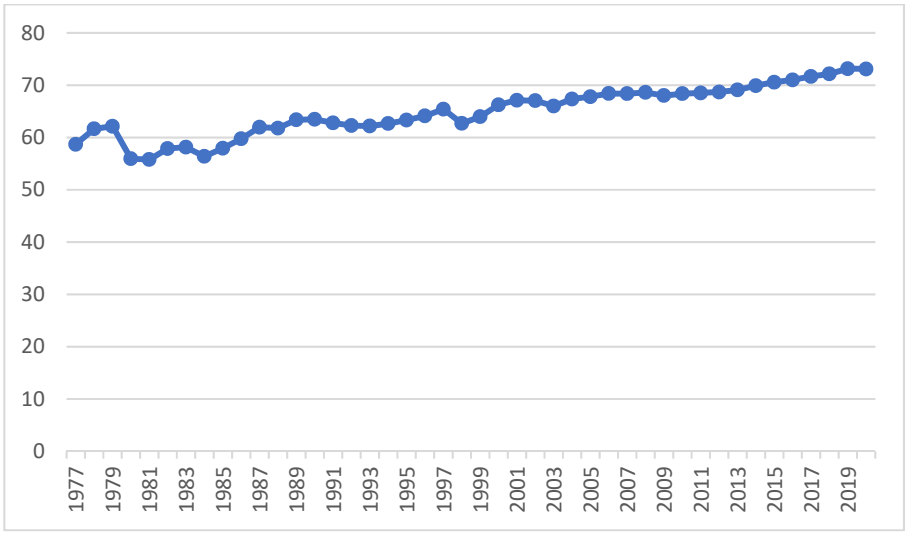
[1] Sweden ranked the top on the glass-ceiling index in 2021.

[Figure 1] Female Labor Force Participation Rate in the Republic of Korea from to 1977 to 2020 (National Estimate)



Note: Percentage of female population ages 15+
Source: World Bank, retrieved from https://data.worldbank.org/indicator/SL.TLF.CACT.FE.NE.ZS?end=2020&locations=KR&start=1977 on 11st October 2021.

[Figure 2] Ratio of Female to Male Labor Force Participation Rate in the Republic of Korea from 1977 to 2020 (National Estimate)



Source: World Bank, retrieved from https://data.worldbank.org/indicator/SL.TLF.CACT.FM.NE.ZS?end=2020&locations=KR&start=1977 on 11st October 2021.

<Table 1> Percentage of 25–34 Year-olds with a Given Level of Education as the Highest Level Attained

Unit: %

Country	**The Republic of Korea**				**Sweden**				**G20 Average**			
Gender	Men		Women		Men		Women		Men		Women	
Year	2010	2020	2010	2020	2010	2020	2010	2020	2010	2020	2010	2020
Below upper secondary	2	2	2	2	10	18	8	14	32	25	31	23
Upper secondary or post-secondary non-tertiary	40	34	32	21	54	42	43	28	38	38	33	32
Tertiary	57	64	66	76	36	40	49	58	32	38	38	46

Note: Total might not add up to 100% for the averages because of missing data for some levels for some countries.
Source: OECD/ILO/UIS (2021).

<Table 2> Average Percentage of Female Managers in the Republic of Korea from 2005 to 2020

Unit: %

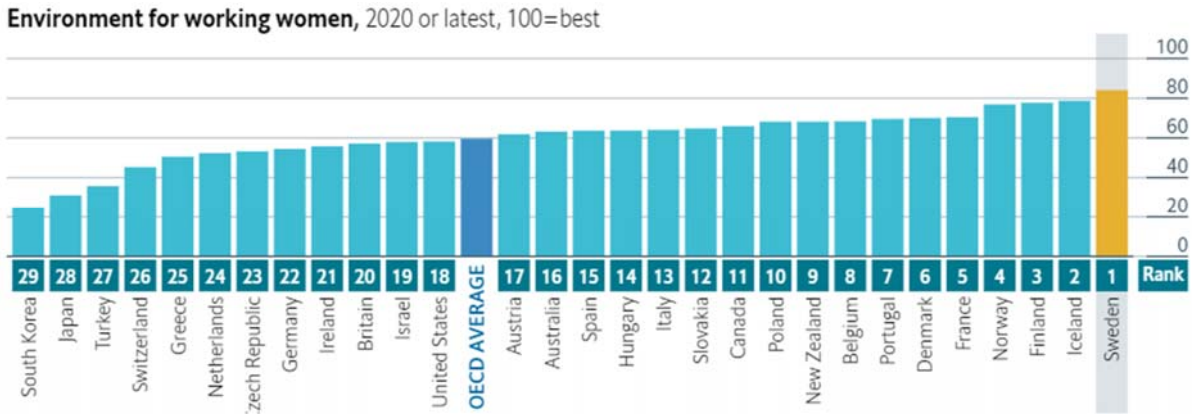
Year	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**
Female managers	**15.1**	**16.1**	**16.6**	**17**	**18.4**	**19.4**	**20.1**	**20.4**	**20.6**	**19.8**	**20.9**
Public institution	9.9	10.5	11	11.6	13.9	15.9	16.4	16.5	17.3	18.8	20.7
Private firm[2]	16.1	17.1	17.6	18	19.2	20	20.8	21.2	21.5	20.9	21.9

Source: South Korea's Ministry of Employment and Labor (2021).

[2] It includes private firms with 500 or more workers and large-scale business groups with 300 or more workers.

