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Essays on Female Employment and Labor Policies in South Korea

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ABSTRACT

Essays on Female Employment and Labor Policies in South Korea

By

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This dissertation examines how family-friendly policies impact labor outcomes in South Korea. South Korea has experienced a longstanding decline in marriage and fertility rates, which if unaddressed, could lead to an unsustainable loss of human capital. Moreover, Korea has had a low female labor force participation rate that ranged from 50% to 60% from 2008 to 2019. To address these issues, the South Korean government encouraged firms in Korea to adopt several family-friendly policies.

The first chapter on this topic, "The Female Turnover Effects of Family-Friendly Policies in South Korea," evaluates the effect of family-friendly policies (FFPs) on female turnover in South Korea. This paper investigates whether FFPs-certification-eligible companies significantly decrease voluntary female turnover. Using a Zero-Inflated Poisson regression, we find that FFPs-certification-eligible firms experienced a decrease in female turnover.

In the Second chapter, "How Does Family-Friendly Certified Firms Affect Female Employment in South Korea?", I consider a more comprehensive set of a firm's characteristics and labor outcomes and firm performance over a long-time period. This paper uses Korean Enterprise Data (KED) data from 2006 to 2019 to examine how firm performance and female employment have changed at companies that received certification for adopting FFPs. I employ difference-in-differences regressions to compare certified versus non-certified firms before and after introducing the certificate program. Our results suggest that receiving FFP certification increases female employment and firm performance.

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ACCEPTANCE

This dissertation was prepared under the direction of the candidate's Dissertation Committee. It has been approved and accepted by all members of that committee, and it has been accepted in partial fulfillment of the requirements for the degree of Doctor of Philosophy in Economics in the Andrew Young School of Policy Studies of Georgia State University.

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DEDICATION

To my father Sang Gab & mother Seung Bum

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INTRODUCTION

This dissertation examines how family friendly policies impact labor outcomes in South Korea. South Korea has experienced a longstanding decline in marriage and fertility rates, which if unaddressed, could lead to an unsustainable loss of human capital. Moreover, Korea has had a low female labor force participation rate that ranged from 50% to 60% from 2008 to 2019. To address these issues, the South Korean government encouraged firms in Korea to adopt several family-friendly policies.

The first chapter on this topic, "The Female Turnover Effects of Family-Friendly Policies in South Korea," evaluates the effect family-friendly policies (FFPs) on female turnover in South Korea. My study seeks to understand if these policies were actually effective by answering: What is the effect of Family-Friendly Policies on female voluntary turnover rate? To answer question, I estimate a Zero-Inflated Poisson (ZIP) model for the female voluntary turnover rate (since 23% of institutions in Korea Workforce Panel Survey (KWPS) have a turnover rate of zero). Despite the government's efforts to promote work-family balance, many firms were hesitant to adopt FFPs. We found that large sized firms, firms with a high percentage of female workers, and non-profit institutions had a higher likelihood of adopting FFPs. Using a ZIP regression, we find that large sized firms, firms with a relatively high percentage of female workers, and non-profit institutions have a higher likelihood of adopting FFPs. Non-female specific policies include providing childcare facilities and subsidizing childcare. While female specific policies lead to a significant turnover reduction, they are not as impactful as general FFPs like childcare support. Applying the general policies has a greater impact on reducing the female voluntary turnover rates. The Korean government has invested $25 billion per year to combat the demographic crisis issues. Specifically, the Ministry of Gender Equality and Family spent about $362 million dollars in 2019, which takes up 0.014% of Korean expenditures to subsidize the firms that obtained the certification. The resulting retention of female workers has led to 0.04% higher GDP per capita per year in Korea. It directly stimulates about $65 millions in total GDP per year. Thus, we expect that the family-friendly policies will provide work-family balance

in a way that may turn out helpful in meeting future economic challenges. My second chapter of my dissertation is, "How Does Family-Friendly Certified Firm affect the female employment rate?." I present the firsthand evidence on the effects associated with female workers and implementing the work-life balance policy for gender-equal employment. The participation rate of female workers in South Korea is prominently low, especially among OECD countries. To address these issues, in 2008, the Korean government's Ministry of Gender Equality and Family devised family-friendly certifications that encourage work life balance while providing incentives for companies that adopt them. Using firm-level panel data from Korea Enterprise Data (KED), I leverage variations across companies to estimate female employment and the organizational performance. I used a difference-in-differences (DID) strategy to compare trends in female employment rates with certified companies against the trends of non- certified companies. The results of the DID analyses indicate that family-friendly certified firms are positively associated with organizational performance and employment. Results from this paper will serve as evidence that family-friendly systems can contribute to the stabilization of female employees and increases company performance. The results suggest that FFPs have led to a 0.10% increase in the female employment. The female employment in our dataset are restricted to full-time workers, so the results may have bigger impact if we also include informal and part-time workers. The percentage of female employees who work part-time increased from 13.9% in 2000 to 22.3% in 2012 (ILO, 2019) in South Korea.

Chapter 1

The Female Turnover Effects of Family-Friendly Policies in South Korea

1.1 Introduction

Over the last 40 years, South Korea has had a radical decline in fertility and marriage rates as well as an unprecedented increase in the percentage of elderly people in the population. These three socioeconomic issues have caused a labor shortage and sluggish economic growth (Jung and Lee, 2019; Maestas, Mullen, and Powell, 2016). The United Nations (UN) estimate that South Korea's potential growth will go as low as one percent by 2030 due to its forecasted 7.5 million decline in the working-age population. The South Korean government has considered tapping into the ample supply of underutilized female labor force by reducing barriers to entry and eliminating discriminatory gaps, thereby reducing the opportunity cost of working and childbearing for women.

For several decades, South Korea has tried to increase the fertility rate in order to reverse population decline. The South Korean government has provided tens of billions of dollars in incentives for having children, ranging from free nurseries to subsidized pay during child-care leave. Unfortunately, temporary subsidies do not work because the sharply rising costs of living and raising children make it difficult to have kids without a double income and job security. In addition to subsidizing childcare, the South Korean government has also passed legislation to increase the number of women in the workforce, as only 50.9% of women are employed compared to 70% of men. Since early 2000 women have surpassed men in terms of university attainment rate - a 7 percentage point gap. The South Korean female labor force is skewed towards non-regular employment despite women's higher education levels (OECD, 2017).

The most significant reason for women withdrawing from work in Korea is maternity (KOSIS, 2018). As shown in Figure 1.1, shows the Korean female labor force participation rate has an M-shaped by age. The "M" refers to the pattern of participation rate over the course of a woman's life. Compared to both the USA and the OECD average, Korea has an apparent decline in the female labor force that occurs during childbearing years (ages 30-40): the percentage of women employed

rises significantly for women in their 20s but, due to marriage and/or childbirth, declines as women fall out of the workforce throughout their 40s. Also, shown in Figure 1.2, the Korean female labor participation rate starts to decline around women's late 20s and has a maximum difference (of around 30 percentage points) with the male labor participation rate during women's 30s. On the other hand, the male labor force participation rate has a hump shape.

Figure 1.1: Age Distribution of Female LFP in Korea, USA and OECD

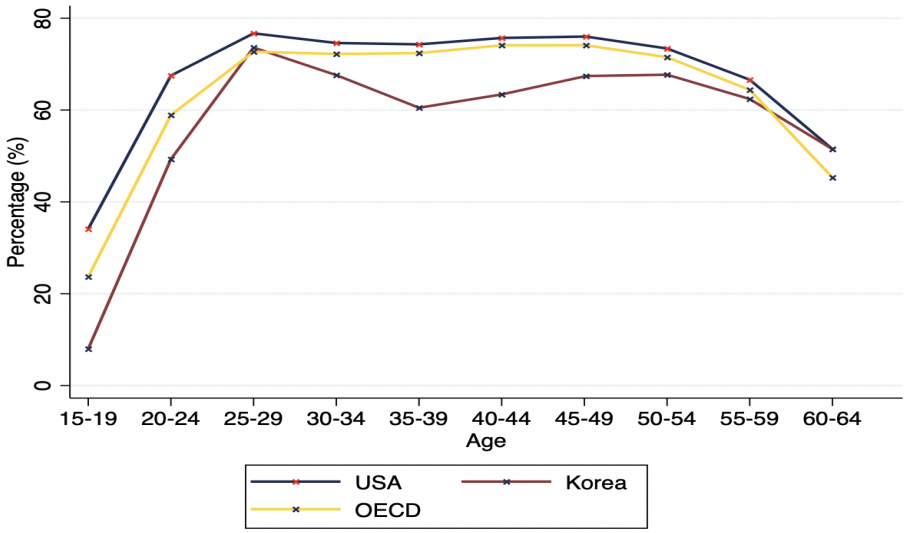
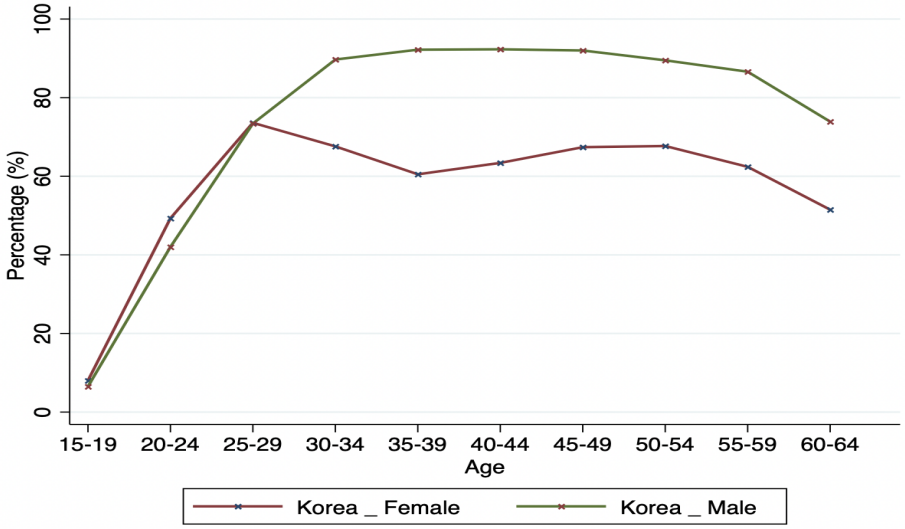


Figure 1.2: Labor Force Participation Rate of Male and Female in Korea



SOURCE: OECD database; https://stats.oecd.org

Nordic countries such as Denmark, Norway, and Sweden are good role models for boosting female labor force participation with higher fertility rates (Kinoshita and Guo, 2015). Nordic countries have more extended parental leave than OECD countries and have generous childcare coverage. It has led to the Nordic experienced that countries can have succeeded in maintaining a high rate of working women without decreasing the fertility rate. This evidence from the Nordic countries suggest that support for family-friendly policies for the female labor force around childbearing age may aid the Korean economy now and in the future.