[Figure 3] The Glass-Ceiling Index (2020)

Unit: point



Source: The Economist, retrieved from https://www.economist.com/graphic-detail/2021/03/04/is-the-lot-of-female-executives-improving on 1st October 2021.

To counter the issue, the affirmative action was introduced in Korea in 2006 during the presidency of Moo-hyun Roh. Given the progress had remained sluggish, the incumbent president Jae-in Moon pledged to strengthen the affirmative action by expanding the subjects of the policy, stressing that it is imperative for sustainable growth of the nation as well as its workplaces (South Korea's Ministry of Employment and Labor, 2017).

To outline the affirmative action, it is focused on improving employment outcomes of women (Jacobsen, 2008), measured as an average percentage of female managers and female workers at a workplace-level. Whether a workplace is subject to the policy is solely determined by its total number of workers[3]: initially, the policy criterion was 1,000 but it changed to 500 in 2008. The subjects are required to increase or maintain the percentage of female workers and managers

[3] Only workers who contracted to work more than three months are counted.

as it is not lower than 70%[4] of the average of similar-sized workplaces in the same industry.

The effectiveness of this policy, however, has remained highly controversial. The empirical findings are mixed depending upon various factors such as which data or methodology was used, and how key variables were measured: some studies contend that the affirmative action had caused greater gender diversity in management across workplaces in Korea while the others disagree with the argument. In spite of such growing interest in analyzing the actual effectiveness of the affirmative action, however, relatively little research has been conducted on verifying the causality between the policy and an increase in employment of female managers.

Thus, adding a solid empirical analysis of the affirmative action is significant and necessary. Moreover, to the best of my knowledge, this study is the first research that takes into account that (a) treatment timing between the two treatment groups[5] varies due to the policy criterion change, from 1000 to 500, in 2008; (b) some workplaces belong to a treated group in some years and to a controlled group in the other years due to variation in total number of workers over time. Therefore, this study will add to scholarly debate on Korea's affirmative action by empirically corroborating its efficacy.

[4] Until 2012, the subjects had been required to increase or maintain the percentage of female workers and managers as it is not lower than 60% of the average of similar-sized workplaces in the same industry.

[5] Workplaces of which total number of workers (1) is 1,000 or more and (2) falls between 500 and 999.

2. LITERATURE REVIEW

Since the initial adoption of the affirmative action, there has been a growing interest in analyzing the efficacy of this policy on employment of female managers. In response, it has been steadily studied with different approaches in Korean academia and the extant research can largely be classified into two groups: while some studies have shown that the affirmative action had had a positive impact on employment of female managers, others contradict such argument.

Many studies among them have indicated that the affirmative action yielded greater gender diversity in workplaces of Korea to greater or lesser degrees (Kim & Ji, 2007; Jeon & Kim, 2008; Jung et al., 2010; Kwak, 2015; Kim et al., 2020). Jung et al. (2010) analyzed 2005 and 2009 data from Human Capital Corporate Panel (HCCP) employing difference-in-differences and showed the policy caused an increase in the average share of female workers as well as female managers. Additionally, the findings of Kwak (2015) support this view, arguing that the average percentage of both female workers and female managers has gradually increased from 2006 to 2014 due to the affirmative action.

However, this position is not shared by other several researchers (Sung, 2012; Sung et al., 2013; Sung & Choi, 2015; Lee, 2016). Sung (2012) concluded that the affirmative action had neither positive nor negative impact on employment of female workers and managers even though the author adopted the identical data and empirical methodology as Jung et al. (2010)[6]. Similarly, Lee (2016) also suggested that the policy had no effect on women's employment across workplaces

[6] Sung (2012) controlled different covariates from those of Jung et al. (2010).

from 2005 to 2011 after analyzing data from HCCP.

In summary, even though findings are mixed depending upon diverse factors such as what data or methodology was used, and what kind of variables are controlled, more papers positively evaluate the effectiveness of Korea's affirmative action.

Yet, in my view, in order to contend that the affirmative action increased employment of female managers, the argument must be based on proper empirical strategies which can effectively control for confounders that may affect the average share of female managers over time instead of simply comparing the average percentage of female managers across workplaces before and after the policy implementation. Additionally, research should consider concerns that may lead to endogeneity issue, such as change in total number of workers at some workplaces over time, to underpin the validity of the argument.

3. DATA

This study utilized the data collected from Workplace Panel Survey (WPS) conducted by the Korea Labor Institute (KLI) from 2005 to 2015 by every other year. The population of WPS is all workplaces[7] across the country employing 30 or more workers[8] in all industries except agriculture, hunting, forestry, and fishing.

The rationale behind using the data is that it allows this research to exploit detailed, workplace-level information of each public/private company or organization, ranging from the number of workers for each position by gender to management and employment structure, human resources management system. Moreover, the data covers essential workplace information that may correlate with employment of female managers, thus enabling this study to control for potential confounders.

<Table 3> Descriptive Statistics

Variables	Observation	Mean	Median	Std	Min	Max
A. Employment Outcomes						
The percentage of female managers	12,329	16.230	11.111	17.676	0	100
Natural log of total number of female managers	12,336	1.668	1.386	1.333	0	8.210
Total number of female managers	12,336	19.022	3	103.813	0	3,677
B. Workplace Information						
Total number of workers	12,336	349.641	124	886.985	2	33,983
Total number of male managers	12,336	106.835	27	413.265	0	25,164

[7] State or local administrative agencies, military/police, and national/public educational institutions are excluded.

[8] For the 6th survey (WPS2015), workers who contracted to work less than three months were excluded from the population.

Average of total assets	9,072	2.68E+07	2,211,891	2.08E+08	-10609.055	1.41E+10
Age	12,336	23.693	20	16.226	1	129
Foreign equity share	12,336	5.347	0	18.862	0	100
C. Workplace Measure/policy (Dummy variable)						
Communication						
Whether CEO holds a meeting with all employees	12,336	0.531	1	0.499	0	1
Whether top management regularly visits work sites and engages in dialogue with workers	12,336	0.529	1	0.499	0	1
Whether to have a hotline for direct communication with the top management	12,336	0.231	0	0.421	0	1
Whether each department, division, team and workgroups regularly hold a meeting to share management information	12,336	0.547	1	0.498	0	1
Whether to conduct regular survey for employees	12,336	0.162	0	0.368	0	1
Whether to issue a regular newsletter providing management information	12,336	0.150	0	0.357	0	1
Whether to regularly share information via emails	12,336	0.242	0	0.428	0	1
Whether to disclose information on intranet for all employees	12,336	0.343	0	0.475	0	1
Equal Treatment/Anti-discrimination						
Whether to have codify policies for securing equal treatment and managing diversity	12,336	1.598	2	0.490	1	2
Whether the document addresses discrimination with regard to						
- Gender	4,959	0.778	1	0.416	0	1
- Education level	4,959	0.682	1	0.466	0	1
- Marital status	4,959	0.586	1	0.493	0	1
Maternity Protection						
Maternity leave	11,986	0.756	1	0.430	0	1
Parental leave	11,986	0.652	1	0.476	0	1
Workplace daycare	11,986	0.050	0	0.218	0	1
Financial support for childcare costs	11,986	0.122	0	0.328	0	1
Period leave	11,986	0.522	1	0.500	0	1

Lactation breaks	11,986	0.145	0	0.352	0	1
Lactation room	11,986	0.118	0	0.323	0	1
None of the above	11,986	0.116	0	0.320	0	1

Note: Except for variables belonging to employment outcomes and workplace information, measured as continuous, the other items were converted into dummy variables of which 1 indicates 'Yes' while 0 or 2 indicate 'No' for each corresponding survey question.

4. EMPIRICAL STRATEGY

The estimation strategy of this paper basically follows the same logic as a standard difference-in-differences strategy, exploiting the fact that only workplaces of which total number of workers exceeds the policy criterion are subject to the affirmative action: it compares the change in employment of female managers in the post-adoption periods compared to the pre-adoption periods between workplaces subject to the policy and those that are not.

Thus, the regression equation is as follows:

$$Employment\ of\ female\ managers_{it} = \beta_1(Treat_i * Post_t) + \ \delta_i + \ \alpha_i + \mu_t + Z_{it} + \varepsilon_{it},$$

where i indexes workplaces and t indexes time periods from 2005 to 2015 by every other year. The outcome variable, $Employment\ of\ female\ managers_{it}$, is measured either as a percentage of female managers[9] or as natural log of total number of female managers at each workplace *i* in year *t*. $Treat_i$ is a dummy variable which takes a value of one if a workplace i is subject to the affirmative action. $Post_t$ is another dummy variable that equals one for periods after the introduction of the affirmative action. The coefficient of the interaction term between $Treat_i$ and $Post_t$, β_1, captures the impact of this policy on employment of female managers.

With regard to the empirical strategy, one critical issue taken into account is that there is

[9] Total number of female managers divided by total number of all managers.

variation in treatment timing between the two treated groups due to the policy criterion change in 2008, briefly mentioned in section 1. As the criterion changed from 1,000 to 500, workplaces with 1,000 workers or more have been subject to the affirmative action since 2006, while workplaces of which total number of workers falls between 500 and 999 have become subjects of the policy since 2008. Accordingly, the value of the interaction term for treated and control groups takes the corresponding pattern shown in Table 4.

<Table 4> The Value of the Interaction Term for Each Treated and Control Groups by Year

	2005 (pre)	**2007**	**2009**	**2011**	**2013**	**2015**
A workplace with 1000 or more workers (Treated)	0	1	1	1	1	1
A workplace with 500-999 workers (Treated)	0	0	1	1	1	1
A workplace with less than 500 workers (Control)	0	0	0	0	0	0

Given this matter, workplace-, industry-, and time-varying factors that may bias the estimate, δ_i, α_i, and μ_t respectively, are directly controlled in the regression equation. In other words, controlling for workplace-, industry-, and time-varying factors addresses potential endogeneity problems that may be stemming from violation of common trends assumption, on which the estimation strategy relies, there being no other shocks occurring around the same time in which this policy was adopted that are correlated with the proportion of female managers.

Additionally, in order to further address the concern, other possible confounders, Z_{it}, have also been controlled. Z_{it} includes workplace's basic information, such as total number of workers, and dummy variables indicating whether a workplace has policies for improving workplace communication, equal treatment, and maternity protection.

The other significant issue considered is that there are workplaces of which total number of workers vary over time. This issue brought about a problem that some of those workplaces belong to a treated group in some years and to a controlled group in the other years. This also may cause endogeneity problem as it is possible that workplaces incompetent or reluctant to comply with the policy have intentionally reduced the number of workers to right below the policy criterion to avoid it.

Thus, this paper addresses this potential endogeneity issue by employing intent-to-treat analysis, in which whether a workplace belongs to a treatment or control group hinges on total number of workers in 2005, as a main analysis. To be more concrete, let's assume there is a workplace of which total number of workers was 1,000 in 2005 and then decreased to 998 after two years. Regardless of this change, the workplace belongs to a treated group and accordingly, the value of the interaction term between $Treat_i$ and $Post_t$ takes the pattern of 'Workplaces with 1,000 or more workers' shown in Table 4.