In 2018, the Korean Statistics Information Services (KOSIS, 2018) estimated that 30.7% of female workers left from the labor force when they were married, whereas 38.2% left because of childbearing responsibilities. Indeed, the Korean Labor & Income Panel Study (KLIPs) reports that the most frequent reason females give for not participating in the labor market is "to take care of young children". The burden of child-care discourages women from entering and re-entering the labor market (Lee and Baek, 2014)[1].

In addition, the male-centered workplace and cultural expectations related to motherhood can pressure women to withdraw from the labor force (OECD, 2017). Consequently, many females who re-enter the workplace during or after childbearing tend to participate in short-term and part-time work rather than regular jobs (Kinoshita and Guo, 2015). Despite the increased effort in work-life balance policies and increased government expenditure on Family - Friendly policies (FFPs), the percentage of females who left the workforce to take care of their children increased from 14 percent in 2002 to 16 percent in 2010.

To cope with the chronic labor shortages, starting in 1980, the South Korean government devised several family-friendly policies (FFPs), or policies related to gender equality and families in the workplace to boost the female labor force participation and to accommodate work-life balance. In order to encourage firms to implement the FFPs in the workplace, the Korean government launched the Family-Friendly Certification program in 2008, which provides incentives for firms to adopt FFPs.

[1]More than half of the total female labor force in Korea is in low-paid, non-regular employment with a low chance of career progression(OECD (2016))

This study aims to evaluate the effects of the FFPs on female voluntary turnover. We use a Zero-Inflated Poisson (ZIP) regression to estimate the effect of the FFPs on voluntary female turnovers. We find that certification-eligible firms decrease in female turnover by 14% on average compared to other firms. Having at least one FFPs policy reduces female turnover by 22%, and the increasing number of FFPs has an inverse effect on female turnovers by 1.7%.

The rest of the paper is organized as follows. First, section 2 introduces literature review of FFPs on employee turnovers. Data and Descriptive Statistics for the study are documented in section 3. Econometric Analysis lays out the Logistic Model and Zero-Inflated Poisson models in section 4. Finally, we discuss the results and conclusions in the rest of the paper.

1.2 Literature Review

Interest in a family-friendly environment in Korea, sometimes called 'flexible-working environments' or 'work–life balance,' started by focusing on women's employment (*Ministry of Employment and Labor* 2019). Motivated by projected demographic declines in the school-leaver workforce in the 2000s, some Korean employers - public institutions in particular - started to think of ways of retaining valuable women workers. The focus gradually extended to encompass all workplaces, and a broader work–life balance agenda developed as the basis for considering the flexible environment in workplaces. Family-friendly policies mainly started from maternity or parental leave. The government has added additional policies such as career breaks, emergency leave, workplace nurseries, other help with child care, and the ability to change from full to part-time hours or work from or at home at least part of regular working hours. Employees at companies that have at least one family friendly policy report relatively higher job satisfaction than employees at other companies (74.4% vs. 56.2%). Those companies also show a higher employee labor productivity (64.6% vs. 43.6%) than other companies (KOSIS, 2019).

Work-life balance has been a popular research topic since the 1960s in developed countries (Gregory, Milner, et al., 2009). Family-friendly policies have helped employees manage the balance between work and family obligations (Lobel, 1999). There are different economic theories which

explain why a firm might choose to adopt Family Friendly Policies (Drago and Hyatt, 2003). According to institutional theory, a firm will involuntarily implement FFPs out of social pressure. In contrast, under rational choice theory, a firm will willingly adopt the policies out of an expectation of economic profits (Den Dulk, 2005; Yoo and Kim, 2006). The firms that follow rational choice theory consider adopting policies as one source of benefits instead of expenses (Den Dulk, 2005). The job matching model, usually associated with efficiency wage theory, and psychological contract theory also aligns with a resource-based view of implementing FFPs; this stems from a rational choice to hire and retain high skilled employees and ultimately strengthen competitiveness (Heiland and MacPherson, 2005; Perry-Smith and Blum, 2000; Rousseau, 1995). In addition, special benefits from FFPs inspire organizational commitment and loyalty among employees. The special benefits lead to improved labor productivity and a reduction in turnover-related costs (Yanadori and Kato, 2009). Indeed, several studies show that the provision of FFPs is positively related to organizational performance (Eaton, 2003; Lee and Kim, 2010; Ngo, Foley, and Loi, 2009; Perry-Smith and Blum, 2000). The implementation of FFPs is a good indicator of organizational support (Wang and Walumbwa, 2007). Kang (2013) and Halpern (2005) find evidence that FFPs raise job satisfaction in the private sector and have increased organizational commitment.

As for why firms might choose to forgo the FFPs, some studies find a negative relationship between FFPs and firm economic profits. Inequality problems arise when some employees are not eligible for benefits, and some workers may leave their jobs after taking advantage of the policies (Bloom and Van Reenen, 2006; Heiland and MacPherson, 2005; Konrad and Mangel, 2000; Clifton and Shepard, 2004). If this occurs, then firms will view FFPs as a burden that impose additional costs. FFPs are not universal, and this may be at least part of the reason for the underutilization of FFPs among firms (Veiga, Baldridge, and Eddleston, 2004). Underutilization of FFPs influences employee's utilization of these programs.

To encourage usage of these programs, the Korean government developed its program to certify family-friendly workplaces (Kim and Faerman, 2013). Certified firms enjoy benefits from the government such as fiscal transfers of cash benefits through tax breaks. However, FFPs are still

underutilized in small-to-medium enterprises (SMEs). The purpose of the certification system is to retain female employees and to raise labor force participation. An increase in highly qualified women is presumed to improve productivity gains and foster economic growth (Esping-Andersen and Myles, 2009; Luci, 2009). Once the policies become commonplace, they should directly and indirectly, through a series of spillover effects, work towards that goal. First, the companies can expect to improve their value for the public. They have a greater probability to hire high-skilled employees, thereby reducing absenteeism and turnover rates, and increasing employees' motivation and productivity overall (Chung, 2018). From the employee's side, life quality increases many-fold. They enjoy better satisfaction from work and no longer hesitate to start a family out of fear that doing so will threaten their job. Moreover, the reduced stress levels lead to better work-life balance. Society itself will gradually improve as a work-life balanced culture becomes the new norm, strengthening the national competitiveness in the long-run (Chung and Lippe, 2020).

Few empirical studies investigate the link between family-friendly programs and turnover rates in Korea. Most of these studies show mixed and inconclusive results. One reason for the divergence in empirical results lies in the long-standing unobserved differences between firms. Bae and Goodman, 2014 found that the FFPs do not reduce the turnover rate in public institutions, but Lee and Hong (2011) found there is an inverse relationship between one particular policy – childcare subsidies – and the turnover rate. Bae and Goodman (2014) estimated the relationship between FFPs and the turnover rate only in public institutions. This study focused solely on the effects of individual family-friendly practices on the overall turnover rate by conducting a fixed-effects analysis. They did not show how female-friendly policies collectively affect the voluntary turnover rate at the firm level, which is precisely the purpose of our study. We extend the workplace from public institutions to also include private companies, such as large and small-medium sized firms (SMEs). Including SMEs in our research is meaningful because SMEs make up approximately 99.9% of firms in Korea (*Kosme* 2020). Moreover, 88% of employees are working in SMEs (*Kosme* 2020). Lee and Hong (2011) found an inverse relationship between the child care subsidies and the turnover rate. Our

study also covers the relationship between the overall FFPs (i.e., pregnancy, childcare, flexible working hours, and parental leave) and the turnovers along with the intensive and extensive margins.

1.3 Data and Descriptive Statistics

The data used in this paper come from the Korea Labor Institute's Korea Workplace Panel Survey (KWPS), which contains information on Korean firms' characteristics. The KWPS is a nationally representative sample of establishments in the South Korea by the Korea Labor Institute (KLI). The KWPS is well suited for this study since it has variables that allow for voluntary turnovers. Moreover, the data has a series of family-friendly variables, such as how many firms adopt each family-friendly policy and how these firms implemented those policies. The survey data was collected by conducting interviews with the human resource managers and employee representatives from each organization. Survey questions asked about workplace demographics, organizational finances and various policies and practices in place during the survey year.

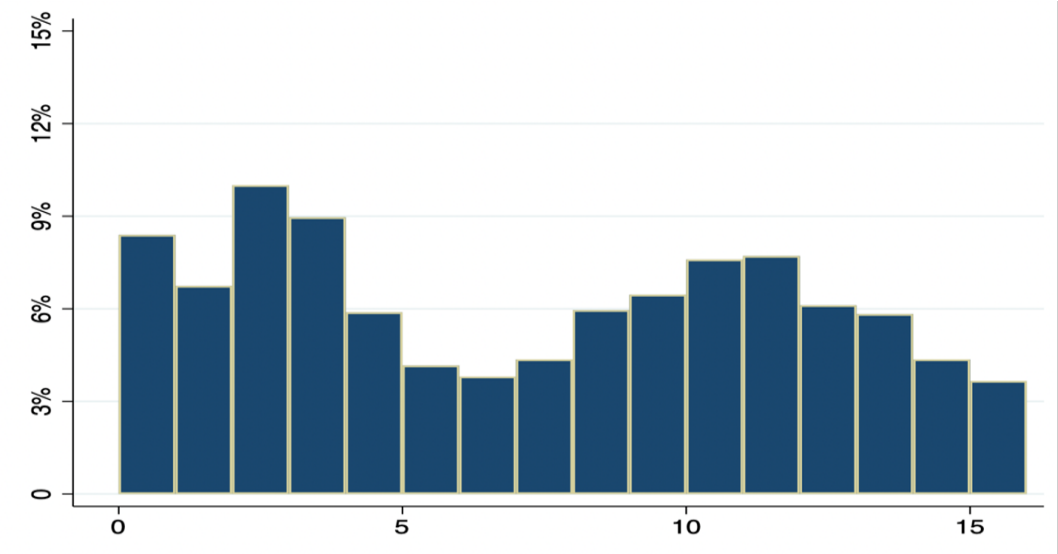
KWPS surveyed the same sample of firms every two years from 2005 to 2017. Our analysis only considers data from 2007 to 2013 because one of our main outcome variables (voluntary turnovers) is not available in the years 2005, 2015, and 2017. Our data includes companies with a size of 30 or more employees from both the private and public sectors nationwide. There were a 1,735 respondents (firms) in 2007, 1,737, 1,770, and 1,775 respectively in each survey year. In the integrated dataset of the four-year KWPS sample, the number of observations comprise 7,017 firms in all industries except agriculture, forestry, fishery, and mining sectors. Of the firms in our dataset, 87% are private firms (6,139) and 6.8% (477) are public institutions, 41.63% (6,330) are in the Manufacturing industries, 23% (426) are in the Service industries, and 21% (568) are in the Public sector. Almost 50% of companies are located in Seoul.