Admittedly, intent-to-treat analysis does not perfectly fit Korea's affirmative action in that the policy, in reality, is applied to workplaces based on its each year's total number of workers. In light of the limitation, an additional analysis in which total number workers of each year determines whether a workplace belongs to a treated group was also conducted for reference. Moreover, various subsample analyses have been conducted to underpin the main analyses.

5. EMPIRICAL RESULTS

5.1. Main Estimation: (1) Intent-to-Treat Analysis

Estimates of intent-to-treat analysis are reported in Table 5. In the first two columns, employment of female managers is measured as the percentage of female managers at a workplace while natural log of total number of female managers is used as another dependent variable in the remaining columns (3) and (4). The specification, reported in columns (1) and (3), includes workplace-, industry-, and year-fixed effects only, without additional controls. In contrast, the regression equation of columns (2) and (4) contains all the additional controls as well as the fixed effects.

Columns (1)-(4) consistently show statistically insignificant coefficients of the interaction term between $Treat_i$ and $Post_t$, indicating that the policy did not increase employment of female managers across workplaces subject to the affirmative action compared to the other workplaces that are not subject to the policy.

<Table 5> Effect of the Affirmative Action on Employment of Female Managers

	(1) The percentage of female managers	(2) The percentage of female managers	(3) ln_total number of female managers	(4) ln_total number of female managers
$\text{Treat}_i * \text{Post}_t$	-0.261	-0.234	0.109	0.102
	(0.592)	(0.780)	(0.0674)	(0.0885)
Workplace Information Controls	N	Y	N	Y
Communication Policy Controls	N	Y	N	Y
Equal treatment/Anti-discrimination Policy Controls	N	Y	N	Y

Maternity Protection Policy Controls	N	Y	N	Y
Year Fixed Effects	Y	Y	Y	Y
Workplace Fixed Effects	Y	Y	Y	Y
Industry Fixed Effects	Y	Y	Y	Y
Constant	12.85***	2.979*	1.519***	-2.007***
	(0.199)	(1.589)	(0.0178)	(0.350)
Observations	7,571	2,728	7,575	2,728
R-squared	0.054	0.106	0.093	0.473
Number of id	1,899	1,217	1,899	1,217

Note: Standard errors in parentheses are clustered at a workplace-level.

5.2. Main Estimation: (2) Total Number of Workers in a Pertinent Year Decides Whether a Workplace Belongs to a Treated Group

In this additional analysis, total number of workers in a pertinent year decides whether a workplace belongs to a treated or control group as with the policy and thus fits the policy better than the intent-to-treat analysis. However, this analysis is more likely to have an endogeneity issue as it basically condones those workplaces that go back and forth between a treatment and control group due to the change in total number of workers over time.

Table 6 presents the estimation results. While columns (1) and (2) show the same results as those of the intent-to-treat analysis, columns (3) and (4), in which employment of female managers is measured as log of total number of female managers, report statistically significant estimates. According to column (4) with additional controls, it suggests that employment of female managers increased by 21.3% among workplaces under the affirmative action.

<Table 6> Effect of the Affirmative Action on Employment of Female Managers

	(1) The percentage of female managers	(2) The percentage of female managers	(3) ln_total number of female managers	(4) ln_total number of female managers

$\text{Treat}_i * \text{Post}_t$	0.268	0.163	0.415***	0.213***
	(0.486)	(0.699)	(0.0529)	(0.0794)
Workplace Information Controls	N	Y	N	Y
Communication Policy Controls	N	Y	N	Y
Equal treatment/Anti-discrimination Policy Controls	N	Y	N	Y
Maternity Protection Policy Controls	N	Y	N	Y
Year Fixed Effects	Y	Y	Y	Y
Workplace Fixed Effects	Y	Y	Y	Y
Industry Fixed Effects	Y	Y	Y	Y
Constant	13.43***	5.018***	1.330***	-1.740***
	(0.291)	(1.386)	(0.0246)	(0.319)
Observations	12,329	3,643	12,336	3,644
R-squared	0.046	0.097	0.098	0.452
Number of id	4,984	1,868	4,985	1,868

Note: Standard errors in parentheses are clustered at a workplace-level.

5.3. Subsample Analysis

5.3.1. Excluding Workplaces of which Total Number of Workers Vary Over Time

Considering concern that both main analyses may still run the risk of endogeneity problems, a subsample analysis excluding the workplaces that have swung from a treatment group to a control group, or vice versa, owing to the change in total number of workers, was conducted as well. While this subsample analysis has advantage of ruling out such concern, there is still a downside that the sample size decreases, which leads to a reduction in the power of the analysis.

The results are presented in Table 7. It shows the same pattern as the second main analysis in which total number of workers in a pertinent year decides whether a workplace belongs to a treated group: when employment of female managers is measured as log of total number of female managers, the estimation shows that there has been a statistically significant increase in employment of female managers among workplaces under the policy, compared to the other remaining workplaces that are not.

According to column (4) controlling for potential confounders, it is implied that employment of female managers increased by 31.7% among the workplaces subject to the affirmative action. However, when the percentage of female managers is used as a dependent variable, the coefficient of the interaction term turns into insignificant.