Table 1.1 presents the summary statistics for the sample. The female turnovers is measured as the number of female employees who voluntarily resigned per surveyed establishment. The mean female voluntarily turnover is 5.72. The minimum value of the female voluntarily turnover is zero, which takes up 33% of our sample. $FFPs_t$ refers to the number of policies that are adopted by

Table 1.1: Summary Statistics

Variable	Min	Max	Mean	SD
Female turnover	0	222.5	5.72	17.65
FFPst (current year)	0	16	6.84	4.66
FFPst-1(lag one year)	0	16	6.64	4.60
All sixteen policies	0	1	0.036	0.187
Total Employment	30	15,800	383.2	885.6
Male turnover	0	625	10.85	19.72
% of female	0	100	28.99	23.75
% of male	0	100	71.00	23.75
% of professional	0	96.42	13.59	9.37
Age of the Establishment	1	129	25.26	16.73
Observations	7,107			

Figure 1.3: The Distribution of FFPs



the firm. The male turnovers is the same way as the female turnovers. The mean male voluntarily turnover is 10.85. The rate of male turnovers (10.85 vs 5.72) may be higher due to the higher percentage of male workers. The percentage of the male workers is higher (71%) than the percentage of female workers (28.99%).

Figure 1.3 shows the distribution of the number of family-friendly policies adopted by firms in the sample. In our data, 589 companies (8.39%) have no policy adoption during the sample period. The distribution takes something of a "U" shape. Roughly 9% of firms adopt just three policies. That percentage falls as the number of policies increases to six, but then rises again to 7-8% when the number of policies increase to 12. That percentage then falls once more until the maximum

number of policies, 16 is reached. 5 to 10 policies may be the break-even point of firms for many firms (especially for Small-Medium-sized firms). Firms have 6.84 policies on average. The variable "All sixteen policies" is equivalent to one if a firm had adopted all sixteen policies and is equal to zero otherwise. In our sample, 3.6 percent of companies (257 firms) have all sixteen policies. In addition, 91.61 percent of companies (6,428) adopt at least one FFPs policy in our sample [2].

Two analytical models are used in this paper. The first model is formulated to identify the factors that induced Korean firms to adopt FFPs. The second model is testing whether the FFPs adopting firms contributed to their female workforce retention. For the two models, dependent variables comprise the incidence of FFPs and female voluntarily turnover. These dependent variables are measured in the following ways: (1) Incidence of FFPs : whether or not surveyed establishments adopted all sixteen Family-Friendly Policies (the number of required to earn the certification), adopted at least one Family-Friendly Policy, adopted the number of Family-Friendly Policies, and (2) Female voluntarily turnover : The number of female voluntarily turnover in surveyed establishments. Incidence of FFPs is examined as a dummy variable (yes = 1, no = 0) through a binary logistic regression model. In addition to, it is estimated as another dummy variable. The binary variable is equal to one if the firm adopts at least one policy and is zero otherwise. Lastly, it is estimate the number of Family-Friendly Policies by using OLS [3]. The female voluntary turnover, of which 33% of firms have a value of zero, is tested by the Zero-inflated Poisson model designed for regression analysis of counts excess zeros with data.

One of the main independent variables in our estimation of the female voluntary turnover is the Family-Friendly Policy, which counts the number of policies adopted by the firm. As there are sixteen policies available, the index can range from one to 16. To estimate the effect of certification-eligible firms on female turnover, we use the binary independent variable (All sixteen policies) which is equal to 1 if the firms adopt all sixteen policies and otherwise zero. Another main

[2]In order to be eligible for certification, firms must implement sixteen policies: See the appendix table A1 & A2 for a description of these policies

[3]To examine which firms adopt policies, we employ a series of variables related to firm characteristics. These include the type of organization (public institution, private company), history of changing nature of business (for-profit, non-profit, or no history of change), and management system (ownership, professional manager, none of the above)

independent variable is a binary variable which is equivalent to one when a firm has at least one Family-Friendly Policy adoption and is zero otherwise (extensive margin). In addition, we examine the effect of increase the number of FFPs on female turnovers (intensive margin).

To estimate the effect of a single policy's gender specificity on the female voluntary turnovers, we split the policies into those only applicable for female employees – "Female Specific [4]"– and those for all employees – "Non-Female Specific [5]". The first group is called "Female-Specific-Subgroup". The second group is called "Non-Female-Specific-S ubgroup".

The subgroup analysis is intended to estimate the effectiveness of a gender specificity. The female voluntarily turnovers may be more (or possibly less) responsive to policies specifically targeted towards women (Kim & Ko, 2001; Bae & goodman, 2014 Kang, 2002), not only applicable for female policies. The Female Specific counts the number of policies adopted by firms that are only applicable to females such as guaranteed breastfeeding breaks or miscarriage and stillbirth leave, etc., and ranges from 0 to 13. The Non-Female Specific counts the number of policies adopted by firms that are not specific to women, such as paternity leave, workplace childcare facilities, and support for childcare costs, and ranges from 0 to 3. We employ a number of controls, including: the age of the establishment (Lee and Kim, 2010; Perry-Smith and Blum, 2000), the total employment (Davis and Kalleberg, 2006; Den Dulk, 2005; Lee and Kim, 2010), the percentage of female employees (Davis and Kalleberg, 2006; Den Dulk, 2005; Konrad and Mangel, 2000), the percentage of professional employees (Konrad and Mangel, 2000; Lee and Kim, 2010), and the male voluntary turnovers.

To understand what the firms in the data look like before the start of the certification program - which can be understood as our policy intervention - Table 1.2 shows characteristics of the firms in both the treatment and control groups in 2007, which is the year before the start of the certification program. Firms in the treatment group have adopted all sixteen policies at least once during the

[4]"Female-Specific-Subgroup" that contains Maternity leave, Guaranteed breastfeeding breaks, Breastfeeding facility, Restriction of night work, Holiday work, overtime work, for pregnant women, and Provision of alternative work duties for pregnant women, Restriction of hazardous work for women with in one year after birth, Leaves for regular doctor visits during pregnancy, Infertility leave, and Miscarriage and stillbirth leave, Monthly sickness leaves

[5]"Non-Female-Specific Subgroup" that contains paternity leave, workplace childcare facilities, support for childcare cost

Table 1.2: Summary Statistics by Pre-treatment (Full 16 FFPs adopts) and Pre-control (less than 16 FFPs adopts) Characteristics in 2007

	Control group	Treatment group		
Variable	Mean	Mean All(16) policies	Mean 15 policies	Mean Any policies
Female turnover	6.975	4.014	4.354	6.688
Male turnover	11.704	5.523	5.326	8.762
Total Employment	397.2	1005.8	1138.29	1897.4
% of female	28.861	31.187	32.643	23.56
% of professional	5.007	10.061	10.981	20.223
Age of the Establishment	22.273	27.294	25.842	16.33
Type of Organization				
Public Institution	0.120	0.096	0.096	0.294
Private Company	0.754	0.786	0.786	0.410
Change direction of business				
For profit	0.221	0.217	0.217	0.414
For non-profit	0.262	0.250	0.250	0.435
No change	0.508	0.524	0.524	0.501
Management System				
Ownership	0.407	0.423	0.422	0.203
Professional manager	0.221	0.217	0.218	0.413

survey period of our data and are, therefore, eligible to apply for certification. In addition, to understand what firms in the treatment group look like, the treatment group has sorted out the three different ways. First, firms adopt all sixteen numbers of FFPs. Second, firms adopt fifteen numbers of FFPs. Third, firms adopt at least one FFPs during the survey years. The companies in the control group have never adopted all sixteen policies during the survey of our data and are, therefore, ineligible to apply for certification. Firms in the treatment group have lower rates of female (4.014 vs. 6.975) and male (5.52 vs. 11.70) voluntary turnover than firms in the control group. The fifteen policies adopted firms (4.354 vs. 6.975) and any type of policies adopted firm (6.688 vs. 6.975) have lower rates of female voluntary turnovers than firms in the control group. In terms of firm size, or the number of employees, the treatment group consists of larger firms than the control group (413.6 vs. 489.9). The treatment group also has more private companies than the control group. In summary, prior to the start of the certification program, firms in the treatment group (all different types of firms in the treatment group) have lower turnovers, and are more likely to be private companies than firms in the control group. In 2007, about 50 percent of firms in both the treatment and control groups did not change their business direction. Twenty percent of firms in both group changed their business from non-profit to for-profit and vice versa.

Table 1.3: Summary Statistics by Subgroups

Female Specific Subgroup			Non-Female Specific Subgroup	
Variable	Mean	SD	Mean	SD
Female turnover	5.63	10.54	5.12	11.26
Male turnover	9.86	16.00	12.90	27.90
Total Employment	363.2	866.2	245.2	659.1
% of female	30.23	24.51	25.34	23.01
% of professional	6.05	14.33	2.78	9.37
Age of the Establishment	25.41	16.32	24.46	16.44
Observations	5,757		1,245	

Table 1.3 shows the summary statistics by sub-sample. Reading from left to right, the first group refers to firms with policies captured by the female-specific, while the second group refers to firms with policies captured by the non-female specific. The first group has larger firms (average total employment is 363.189) than the second group (average total employment is 234.2). This makes sense, as larger organizations tend to have more financial resources and greater human-resource related experiences, enabling them to offer more gender specific family-friendly programs than small-sized companies (Lee and Kim, 2010). The first group also has a higher percentage of female employees (30.23% vs 25.34%), more professional workers, and a higher average for years of operation.

1.4 Econometric Analysis

This paper examines two questions: (1) Which firms adopt FFPs and why? (2) What is the effect of FFPs on female voluntary turnovers? To answer the first question, this study estimates a Logistic Model (LM) wherein the binary dependent variable indicates whether a firm earned certification-eligible and the independent variables are firm characteristics. In addition, we examine a Logistic Model (LM) with a binary variable that is equal to one where the firm has at least one FFPs adoption and is zero otherwise. By using OLS, we estimate firms' characteristics on the number of FFPs.

To address the main research question, this paper estimates a Zero-Inflated Poisson (ZIP) model. The main outcome variable in this paper includes 33% zeros with over-disperse. There are two types of firms ("Always Zero group" and "Not Always Zero group or Sometimes Zero group") that generate excess zero generated by two processes. These two types will look identical in the response

variable, but they have arrived at the same outcome through two different processes. "Always Zero group" is firms that have zero turnovers during all survey years because employees are willing to retain at the firm regardless of illness or desire to quit (for example, she is the one source of the household income). So, for those firms, voluntary turnovers never happen. In our data, 1,852 (26.39 %) companies have zero female voluntary turnovers during all survey years. "Not Always Zero group (or Sometimes Zero group)" is a firm that might have zero turnovers during some survey years if all employees retain. In our data, 932 (13.28%) firms report having zero voluntary turnovers in at least one survey year. Thus, the number of zeros may be inflated by two different approaches.

1.4.1 The Determinant of Family-Friendly Policy (FFPs) Adoption

We study the firm characteristics that are correlated with increased FFPs, to see why firms would want to implement FFPs in the first place, by utilizing the Logistic regression. Different firm characteristics may affect the propensity to adopt such practices, either because FFPs are in higher demand or cheaper to provide in firms with specific characteristics. The Logistic regression is well suited for problems when the dependent variable is binary. The Logistic model can be estimated through maximum likelihood estimation using numerical methods.

Bloom, Kretschmer, and Van Reenen (2011) suggested that their linear regression model could identify factors, regardless of firm performance, that cause FFPs to be adopted since (1) firms may take other factors into account such as employee well-being or corporate social responsibility, and (2) firm characteristics or circumstances may dictate the implementation of FFPs. Our framework is similar to Bloom, Kretschmer, and Van Reenen (2011) and improves upon it by providing more information about why firms provide FFPs. The dependent variable P_{it} in our logistic regression model indicates whether a firm is certification-eligible $P_{it} = 1$ or does not $P_{it} = 0$

$$Pr[P_{it} = 1|x] = \frac{exp(x_i^{'}\beta)}{1 + exp(x_i^{'}\beta)} = \Gamma(x_i^{'}\beta) \tag{1.1}$$

The logistic distribution function transforms the regression into the interval (0,1). Further defining the logit(x) as

$$logit(x) = log(\frac{x}{1-x}) \tag{1.2}$$

Equation (3) is equivalent to

$$logit[Pr(P_{it} = 1|x)] = \alpha_0 + \beta X_{it} + \epsilon_{it} \tag{1.3}$$

Where P_{it}, which equals one if a firm adopts sixteen programs so that they can become certification-eligible firms, and zero otherwise. In other words, $P_{it} = 1$ when $FFPs_{it}$ is adopting all sixteen policies and $P_{it} = 0$ when $FFPs_{it}$ is equal to zero.

In addition,

$$logit[Pr(F_{it} = 1|x)] = \alpha_0 + \beta X_{it} + \epsilon_{it} \tag{1.4}$$

Where F_{it} is equivalent to one if a firm adopts at least one FFP policies (i.e., $FFPs_{it}$ is greater than equal to one) and zero otherwise. X_{it} represents the firm's characteristics including: firm size, age of establishment, percentage of female workers, percentage of professional workers, percentage of general managers, percentage of fixed-time workers and percentage of part-time workers. The set of parameters β reflects the impact of changes in x on the probability a firm adopts FFPs. For example, we could use β to estimate the marginal effect of firm size on the probability of adopting FFPs. ϵ_{it} is assumed to distribute according to the logistic density.

Family obligations are more often fulfilled by women (Shelton and John, 1996; Parasuraman and Greenhaus, 1999; Abbott, De Cieri, and Iverson, 1998; Borrill and Kidd, 1994; Judge, Boudreau, and Bretz, 1994; Konrad and Mangel, 2000), and so institutions that adopt FFPs are affected by the proportion of female employees likely to take them up when offered. We assume that the percentage of female employees affects the provision of FFPs. Regardless of the overall proportion of female employees, a higher percentage of female professionals is associated with a higher likelihood of FFP adoption (Goodstein, 1994; Goodstein, 1995; Ingram and Simons, 1995). We expect female professionals to be positively associated FFP adoption, not only because they are likely to be

considered 'important' employees by top management, but also because they are more likely to overcome resistance by top management to implement these practices. Our model includes the firm size measured by the total employment and the age of establishment. Furthermore, we include the type of organization (public institution, private company), history of changing nature of business (for-profit, non-profit, or no history of change), management system (ownership, owner-centric professional manager, and none of above), and location (Seoul).

1.4.2 The Effect of FFPs on Turnover

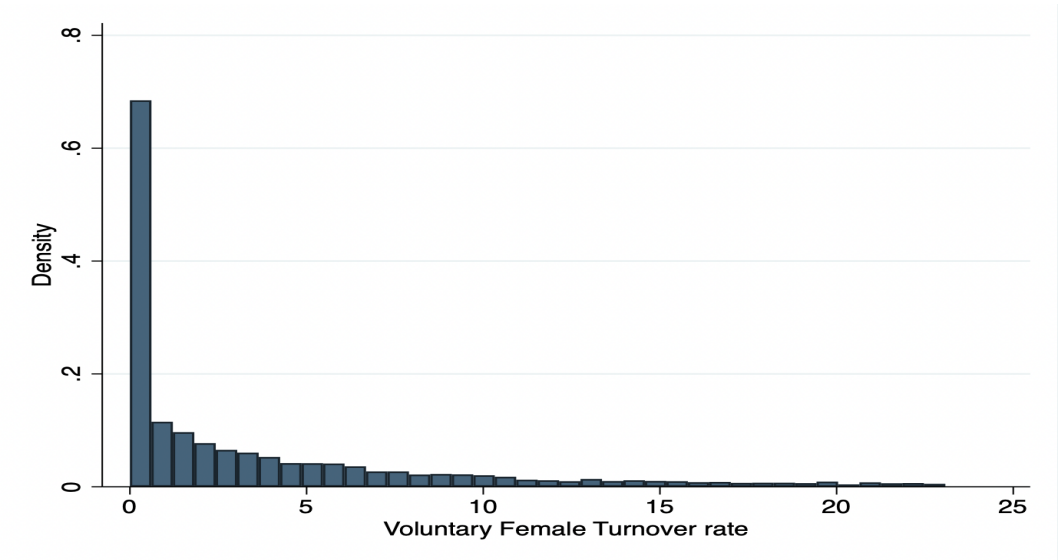
To estimate the effect of FFPs on turnover, we use a model for count data. Count data models are used when the variables of interest only have non-negative integers (Blundell, Griffith, and Reenen, 1995). The histogram presented below (Figure 1.4) shows that our main dependent variable distribution contains both an excess number of zero counts (33% of the sample) and a left-skewed series of relatively high-count values, which suggests that the dependent count variable has a high degree of overdispersion. Indeed, the standard deviation of voluntary female turnover, which is 17.65, is significantly larger than the variable mean, which is 5.72. Because our data has overdispersion with excess zero in the dependent variable, we employ the Zero-Inflated Poisson model in our analysis.

The Zero-Inflated Poisson model accounts for overdispersion by assuming that there are two different types of individuals in the data: [1] Those who have a zero count with a probability of 1 (Always Zero group), and [2] those who have counts predicted by the standard Poisson distribution (Not Always Zero group or Sometimes zero group).

Membership in the always zero group is a binary outcome variable that can be predicted by a Logit model. The probability π_{it} that observation i is in "Always Zero Group" can be written as:

$$\pi_{it} = F(x_i^{'}\beta) \tag{1.5}$$

Figure 1.4: The Distribution of Female Voluntary Turnovers



Where x_i is the vector of covariates and β is the vector of coefficients for Logit regression. The probability that observation i is a member of the "Not Always Zero" group becomes 1-π_{it} and their positive count outcome is predicted by the standard Poisson model.

$$Pr[y_{it}|x_{it}] = \frac{\mu_{it}^{y_{it}} exp(-\mu_{it})}{y_{it}!} \tag{1.6}$$

Where μ_{it} is the conditional mean.

A zero could be observed from either group, and if the zero comes from the "Always Zero Group" it indicates that the observation is free from the probability of having a positive outcome (Long and Long, 1997). The overall ZIP model is a mixture of probabilities from the two groups, which allows for both the over-dispersion and excess zeroes that cannot be predicted by the standard Poisson model. The probability mass function of a Zero-Inflated Poisson random variable is shown in Equation (7).

$$Pr[Y_{it} = y_{it}|x_{it}] = \begin{cases} \pi_{it}(x_{it}) + (1 - \pi_{it}(x_{it}))exp(-\mu_{it}) & \text{if } Y_{it} = 0 \\ (1 - \pi_{it}(x_{it}))\frac{\mu_{it}^{y_{it}} exp(-\mu_{it})}{y_{it}!} & \text{if } Y_{it} > 0 \end{cases} \tag{1.7}$$

$$E(y_{it}|x_{it}) = [0 \times \pi_{it}] + [\mu_{it} \times (1 - \mu_{it})] = \mu_{it}(1 - \pi_{it}) \tag{1.8}$$

$$V(y_{it}|x_{it}) = \mu_{it}(1 - \pi_{it})(1 + \mu_{it}\pi_{it}) \tag{1.9}$$

Since $0 \leq \pi_{it} \leq 1$, the mean of the ZIP is smaller than μ_{it}. This indicates that the ZIP model has a different mean structure than that of the standard of Poisson model (Erdman, Jackson, Sinko, et al., 2008). Since $V(y_{it}|x_{it}) \geq E(y_{it}|x_{it})$, we know that the ZIP model addresses over-dispersion. In Equation (7) Y_{it} denotes the voluntary female turnovers at each firm i at time t. π_{it} can be interpreted as the additional probability of observing zero, and μ_{it} represents the expected value of the Poisson component (i.e., the expected voluntary turnover count when there is no additional probability of observing zero voluntary turnovers).