<Table 7> Effect of the Affirmative Action on Employment of Female Managers within Workplaces of Which Total Number of Workers Does Not Vary over Time

	(1) The percentage of female managers	(2) The percentage of female managers	(3) ln_total number of female managers	(4) ln_total number of female managers
$\text{Treat}_i * \text{Post}_t$	0.151	-0.232	0.349***	0.317**
	(0.908)	(1.158)	(0.121)	(0.145)
Workplace Information Controls	N	Y	N	Y
Communication Policy Controls	N	Y	N	Y
Equal treatment/Anti-discrimination Policy Controls	N	Y	N	Y
Maternity Protection Policy Controls	N	Y	N	Y
Year Fixed Effects	Y	Y	Y	Y
Workplace Fixed Effects	Y	Y	Y	Y
Industry Fixed Effects	Y	Y	Y	Y
Constant	13.17***	4.471***	1.202***	-1.411***
	(0.303)	(1.435)	(0.0235)	(0.330)
Observations	10,774	3,001	10,781	3,002
R-squared	0.043	0.089	0.076	0.419
Number of id	4,665	1,610	4,666	1,610

Note: Standard errors in parentheses are clustered at a workplace-level.

Following subsample analyses have been done given probable speculation that the industrial characteristics may influence whether a workplace complies with the policy or not.

5.3.2. Examining within Manufacturing Industry

In this part, the regression model was conducted only with workplaces that belong to manufacturing industry. The estimation results are shown in the following Table 8 and 9.

As for the intent-to-treat analysis, when log of total number of female managers is used as a dependent variable, the coefficients of the interaction term turned out to be statistically indistinguishable from zero, suggesting that the affirmative action had not caused an increase in employment of female managers. On the other hand, the remaining coefficients in models (1) and (2), in which Y is set as the percentage of female managers, indicate that the policy had adversely reduced female manager employment by 1.23% and 1.81% respectively.

<Table 8> Effect of the Affirmative Action on Employment of Female Managers within Workplaces that Belong to Manufacturing Industry (ITT analysis)

	(1) The percentage of female managers	(2) The percentage of female managers	(3) ln_total number of female managers	(4) ln_total number of female managers
$\text{Treat}_i * \text{Post}_t$	-1.238*	-1.817*	0.0938	-0.0326
	(0.713)	(0.980)	(0.110)	(0.144)
Workplace Information Controls	N	Y	N	Y
Communication Policy Controls	N	Y	N	Y
Equal treatment/Anti-discrimination Policy Controls	N	Y	N	Y
Maternity Protection Policy Controls	N	Y	N	Y
Year Fixed Effects	Y	Y	Y	Y
Workplace Fixed Effects	Y	Y	Y	Y
Industry Fixed Effects	Y	Y	Y	Y
Constant	8.099***	5.614***	1.142***	-1.924***
	(0.263)	(0.997)	(0.0294)	(0.562)
Observations	2,913	1,204	2,913	1,204
R-squared	0.051	0.118	0.100	0.346
Number of id	723	525	723	525

Note: Standard errors in parentheses are clustered at a workplace-level.

With regard to the other main analysis where total number of workers in a pertinent year decides whether a workplace belongs to a treated group, only model (3) shows the positive and statistically significant coefficient, implying that the policy enhanced female manager employment by 37.1%. The regression of model (3), however, does not control for possible confounders, which makes the model itself less rigorous than the other models (2) and (4). In all the other remaining models, the coefficient of the interaction term is statistically insignificant.

<Table 9> Effect of the Affirmative Action on Employment of Female Managers within Workplaces that Belong to Manufacturing Industry

	(1) The percentage of female managers	(2) The percentage of female managers	(3) ln_total number of female managers	(4) ln_total number of female managers
$\text{Treat}_i * \text{Post}_t$	-0.555	-1.224	0.371***	0.0888
	(0.563)	(0.807)	(0.0836)	(0.128)
Workplace Information Controls	N	Y	N	Y
Communication Policy Controls	N	Y	N	Y
Equal treatment/Anti-discrimination Policy Controls	N	Y	N	Y
Maternity Protection Policy Controls	N	Y	N	Y
Year Fixed Effects	Y	Y	Y	Y
Workplace Fixed Effects	Y	Y	Y	Y
Industry Fixed Effects	Y	Y	Y	Y
Constant	8.895***	6.601***	1.020***	-1.872***
	(0.323)	(0.906)	(0.0339)	(0.512)
Observations	5,093	1,668	5,095	1,669
R-squared	0.045	0.109	0.101	0.323
Number of id	2,066	863	2,066	863

Note: Standard errors in parentheses are clustered at a workplace-level.

5.3.3. Examining within the Remaining Industries except Manufacturing Industry

Estimation results from the subsample analysis conducted only with workplaces in all the

other remaining industries excluding manufacturing industry are also mixed and similar to those of the main analyses. Most of models present statistically insignificant coefficients of the interaction term between $Treat_i$ and $Post_t$.

Meanwhile, model (4) of the intent-to-treat analysis and models (3) and (4) of the other analysis imply that the affirmative action had raised employment of female managers across the workplaces subject to the affirmative action, compared to the other workplaces not under the policy, by 19.8%, 44.2%, and 30.5%, respectively.