The regression specification for the Zero-Inflated Poisson regression is given by equation (10) where π_{it} is the probability that the number

$$\mu_{it} = exp(\alpha + \beta_1 FFPs_{it} + x_{it}\beta_2^{'} + \eta_i + \rho_i + \tau_t + \epsilon_{it}) \tag{1.10}$$

of events has a Poisson distribution and x_{it} is the vector of control covariates, including total employment, the age of establishment, the percentage of female worker, the percentage of professional workers, the male voluntary turnovers, for firm i at time t. ($FFPs_{it}$) is the number of Family-Friendly Policies Index at time t. β_1 is the key coefficient to show the extensive margin on the female voluntary turnovers. η_i is the regional fixed effect, $\rho_i$is firm fixed effect, τ_t is the year fixed effect, and ϵ_{it} is the idiosyncratic error.

We use the regional fixed effect because about 50% of companies are located in Seoul and next 30% of firms are located in East south of Korea. The firms are located very unevenly by region. We incorporated the firm fixed effect to capture the variation within each firm. The inclusion of the firm fixed effect can be used to remove the unobserved heterogeneity within each firm and may allow us to remove potential omitted variable biases introduced by such unobserved heterogeneity in firm

level data.(Graham, Li, and Qui 2012; Coles and Li 2011a) Also, Gormley and Matsa, 2014 found that only the fixed effects approach yields consistent estimates in the presence of unobserved group heterogeneity while the other widely used approaches yield inconsistent estimates.

Our main independent variable of interest in decomposing the effect into the part due to firms starting to adopt (called *extensive margin*), and the part attributable to already adopting firms (called *intensive margin*). The participation effect drives the extensive margin, the change in the probability to participate. The intensive margin is driven by the conditional positive effect, the change in the effect given participation.

To estimate extensive margin of the family friendly polices on female turnovers, the main independent variable $FFPs_{it}$ is replaced a binary variable. $FFPs_{it}$ is equal to one if firms start to adopt at least one FFPs, otherwise $FFPs_{it}$ is zero. Extensive margin refers to participation effect (Winkelmann, 2015; Staub, 2014).

$$\mu_{it} = exp(\alpha + \beta_1 I(FFPs_{it} > 0) + x_{it}\beta_2^{'} + \eta_i + \rho_i + \tau_t + \epsilon_{it}) \tag{1.11}$$

where I($FFPs_{it} > 0$) is the Family-Friendly Policies Index at time t and it is equal to 1 if the firms adopts at least one policies and zero otherwise (Participation effect).

To estimate intensive margin of family friendly policies on female turnovers, the main independent variable refers to the number of family friendly policy adopted. Intensive margin refers to the effect of a policy on the mean conditional on the count being positive (Winkelmann, 2015; Staub, 2014).

$$\mu_{it} = exp(\alpha + \beta_1 FFPs_t + x_{it}\beta_2^{'} + \eta_i + \rho_i + \tau_t + \epsilon_{it}) \tag{1.12}$$

where $FFPs_t$ is the number of family-friendly policy adopted after participation into adopting policies. β_1 is the key coefficient to show the intensive margin on the female voluntary turnovers. In equation (11) and (12), the control variables are same with the equation (10).

In addition, to estimate the effect of a single policy's gender specificity on female voluntary turnovers, we separate the policies into ones only applicable for female employees – "Female-Specific "– and ones for all employees – "Non-Female Specific" – as an independent variable. Here $FFPs^j$ is a Female-Specific when $j = F$, and Non-Female Specific when $j = N$.

$$\mu_{it} = exp(\alpha + \beta_1 FFPs_t^j + x_{it}\beta_2^{'} + \eta_i + \rho_i + \tau_t + \epsilon_{it}) \tag{1.13}$$

1.4.3 Some Econometric Issues

Estimation of policy effects in count data models require exogenous policy variation, i.e. Policies are randomly assigned (Winkelmann, 2015). Our study may violate this requirement since participants (firms) may self-select into the policy "treatment" group in a non-random manner. Windmeijer and Santos Silva (1997) suggest that the problem can be solved by using multiple regression and a count model that includes all variables that might determine whether a firm gets "treated" and thus affected by the policy intervention. We investigate which firm characteristics are the greatest determinants of policy adoption, we utilize a Logistic Model (LM) with a binary dependent variable that equals one when at least one family-friendly policies are adopted and is zero otherwise. Then, to alleviate the potential self-selection issues within our study, we use the variables from our logistic model that are "statistically significant" as control variables for analyzing the effect of FFPs on female turnover.

In our study, a potential endogeneity problem could arise if both the number of firms adopting family-friendly policies and the voluntary female turnovers are determined simultaneously. For example, high FFP adoption could cause reduced voluntary turnovers, but on the other hand, high voluntary turnovers could cause higher FFP adoption. A common approach to deal with this reverse causality endogeneity problem is to use lagged independent variables (Booth, Rioseco, and Crawford, 2014; Green, Malpezzi, and Mayo, 2005; MacKay and Phillips, 2005; Baccini and Urpelainen, 2014). Thus, we chose to incorporate lagged values of our endogenous explanatory variable $FFPs_{t-1}$. Since the current female voluntary turnovers (Y_t) cannot possibly be causal to the past

period of FFP adoption ($FFPs_{t-1}$), replacing $FFPs_t$ with $FFPs_{t-1}$ could help alleviate concerns about the simultaneity problem since the lagged independent variable can estimate exogenous variation (MacKay and Phillips, 2005; Reed, 2015). This lagged variable allows for a potential delay between an employer's adoption of FFPs and a female employee's voluntary turnover decision. In other words, it could take a while for a policy to begin having a meaningful impact on the female employee's decision-making process.

1.5 Results

1.5.1 Main Results

In Table 1.4 we show how several firm characteristics correlate with FFP adoption. In all three columns, We see that firm size has a positive association with the provision of FFPs. We also see that the percentage of female workers and professional workers have a positive association with FFPs. A higher percentage of female workers may increase demand for favorable FFPs at a given workplace (Konrad and Mangel, 2000). Age of establishment also has a positive association with FFPs. Private companies have a negative association with FFPs. This is in line with the results in which show that businesses that change from non-profit to for-profit have a negative association with FFPs.

These results also suggest that, in order to be consistent with their goals, companies that pursue public interests or which are public institutions may choose to provide more FFPs. Also, there was increased government pressure on public institutions to adopt FFPs early in order to see if FFPs were effective. This table shows the effect of firm location of the adoption of FFPs. In the KWPS data set, 52.78% of companies are located in Seoul, despite Seoul only taking up a small fraction of the total area of South Korea. The firms located in Seoul have a positive association with FFPs.

Table 1.5 shows that the effects of FFPs on turnovers. The first row shows that the certified-eligible firm's effect on the female turnovers. In addition, the female voluntary turnovers along the extensive and intensive margins in response to having FFPs. We examine having at least one policy firm's effect on the female turnovers at an extensive margin. At the intensive margin (i.e., the

Table 1.4: Firm Characteristics by FFP Adoption in 2007

VARIABLES	Full adoption (LM)	Any adoption (LM)	Number of adoptions (OLS)
Firm size	0.0002***	0.0018***	0.0007***
	(0.000)	(0.001)	(0.000)
% of female workers	-0.0018	0.0210***	0.0205***
	(0.008)	(0.006)	(0.005)
% of professional workers	0.0180*	0.0475**	0.0403***
	(0.010)	(0.023)	(0.009)
% of General Managers	0.2097	0.0545	0.1885**
	(0.199)	(0.093)	(0.092)
% of Fixed-time contractors	-0.0110	-0.0107	0.0074
	(0.018)	(0.013)	(0.011)
% of Part – Time workers	-0.0144	-0.0225	-0.0219
	(0.042)	(0.020)	(0.023)
Age of the Establishment	0.0066	-0.0024	0.0013
	(0.008)	(0.007)	(0.007)
Public institution	0.1290**	0.3281**	0.1073***
	(0.560)	(0.524)	(0.406)
Private company	-0.9278**	-0.1823***	-0.7851***
	(0.436)	(0.322)	(0.273)
For profit	-0.9306*	-0.3158***	-0.4394***
	(0.522)	(0.474)	(0.355)
Non-Profit	0.6183***	0.7846*	0.9581***
	(0.444)	(0.401)	(0.342)
Seoul	0.0238	0.1959	0.5720**
	(0.311)	(0.221)	(0.223)
Observations	1,735	1,735	1,735

Standard errors are in parenthesis
*** p<0.01, ** p<0.05, * p<0.1

Note: The first and second columns are estimated by Logistic Model. The third column is estimated by OLS

Table 1.5: The Effect of FFPs on Turnovers

Dep.Var	Female Voluntary Turnovers			
	(1)	(2)	(3)	(4)
Certified eligible	-0.1435***	-0.0698**	-0.1324***	-0.0865***
	(0.033)	(0.029)	(0.033)	(0.029)
Observations	7,002	7,001	7,002	7,001
Extensive Margin	-0.2212***	-0.1594***	-0.2193***	–0.1548***
	(0.020)	(0.020)	(0.020)	(0.020)
Observations	7,002	7,001	7,002	7,001
Intensive Margin	-0.0171***	-0.0018**	-0.0171***	-0.0027***
	(0.001)	(0.001)	(0.001)	(0.001)
Observations	6,413	6,412	6,413	6,413
Full	-0.0173***	-0.0047***	-0.0179***	-0.0057***
	(0.001)	(0.001)	(0.001)	(0.001)
Observations	7,002	7,001	7,002	7,001
Fixed effects				
Region	No	Yes	No	Yes
Firm	No	Yes	No	Yes
Year	No	Yes	No	Yes

Standard errors are in parenthesis
*** p<0.01, ** p<0.05, * p<0.1

Note: Control variables include Total employment, Age of establishment, The percentage of female worker, The percentage of professional worker.

number of FFPs), we estimate the level of FFPs on the female turnovers. The second row and third row show the female turnovers in the extensive margin and intensive margin. The direction of the relationship between turnovers and FFPs is the same on the two margins. The extensive margin has a more significant impact on the female turnovers than the intensive margin of FFPs.

Columns (1) and (3) predict female voluntary turnovers with current family-friendly policy adoptions by following the Zero-Inflated Poisson regression. The certified-eligible firms have lower predicted turnovers by 14%. The second row shows the female turnovers at an extensive margin. Having at least one FFPs policy decreases a female turnovers by 22% without year fixed effects. In other words, participation effect reduces a firm's predicted female voluntary turnovers. Columns (2) and (4) estimate the turnovers for the lagged explanatory variable ($FFPs_{t-1}$) with and without region, industry, and year fixed effect. The third row shows the female turnovers in the intensive margin. columns (1) and (3) predict the current family-friendly policy adoptions on the voluntary

Table 1.6: The Effect of FFPs on Turnovers - Sub-group Analysis

	Panel A : Female-Specific		Panel B : Female-Specific	
	(1)	(2)	(1)	(2)
$FFPs_t$	-.0725***	-.0724***	-.4047***	-.4072***
	(0.009)	(0.009)	(0.072)	(0.072)
$FFPs_{t-1}$	-.0656***	-.0656***	-.3442***	-.3442***
	(0.009)	(0.009)	(0.070)	(0.072)
Observations	5,757	5,757	1,245	1,245
Fixed effects				
Region	No	Yes	No	Yes
Firm	No	Yes	No	Yes
Year	No	Yes	No	Yes

Standard errors are in parenthesis
*** p<0.01, ** p<0.05, * p<0.1

Note:"Female-Specific" that contains Maternity leave, Guaranteed breastfeeding breaks, breastfeeding facility, Restriction of night work, holiday work, overtime work, for pregnant women, and Provision of alternative work duties for pregnant women, Restriction of hazardous work for women with in one year after birth, Leaves for regular doctor visits during pregnancy, Infertility leave, and Miscarriage and stillbirth leave, Monthly sickness leave.
"Non-Female-Specific" that contains paternity leave, workplace childcare facilities, support for childcare cost.
Note: Control variables include Total employment, Age of establishment, The percentage of female worker, The percentage of professional worker, and The male voluntary turnovers.

female turnovers. The column (1), if a firm were to increase the number of FFPs, the expected female turnovers would decrease by 1.7%. Columns (2) and (4) predict the previous period family friendly policy adoptions on female turnovers. In column (4), if a firm were to increase the number of the prior period of FFPs, the expected female turnovers would decrease by 0.4% without year fixed effects and by 0.5% with year fixed effect. Thus, increasing current and past family-friendly policy adoption lowers the predicted turnovers.

In order to investigate the effect of gender specific policies on turnovers, we split the sample into two sub-samples for utilization of female-specific policies and non-female-specific policies. Table 1.6, Panel A shows that when firms adopt policies that are only applicable to females (e.g. breastfeeding facilities, guaranteed breastfeeding breaks, etc.), then the female turnover decreases by 7.25%. Panel B presents the results from estimating the non-female-specific (e.g. childcare facilities and child care subsidy) and shows that these policies reduce the female turnovers by 40.7%. Child care programs have a bigger effect on the female voluntary turnover than female specific programs. Models (2) and (4) reports the lagged explanatory variable with female turnover.

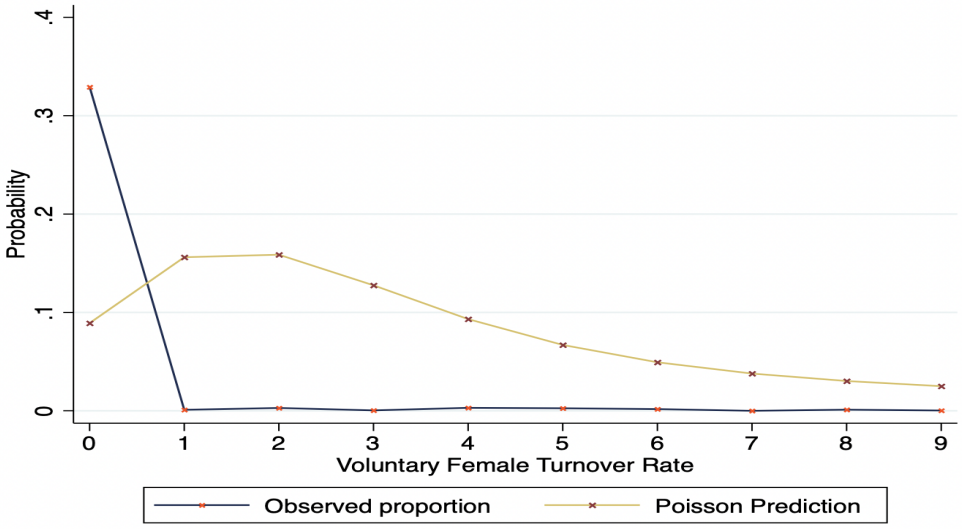
1.5.2 Specification Analyses and Robustness Check

1.5.2.1 Specification Analyses. Poisson distribution based log-linear regression models are widely used when count variables are treated as the dependent variable in an analysis (Hall, 2000; Hinde, 1982). The Poisson model has a strong assumption that the count outcome variance is equal to the mean, whereas most of the real count data have a greater variance than the mean. Ignoring overdispersion and applying the standard Poisson regression to data can cause underestimation of standard errors and p-values, thereby increasing the chance of an inflated Type I error. Inflating Type I errors will very quickly leave us with evidence that is too weak to be convincing support for our hypothesis. In our paper, adopting FFPs firms would not reduce female voluntary turnovers.

From Figure 1.4, we see that the source of the overdispersion in the data is not the extreme values on the right side of the distribution. Instead, the overdispersion comes from the very large number of zeros on the left. Thus, if the overdispersion is due to a high frequency of zero counts, then ZIP regression will give a more satisfactory fit to the data (Speedie et al., 2014; H Greene, 2002). The Zero-Inflated Poisson model is an extension of the Poisson distribution that allows for additional probability of excess zero counts.

Figure 1.5 shows the empirical distribution and the predicted distributions from the Poisson and the Zero-Inflated model for the response variable in our data. Figure 1.5 shows that the ZIP model has fairly better prediction than Poisson model. The ZIP model has almost fit for prediction in zero counts compared to the Poisson model. The ZIP model has relatively big gaps from three to five, but those gaps are still smaller than Poisson prediction. The predictions from the Poisson and ZIP models are summarized in Table 1.7. The Poisson model underpredicts the percentage of zero counts and overpredicts ones, twos, and threes so on. For example, the Poisson distribution predicts that 9.3% of the cases will be zeros whereas its observed percentage is more than 33%. The pattern of these prediction errors once again suggests excess of zeros as the reason for the lack of fit in the Poisson model of our data. A ZIP model has a better prediction of the percentage zero counts (the observed percentage is 33.5% and ZIP predicts 32.5%). The summation of the

Figure 1.5: Prediction by Poisson and Zero-Inflated Poisson Model



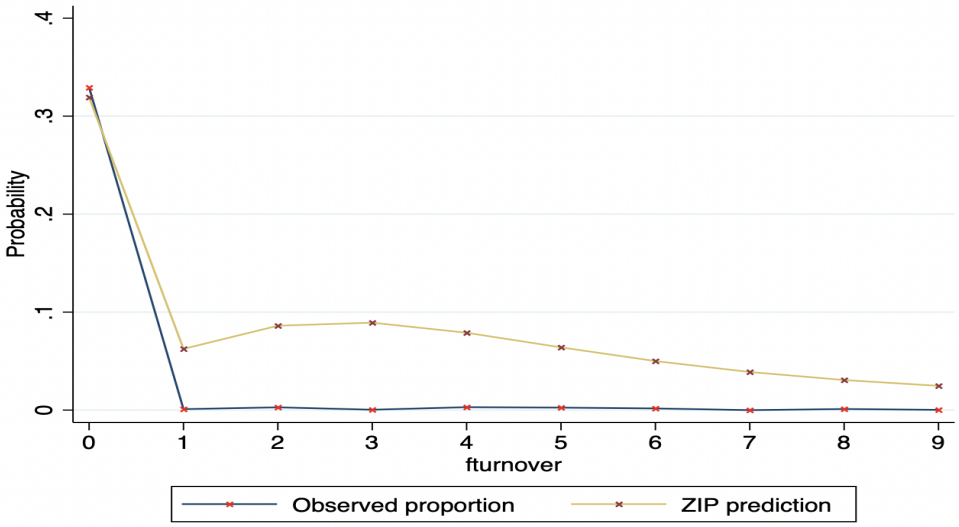


Table 1.7: Observed Values and Predictions Probabilities in Poisson and ZIP

		Poisson		ZIP	
Count	Actual	Predicted	—Difference—	Predicted	—Difference—
0	0.335	0.093	0.242	0.325	0.010
1	0.001	0.166	0.165	0.064	0.063
2	0.003	0.170	0.167	0.091	0.088
3	0.000	0.136	0.135	0.096	0.095
4	0.003	0.098	0.095	0.085	0.082
5	0.003	0.070	0.067	0.069	0.066
6	0.002	0.051	0.049	0.053	0.051
7	0.000	0.038	0.038	0.041	0.041
8	0.001	0.030	0.029	0.032	0.030
9	0.000	0.025	0.024	0.025	0.025
Sum	0.348	0.877	1.013	0.879	0.552

difference between actual and predicted in the Poisson and the ZIP, the ZIP prediction has smaller than Poisson prediction (0.552 vs. 1.013)

1.5.2.2 Robustness Check. Several other models are also considered in our robustness check, with their results presented in the appendix. A Zero-inflated Negative Binomial (ZINB) model, a Tobit model that is left-censored at zero, and a Two-part model with strictly positive variables and a large number of zero values are all estimated as robustness checks. The ZINB result shows that female turnover decreases by 4% without the year fixed effects, but when we add the year fixed effect then female turnover is decreased by 3%, which is more similar to our main result. Second, we use a Tobit model, also called a censored regression model. In this sense, we use a left censored regression model. The result shows that female turnover decreases by 6% with the year fixed effect and 6% without year fixed effect. Lastly, we estimate a Two-Part model with a Probit-Regression model. To accommodate the features with zero values in our data, we utilize two-stage estimation procedures, such as the Two-Part model (2PM). Our results show that the female turnover is decreased by 3%. All in all, various test results imply that when firms use family-friendly policies then female voluntary turnover decreases.