<Table 10> Effect of the Affirmative Action on Employment of Female Managers within Workplaces that Belong to the Remaining Industries except Manufacturing Industry (ITT)

	(1) The percentage of female managers	(2) The percentage of female managers	(3) ln_total number of female managers	(4) ln_total number of female managers
$\text{Treat}_i * \text{Post}_t$	0.328	0.760	0.119	0.198**
	(0.844)	(1.161)	(0.0855)	(0.0962)
Workplace Information Controls	N	Y	N	Y
Communication Policy Controls	N	Y	N	Y
Equal treatment/Anti-discrimination Policy Controls	N	Y	N	Y
Maternity Protection Policy Controls	N	Y	N	Y
Year Fixed Effects	Y	Y	Y	Y
Workplace Fixed Effects	Y	Y	Y	Y
Industry Fixed Effects	Y	Y	Y	Y
Constant	15.84***	3.022	1.755***	-1.847***
	(0.277)	(2.723)	(0.0225)	(0.442)
Observations	4,658	1,524	4,662	1,524
R-squared	0.057	0.153	0.090	0.603
Number of id	1,176	692	1,176	692

Note: Standard errors in parentheses are clustered at a workplace-level.

<Table 11> Effect of the Affirmative Action on Employment of Female Managers within Workplaces that Belong to the Remaining Industries except Manufacturing Industry

	(1) The percentage of female managers	(2) The percentage of female managers	(3) ln_total number of female managers	(4) ln_total number of female managers
$\text{Treat}_i * \text{Post}_t$	0.737	1.144	0.442***	0.305***
	-0.695	(1.092)	(0.0682)	(0.0901)
Workplace Information Controls	N	Y	N	Y
Communication Policy Controls	N	Y	N	Y
Equal treatment/Anti-discrimination Policy Controls	N	Y	N	Y
Maternity Protection Policy Controls	N	Y	N	Y
Year Fixed Effects	Y	Y	Y	Y
Workplace Fixed Effects	Y	Y	Y	Y
Industry Fixed Effects	Y	Y	Y	Y
Constant	16.65***	5.778**	1.545***	-1.514***
	(0.434)	(2.411)	(0.0345)	(0.408)
Observations	7,236	1,975	7,241	1,975
R-squared	0.047	0.135	0.097	0.598
Number of id	2,918	1,005	2,919	1,005

Note: Standard errors in parentheses are clustered at a workplace-level.

5.3.4. Examining within Female-dominated Industries

Motivated by another probable speculation that workplaces which belong to industries with more female workers than men might have been less reluctant to comply with the policy, the regression equation was conducted only with workplaces that belong to one of such female-dominated industries.

In order to identify 'female-dominated industry', this study calculated the median

percentage[10] of female workers across all industries and then listed the industries in ascending order of each median share of female workers from 2005 to 2015. Industries with the median greater than 22.03% are defined as a female-dominated industry: ten of all industries, such as education, human health and social work activities industry, are identified as a female-dominated industry.

The estimates are reported in Table 12 and 13, respectively. The estimated coefficient for the interaction term between $Treat_i$ and $Post_t$ reveals the impact of the affirmative action on employment of female managers across workplaces within the female-dominated industries.

As for the analysis in which total number of workers in a pertinent year decides whether a workplace belongs to a treated group, when the dependent variable is log of total number of female managers, it is suggested that the policy had increased female manager employment by 21.3%. However, the results do not remain robust to the intent-to-treat analysis and the measure of Y. That is to say, contrary to the conjecture, even workplaces in female-dominated industries had not complied with the affirmative action.

<Table 12> Effect of the Affirmative Action on Employment of Female Managers within Workplaces that Belong to Female-dominated Industries (ITT)

	(1) The percentage of female managers	(2) The percentage of female managers	(3) ln_total number of female managers	(4) ln_total number of female managers
$\text{Treat}_i * \text{Post}_t$	-0.261	-0.234	0.109	0.102
	(0.592)	(0.780)	(0.0674)	(0.0885)
Workplace Information Controls	N	Y	N	Y

[10] 22.03%

Communication Policy Controls	N	Y	N	Y
Equal treatment/Anti-discrimination Policy Controls	N	Y	N	Y
Maternity Protection Policy Controls	N	Y	N	Y
Year Fixed Effects	Y	Y	Y	Y
Workplace Fixed Effects	Y	Y	Y	Y
Industry Fixed Effects	Y	Y	Y	Y
Constant	12.85***	2.979*	1.519***	-2.007***
	(0.199)	(1.589)	(0.0178)	(0.350)
Observations	7,571	2,728	7,575	2,728
R-squared	0.054	0.106	0.093	0.473
Number of id	1,899	1,217	1,899	1,217

Note: Standard errors in parentheses are clustered at a workplace-level.

<Table 13> Effect of the Affirmative Action on Employment of Female Managers within Workplaces that Belong to Female-dominated Industries

	(1) The percentage of female managers	(2) The percentage of female managers	(3) ln_total number of female managers	(4) ln_total number of female managers
$\text{Treat}_i * \text{Post}_t$	0.268	0.163	0.415***	0.213***
	(0.486)	(0.699)	(0.0529)	(0.0794)
Workplace Information Controls	N	Y	N	Y
Communication Policy Controls	N	Y	N	Y
Equal treatment/Anti-discrimination Policy Controls	N	Y	N	Y
Maternity Protection Policy Controls	N	Y	N	Y
Year Fixed Effects	Y	Y	Y	Y
Workplace Fixed Effects	Y	Y	Y	Y
Industry Fixed Effects	Y	Y	Y	Y
Constant	13.43***	5.018***	1.330***	-1.740***
	(0.291)	(1.386)	(0.0246)	(0.319)
Observations	12,329	3,643	12,336	3,644
R-squared	0.046	0.097	0.098	0.452
Number of id	4,984	1,868	4,985	1,868

Note: Standard errors in parentheses are clustered at a workplace-level.