1.6 Discussion

Despite the Korean government's efforts to promote work-family balance, some firms are hesitant to adopt FFPs (Dex and Scheibl, 2001). If FFPs are a universally desirable policy, why are some firms reluctant to adopt FFPs? To help answer this question, we study a set of firm characteristics that may affect a firm's propensity to adopt FFPs. We find that large firms are more open to adopting any given family related policies than small to medium size firms. The fact may be because many small-to-medium-sized firms are pessimistic of the benefit from the FFPs (The Ministry of Gender Equality and Family, 2020) due to the implementing costs of FFPs. Although FFPs can potentially benefit firms in the long run, they can be expensive investments that burden firms with additional costs and operating constraints, especially for small to Medium-sized corporations (Konrad & Mangel, 2000). Large companies are less likely to feel the burden of financial restrictions than smaller companies. Benefit from the FFPs is more likely to attract highly skilled employees (Moy and Lee, 2002). As a result, bigger companies may see high returns from adopting FFPs compared to small-to-medium-sized companies.

One possible explanation for why businesses that changed from non-profit to for-profit had a negative association with FFP adoption is that these firms may be risk averse to adopting policies with a large up-front costs. Although FFPs can potentially benefit firms in the long run, they can be expensive investments that burden firms with additional costs and operating constraints (Konrad and Mangel, 2000).

We find that firms with a high percentage of female workers and a high percentage of professional workers have a positive association with increased adoption of FFP. This finding is in line with efficiency wage theory (Heiland and MacPherson, 2005; Perry-Smith and Blum, 2000; Rousseau, 1995), which suggests that a higher percentage of professionals would be associated with higher FFP adoption because more favorable work environments that respect women would act as a non-financial compensation to female workers. This non-financial compensation would, in turn, help retain these talented female employees (Heiland and MacPherson, 2005).

We also find that certification-eligible firms that adopted FFPs decrease female turnovers by 14%. The participation effect see a reduction in female turnovers by 22%. Among participating firms, increased the number of FFPs reduces female turnovers by 9.5%. Firms that adopted female-specific policies reduced their female turnover by 7.51%, whereas those that adopted non-female specific policies reduced their female turnover by 49.9%. Although female-specific policies lead to a significant turnover reduction (See Table 6), applying more general policies has a greater impact on reducing the female voluntary turnover. Most of the policies in the female-specific Index are very specific to pregnancy, and although these types of policies are good to have, they may not be the most helpful to women who want to stay in the labor force. Workplace childcare facilities and support for childcare costs may be more helpful (Lee and Hong, 2011). Companies often have too few childcare facilities in Korea [6], and for many women, the cost of childcare consumes most of their pay [7]. As a result, women may rationally choose to forgo the little extra income that they may earn to take care of their child. Korea's work environment is not favorable for female workers, who already have the longest working hours among the OECD countries. Korean female employees work 17% more hours than the OECD average and also face the largest gender wage gap (OECD, 2016). The general lack of childcare, the high competition for entering government childcare facilities, and the high cost of private childcare leads many women to leave their job when they have a child (KOSIS, 2019). Consequently, we suggest that supporting childcare is the most effective policy.

Unlike prior studies, our analysis covers a wide range of workplaces in Korea, including public institutions as well as large, medium, and small sized private companies. Including SMEs in our analysis is significant because SMEs make up about 99% of the total number of Korean firms and employ nearly 14 million workers, or approximately 88% of the workforce (*Kosme* 2020). If we assume that all SMEs adopt FFPs, then we expect that around 11.34 million employees, or almost 70% of the workforce, take advantage of FFP benefits. Our study finds that about 14 percent of

[6]Today, out of over 8,837 kindergartens consist of 3 are run by federal government, 4,856 are run by local government and 3,987 are run by private institutions (KOSIS, 2019)

[7]Statistics come from KOSIS, 2019. The average salary on month is 3,679 US dollars for female workers at nation's top 150 companies as of 2020KOSIS, 2019. The cost of childcare varies from 700 US dollars (by federal or local government) to 2,500 US dollars (private) per month and plus for extra costs

female employees are retained in the labor force, so approximately 201,149 female employees (0.56%) will be retained in the labor market each year. According to KWPS, our sample show that 72% of SMEs adopt the FFPs; thus, we expect that around 3,006 female workers stayed at work each year because of FFPs[8], which helps alleviate the under-utilization of human capital. The Ministry of Employment and Labor(2019) estimates that female workers' retention has led to 0.04% higher GDP per capita per year in Korea. In this way, we expect that the FFPs may provide work-family balance in a way that may be helpful to deal with future economic challenges.

1.7 Conclusion

Faced with the worsening labor shortages due to fewer marriages, lower fertility, and the increasing elderly population, the South Korean government implemented FFPs in order to retain the number of women in the work force and promote family-work balance. In this study, we apply a zero-inflated Poisson model and logistic regression to study the impact of family-friendly policies (FFPs) on female turnover and to study the determinants of businesses' adoption of FFPs, respectively. We find that large, public institutions, firms with a higher percentage of female workers, and firms that changed from for-profit to non-profit have a higher likelihood of adopting FFPs. In addition, we estimated that certification-eligible firms decrease female turnover by 14% on average. Having at least one FFPs policy see a significant reduction in female turnovers by 22%. The increasing the number of FFPs reduces female turnover by 1.7%. In addition, female-specific policies (e.g. pregnancy leave) decrease female turnover by 7.25% whereas non-female-specific policies (e.g. childcare support) decrease female turnover by 40.7%. Based on these results, providing more incentives for private businesses to adopt FFPs as well as focusing more on non-female-specific FFPs are likely to improve the impact FFPs have on increasing the number of women in the labor market. Overall, our study suggests that family-friendly policies help retain women in the labor market and, therefore, may help alleviate South Korea's labor shortage.

[8]According to the CXO research institute in Korea, employers spend an average of 33% of a workers annual salary to replace one employee. It costs $1,214 per month to replace an average one female employee making $44,151 a year

Our work is subject to some limitations. KWPS data were collected biannually starting from 2005 to 2019, and we are only able to use data from 2007 to 2013 because these are the only years that include a measure of the voluntary female turnover; thus, this paper has only one period before FFPs came into effect, and we are not able to include more recent voluntary turnovers, Future analysis should include years after 2013 to examine the long term impact of these policy changes. Also, we may have self-selection issues in the policy ”treatment” group in a non-random manner. To capture potential self-selection issues, we use a logistic model. This paper uses ”statistically significant” variables in the logistic model as control variables for analyzing the effect of FFPs on female turnover. However, this paper still has a self-selection issue. Future studies should tackle this issue with robust analysis.

Chapter 2

How Does Family Friendly Certified Firms Affect Female Employment Rate in South Korea

2.1 Introduction

Over the last few decades, low fertility rates and population aging have led to labor shortages in Korea [1]. Labor shortages pose a significant threat to South Korean economic growth (Lee and Choi, 2015; Caucutt, Guner, and Knowles, 2002; Kim, 2014), since human capital and innovation potential are the most important production factors of the Korean economy. Moreover, welfare provisions for the growing elderly population will create a heavy tax burden on the smaller number of workers. To encourage and maintain economic growth, the government must address the socioeconomic issues underlying the labor shortages (Luci, 2009). In terms of enhancing fertility and women's employment, the South Korean government has introduced Family-Friendly-Policies (FFPs) since the early 1980s.

Two reasons for low fertility in South Korea are higher female education levels and the decline in women's participation (Thévenon and Luci, 2012). Educated women choose to have longer careers so that they can maximize the return on investment of their degrees. Because working raises the opportunity cost of giving birth, and vice versa, working women are less likely to have children and are more likely to leave their jobs if they give birth. In addition, women are over-represented in low-wage employment. Regardless of their skills, on average, 37% of women working full-time are in low paid employment compared to 15% of men; and 30% of mothers (12% of fathers) are in non-regular employment (OECD, 2017). Non-regular jobs do not always provide basic social security coverage, exacerbating the vulnerability of those in non-regular employment, and they are not all eligible for maternity or parental leave benefits that are available to those in regular employment. Furthermore, it has become more difficult to support a family due to higher living costs in urban areas, unaffordable or inaccessible child care, and decreased access to well-paying stable

[1] From 1970 to 2018, the fertility rate in South Korea decreased from 4.5 to 0.9 children per women. At the same time, the statistics from KOSIS (2019) indicates that the ratio of the elderly population to the working-age population increased from 5.7 percent in 1970 to 18 percent in 2016 and is expected to increase in the future.

jobs for women. These socioeconomic phenomena causing lower fertility rates and higher female employee turnover have contributed to the labor shortage, leading the South Korean government to implement policies that address family planning and women's issues in the work environment.

In 2008, the Ministry of Gender Equality and Family introduced incentives for family-friendly policies to cultivate an optimal working environment for parents. There are three sub-types of FFPs: (1) support for flexible working hours, (2) financial support for childcare and pregnancy costs, and (3) parental and maternity leave. FFP certification is provided to corporations who pass evaluations for policies within these three subtypes. Although the South Korean government provides subsidies for corporations to incentivize implementation of FFPs, the utilization of these policies by workers is unclear.