5.3.5. Examining with Balanced Panel Data

Given that the data from WPS is an unbalanced panel owing to continuous sample attrition, the regression model was run with the balanced version of the same data. Across models, the estimation results correspond with those of main analyses in terms of a statistical significance. In Table 14, columns (1)-(4) consistently suggest that the affirmative action had no measurable effect on increasing employment of female managers across the workplaces under the policy.

By contrast, columns (3) and (4) from Table 15 present statistically significant coefficients of the interaction term. According to column (5) controlling for confounders, it is implied that employment of female managers increased by 28.5% among workplaces subject to the policy due to the affirmative action.

<Table 14> Effect of the Affirmative Action on Employment of Female Managers, Examined with Balanced Panel Data (ITT)

	(1)	(2)	(3)	(4)
	The percentage of female managers	The percentage of female managers	ln_total number of female managers	ln_total number of female managers
$\text{Treat}_i * \text{Post}_t$	-0.686	0.391	0.0423	0.118
	(0.887)	(1.040)	(0.102)	(0.136)
Workplace Information Controls	N	Y	N	Y
Communication Policy Controls	N	Y	N	Y
Equal treatment/Anti-discrimination Policy Controls	N	Y	N	Y
Maternity Protection Policy Controls	N	Y	N	Y
Year Fixed Effects	Y	Y	Y	Y
Workplace Fixed Effects	Y	Y	Y	Y
Industry Fixed Effects	Y	Y	Y	Y

Constant	11.80***	0.814	1.373***	-2.213***
	(0.303)	(1.853)	(0.0273)	(0.442)
Observations	4,067	1,560	4,068	1,560
R-squared	0.072	0.129	0.107	0.472
Number of id	678	574	678	574

Note: Standard errors in parentheses are clustered at a workplace-level.

<Table 15> Effect of the Affirmative Action on Employment of Female Managers, Examined with Balanced Panel Data

	(1)	(2)	(3)	(4)
	The percentage of female managers	The percentage of female managers	ln_total number of female managers	ln_total number of female managers
$\text{Treat}_i * \text{Post}_t$	0.117	0.997	0.398***	0.285**
	(0.733)	(0.993)	(0.0836)	(0.122)
Workplace Information Controls	N	Y	N	Y
Communication Policy Controls	N	Y	N	Y
Equal treatment/Anti-discrimination Policy Controls	N	Y	N	Y
Maternity Protection Policy Controls	N	Y	N	Y
Year Fixed Effects	Y	Y	Y	Y
Workplace Fixed Effects	Y	Y	Y	Y
Industry Fixed Effects	Y	Y	Y	Y
Constant	11.80***	0.889	1.372***	-1.940***
	(0.303)	(1.858)	(0.0271)	(0.445)
Observations	4,067	1,560	4,068	1,560
R-squared	0.072	0.130	0.121	0.477
Number of id	678	574	678	574

Note: Standard errors in parentheses are clustered at a workplace-level.

6. DISCUSSION

In effect, the fact that results from the main and subsample analyses are mixed and not robust to the measures of employment of female managers reveals that the affirmative action had been ineffective in expanding employment of female managers. In other words, it is indicated that most of the workplaces subject to the affirmative action had not been compliant with the policy.

<Table 16> Noncompliant Workplaces

Unit: number (%)

Year	Workplaces of which percentage of both female workers and female managers fall short of the criterion	Workplaces of which percentage of female workers falls short of the criterion	Workplaces of which percentage of female managers falls short of the criterion	Workplaces compliant with the affirmative action	Total number of workplaces subject to the affirmative action
2006	129 (23.6)	33 (6.0)	164 (30.0)	220 (40.3)	546 (100.0)
2007	149 (24.3)	21 (3.4)	173 (28.2)	270 (44.1)	613 (100.0)
2008	368 (25.8)	74 (5.2)	379 (26.6)	604 (42.4)	1,425 (100.0)
2009	355 (22.1)	91 (5.7)	456 (28.4)	705 (43.9)	1,607 (100.0)
2010	323 (20.5)	92 (5.8)	433 (27.5)	728 (46.2)	1,576 (100.0)
2011	295 (19.1)	85 (5.5)	415 (26.8)	752 (48.6)	1,547 (100.0)
2012	315 (18.8)	92 (5.5)	456 (27.2)	811 (48.5)	1,674 (100.0)
2013	313 (17.6)	103 (5.8)	483 (27.2)	879 (49.4)	1,778 (100.0)
2014	399 (17.4)	114 (5.9)	487 (25.0)	1,005 (51.7)	1,945 (100.0)
2015	442 (22.0)	146 (7.3)	489 (24.3)	932 (46.4)	2,009 (100)

Source: South Korea's Ministry of Employment and Labor of Korea

This finding is also confirmed from the data from South Korea's Ministry of Employment and Labor of Korea (MOEL). For nine consecutive years since the policy adoption, from 2006 to 2015, more than 50% of the subjects were found to be noncompliant with the policy as shown in Table 16. Moreover, among all the noncompliant workplaces, those that failed to meet the criterion of female manager employment consistently hold a majority. Thus, the remainder of this section examines underlying reasons why the policy had not had measurable effects on employment of female managers.

6.1. Not Only Rewards for Compliance but also Penalties for Non-compliance are Too Weak: it is as good as allowing workplaces to choose whether to comply with the policy.

Although South Korea's affirmative action is known to be largely modelled on that of the United States (Chang, 2004), there is a significant difference in their strategy to the enforcement of the policy: while the U.S. adopted a "less carrot, more stick" approach to make its affirmative action established, Korea is quite the opposite.

In the U.S., if a company is found to have violations at a considerable level after a compliance evaluation, Office of Federal Contract Compliance Programs (OFCCP) may impose heavy penalties: such firms possibly incur monetary remedies, or, at worst, lose their government contract; be banned from future contracting with any government agency for a certain period of time. As for positive reinforcement, on the other hand, involves positive publicity, which is much more minor than the penalties for non-compliance (Jacobsen, 2008).

On the contrary, South Korea mainly focuses on providing positive reinforcement for workplaces. It is because that the business community strongly demanded incentives to encourage

their voluntary compliance instead of penalties at the time of the policy introduction (Yoo, 2012). Thus, workplaces selected for their accomplishments in and contributions to equal employment opportunity[11] are awarded Prime Minister's commendation.

In addition, such workplaces will be given additional two points when screened for a commodity bidding by the Public Procurement Service or in the competitive bidding among SMEs by the Ministry of SMEs and Startups; exemption from preventive inspection for violation of labor-related laws; and priority in Ability Development Support Loan project from Human Resources Development Service of Korea.

With regard to workplaces found to be noncompliant, however, the government merely proclaims their name, address, total number and percentage of female workers as well as female managers, etc. on the website of MOEL for six months along with some disadvantages regarding biddings.

And therein lies one of primary reasons that Korea's affirmative action had been ineffective. From our discussion above, it seems clear that U.S.' sanctions for non-compliance with the affirmative action are so burdensome that the affirmative action is almost as good as compulsory for workplaces.

In contrast, Korea's incentives are too weak to induce workplaces' voluntary compliance (Choi, 2017; Yoo, 2012); not only are the benefits for complying with the policy not as attractive

[11] On the basis of the examination results of the affirmative action implementation report, the top 10% of the subjects are selected for the award.

as tax break[12], but disadvantages are also practically negligible. Consequently, it ended up being tantamount to allowing workplaces to choose whether to abide by the policy, thereby contributing to workplaces' low compliance with the policy.

6.2. The Lack of Social Consensus on the Necessity of the Affirmative Action

During the presidency of Moo-hyun Roh from 2003 to 2008, one of the major policy priorities was to resolve five major discriminations on the grounds of gender, disability, academic background, employment status (regular or irregular workers[13]), and national origin.

In this regard, the affirmative action was introduced as a main strategy specifically for countering gender discrimination. With regard to it, however, the government faced a harsh backlash from the public and firms: with the absence of social consensus that gender discrimination exists in labor market, the Korean society was not prepared to agree with the necessity of the policy. Moreover, the backlash was underpinned by the neoliberalism that has become predominant since the Korean financial crisis in 1997[14].

In response, in order to calm the resistance, the government chose to revise the rhetoric of the affirmative action rather than cultivating the social consensus on the existence of gender

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[12] According to Yoo (2012), tax break is the most powerful inducement to have workplaces comply with the affirmative action.

[13] Broadly, it refers to a worker who does not receive the fullest benefits afforded by Korea's labor laws, which could be anything ranging from a sub-contracted worker doing a one-off job to an office worker on a short, two-year contract. (*Source*: The Diplomat, retrieved from https://thediplomat.com/2015/11/number-of-irregular-workers-continue-to-rise-in-south-korea/)

[14] The Korean government agreed to deregulate and minimize its intervention on firms in return for the International Monetary Fund bailout package of $60 billion to halt the financial crisis in 1997.

discrimination or convincing the opponents of the institution's legitimacy and necessity (Yoo, 2012): as a rationale behind the introduction of the affirmative action, the government suggested that this policy measure will contribute to a sustainable growth of the nation in the long-term as well as firms through the expansion of women manpower utilization in the era of low growth and aging[15].

However, such economic benefits narrative has also not garnered support among the public and firms for a lack of relevant empirical evidence and logicality. One case in point is a government meeting, held in 2019, for men in their 20s. According to The Chosun Ilbo (2019), male participants of the meeting strongly criticized the government's plan to expand and strengthen the affirmative action to executive-level officials in the near future, arguing that its economic effects have yet to be concluded in academia.

Besides, amid the long-term unemployment crisis in Korea, it has rather adversely stigmatized the institution as preferential treatment for women (Choi, 2017). Accordingly, little social pressure and expectations to comply the program has been put on companies and hence, there has been less reason for firms to take into account the affirmative action.

[15] *Source*: AA-net, retrieved from https://www.aa-net.or.kr/introduce/relationLaw.asp

7. CONCLUSION

Utilizing the data collected from WPS from 2005 to 2015 by every other year, this research empirically evaluates the effectiveness of Korea's affirmative action. To identify the causal relationship between the policy and greater women representation in managerial occupations in Korea, this study basically follows the same logic as a difference-in-differences model, controlling for workplace-, industry-, and time-varying factors given variation in treatment timing between the two treated groups, caused by the policy criterion change in 2008.

In addition, considering variation in total number of workers over time at some workplaces, this study conducts various analyses ranging from intent-to-treat analysis to the other complementary subsample analyses, thereby securing robustness of the estimation results. It is because the variation result in a crucial problem that some of those workplaces swing between treatment and control groups, which may cause endogeneity issues.

The empirical results are mixed depending on analysis methods, measures of employment of female managers and whether additional confounders are controlled or not: some of them suggest the policy had increased employment of female managers while the others contradict the claim. These mixed findings clearly indicate that the affirmative action had been ineffective in increasing employment of female managers. In other words, most of the workplaces subject to the affirmative action had not been compliant with the policy.

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