Previous studies have investigated the effect of FFPs on job satisfaction, firm performance, and turnover rates (Bae and Goodman, 2014; Kim, 2014; Lee and Jeong, 2017). Although previous studies have shown that earlier government policies, such as the Gender Equality Act in 1980, have increased the female participation rate (the percentage of newly hired full-time female employees), no specific studies regarding the relationship between FFPs and employment rates exist. This paper estimates the causal effect of FFP certification on the female employment rate by using Korea Enterprise Data (KED). This exclusive dataset, which includes confidential company information that is unavailable to the public, is only authorized for use by select research and government organizations. With the KED dataset, we are able to collect additional information on FFP certified corporations listed by the Ministry of the Gender Equality and Family. We use a difference-in-differences methodology to analyze the impact of FFP certification on female employment for companies who were certified since 2008.

This study examines the effects of the Family-Friendly Certified firms on female employment and firms performance. We use a Difference-in-Differences (DID) regression to estimate the effect of the FFPs Certified firms on female employment and firms performance. We find that certified firms increase in female employment by 14.8% on average and increase in firm's performance by 24.6% compared to non-certified firms.

The paper is organized as follows. Section 2 addresses background and literature review. Section 3 introduces the data for the study. Section 4 lays out the difference-in-differences approach to our research questions. Section 5 presents the results and sensitive analysis, and section 6 discusses the results. Section 7 is the conclusion.

2.2 Background and Literature Review

2.2.1 Background

In 2008, to encourage firms to properly use the family friendly policies for their employees, the Korean government devised the Family-Friendly Corporation Certification System. The certification system was implemented by the Korean Ministry of Gender Equality and Family to incentivize corporations and public organizations to adopt Family-Friendly Policies (FFPs) by providing benefits to those organizations that receive certification. In order to get certification, corporations are evaluated on workplace practices that support family-friendliness such as childbirth and parenting support, protecting pregnant women and adjustment of working hour. Thus, the firms ensure family-friendly workplace culture.

To begin the certification process, firms submit an application to the government and provide a list of required documents. After reviewing the documents, government officials perform on-site audit. If the firms pass these reviews, they receive a certification which is valid for three years with a possible extension of two years. At the end of the two-year extension, firms must re-apply to gain certification again. During the certification period, the government maintains regular oversight and delivers feedback in order to ensure that the firms maintain the policies.

As of December 2021, a total of 4,918 companies that 13.2% increase compared to 2020 have participated in the certification program, of which 520 large enterprises, 3,317 Small-to-Medium Enterprises(SMEs)[2], and 1,081 public institutions.

[2]Korean government offers clearer definitions, characterizing a small-sized enterprise as a company with fewer than 50 employees and a medium-sized enterprise as one with less than 300 employees

Despite the Korean government encouraging firms to implement policies widely, firms may still consider FFPs to be more of a cost than a benefit. According to the Ministry of Gender Equality and Family 2020, many companies may be pessimistic about the family-friendly certification system because the benefit may be small compared to the cost of implementing the family-friendly system. Thus, the Korean government provides direct and indirect compensations to increase the number of firms implementing FFPs. The Korean government supports for a total of 220 benefits or incentives, such as issuance of a family-friendly immigration card, additional points for screening by the central and local governments, preferential interest rates on investment and loans at banks, a major tax break for maintaining an on-site childcare center, and a subsidy for helping pay their employees' childcare costs.

Also, certified firms receive a certification decal that can be displayed in their business, a badge that can be placed on their website, and a certificate of recognition. Ideally, the increased exposure, brand prestige, and financial rewards should be enough to spur widespread adoption of the policies. Financial support from the government is a huge benefit, especially for Small to Medium-sized Enterprises (SMEs) where the workers are more likely to be exposed to poor working conditions. The fact that SMEs rely more heavily on each individual employee's performance compared to large companies (Villanueva and Djurkovic, 2009; Smallbone and North, 1995; Johnson, 1995). For example, receiving FFP benefits could improve workers' outlooks on their companies by reducing worker's burdens at home. This boost in employee morale may lead workers to put forth more effort and improve their individual performance. Providing more benefits could also improve companies' competitiveness in the job market (i.e. attracting more talent employee) and improve their brand image with consumers.

2.2.2 Literature Review

It is essential to review existing literature to understand the effects of family policies on female labor outcomes and a firm's performance. Many studies have explored the impact of parental leave policies on female employment. Korpi, Ferrarini, and Englund, 2013 investigated the relationship between

the provision of childcare support for very young children and the parental leave benefits and labor market outcomes. This paper found that Korea has deficient levels of women's employment compared to Sweden. Thévenon, 2011 addressed that Sweden stands out among other OECD countries with high public spending on services and the high quality of support provided as well.

Many studies have examined the relationship between public spending and female employment. Oyvat and Onaran, 2020 find that higher public investment has a positive cumulative effect on female employment in South Korea both in the short-run and medium-run. Public investments in the social sector have especially caused an increase in the female employment rate from 1970 to 2012, and the social sector is currently the most female-dominated industry compared to any other sector in Korea (Oyvat and Onaran, 2020). However, the lack of reliable public childcare support leads to a serious issue regarding the care of very young children in Korea. Given that the total enrollment rate in public child care support is only around 10 percent (Ministry of Health and Welfare, 2012). This contributes to working mothers' concerns about childcare, which may lead them to leave their job (Ministry of Health and Welfare, 2012).

In the 1990s, the South Korean government expanded formal childcare services with the intention of solving an industry labor shortage problem by supplying surplus labor in the form of married women. The South Korean government increased the early childcare budget seven times between 2002 and 2007 (Bang, 2009). Instead of establishing a good infrastructure for childcare facilities, the South Korean government has mainly focused on providing in-cash support for parents (Hong, 2009). The effect mitigated increasing female employment because the cash support has brought the non-working mothers into the market for preschools, thereby making employed mothers apprehensive about getting their children into public preschools (Ministry of Health and Welfare,2009).

The reforms targeting child and elderly care were created to reduce the burden on South Korean women and contribute to increasing female employment (Peng, 2011). Also, Peng, 2011 finds that this growing share of female employment coincided with increased spending on childcare, eldercare, and maternity leave policies implemented in 2001, 2005, and 2006; an increase in the duration of

parental leave; as well as a rise in public financial support for parental leave. In addition, childcare subsidies targeted at working mothers induced a positive impact on the total employment effects (Haan and Wrohlich, 2011).

Some studies have demonstrated that family-friendly benefits have a negative impact on the female employment rate. Lisaniler and Bhatti (2005) find that the duration of parental leave has a negative impact on employment. Milligan, 2005 find that universal child benefits do not affect employment and that the causal effect between subsidized childcare facilities and employment effect is not clear. Moreover, Azmat and González, 2010 argues that overall child deductions significantly reduce positive employment effects.

In sum, previous studies have looked at the relationship between public spending or investment and employment rate, the impact of child care on female employment rate, and the relationship between the FFPs and employment rate. However, no prior studies have looked at the causal effect of FFPs certification on employment and firm performance by using a difference-in-differences methodology.

2.3 Data & Descriptive Stats

The main dataset for this anlaysis is the Korea Enterprise Data(KED). The KED data are collected by the Ministry of Finance. The Ministry of Finance has collaborated with Korea Technology Finance Corporation (KIBO), Korea Development Bank, Industrial Bank of Korea, Korea Federation of Banks, the Small Business Corporation, and other major commercial banks [3]. The survey covers all major industries except agriculture, forestry, and fishing. Our data contains 14 waves of data from 2006 to 2019 in both the private and public sectors. In particular, KED specializes in information on small to medium sized enterprises in addition to large sized enterprises, and has the largest database on SMEs in Korea which has been collected and updated by KODIT and KIBO over the past 30 years. KED has a database of 8.0 million companies and this is the largest in South Korea. KED provides confidential information on several features of these firms, including the CEO's

[3] KEB HanaBank, Korea Exchange Bank, Shinhan Bank, Kookmin Bank, Woori Bank

Table 2.1: Summary Statistics

	Certified Firms		Non-Certified Firms	
Variable	Before	After	Before	AFter
Female employment	45.19	45.05	40.78	41.89
	(183.80)	(189.48)	(174.38)	(170.92)
Male employment	54.07	55.93	58.73	57.75
	(240.13)	(240.57)	(238.27)	(241.16)
Technician employment (%)	6.832	4.524	7.896	4.180
	(30.45)	(31.74)	(33.97)	(31.21)
Professional employment (%)	5.158	3.930	5.978	3.733
	(27.21)	(24.14)	(21,87)	(24.19)
Total Employment	367.47	369.63	319.19	318.57
	(6106.9)	(1380.58)	(834.41)	(733.48)
Asset	30.32	23.56	28.94	24.06
	(2.66)	(1.84)	(1.80)	(1.86)
Current sales	5.142	13.30	6.290	14.37
	(2.65)	(1.66)	(1.55)	(1.66)
ROA (%)	22.43	16.33	23.19	16.96
	(2.40)	(2.57)	(1.60)	(1.89)
Investment for R&D (%)	9.612	10.294	12.30	13.25
	(3.12)	(2.64)	(2.51)	(2.49)
Taxes	0.486	0.410	0.454	0.431
	(2.78)	(2.07)	(2.30)	(2.05)
Observations	7,646		7,370	

Note: Before in 2007 and after in 2010. Female and male employment defines the number of new employment, Technician employment rate define the proportion of the technician, Professional employment defines the proportion of the professional employment in each firm, Total employment defines the total number of employment in each firm, also as a proxy of the firm size, Investment for R&D defines the ratio for the investment for R&D

name, gender and age, the firm's revenue, current sales, expenses, information on labor unions, the number of employees, and information on taxes. These various characteristics allow us to control for heterogeneity among firms and conduct panel data analysis.

Our study estimates the effect of FFPs on firms' profits and female employment, which is defined as the number of newly hired full-time female employees. We use the Return On Assets (ROA) as the firm performance. ROA provides how much profit a company is able to generate from its assets. Firms with a high ROA usually have fewer assets involved in generating profit, while companies with a low ROA have more assets. Thus, ROA is the best when comparing company's performance.

Table 2.1 shows summary statistics for the certified group (treatment group) and non-certified group (control group) before and after 2008. The certified group has higher female and male employment than the control group before 2008. The treatment group has a higher female employment (45.19) than the control group (41.89). With regards to firm size, which is measured by total

employment, firms in the treatment group are larger than firms in the control group, although the size of firms in the treatment group does decline after 2008. Across the treatment and control groups ROA (i.e., firm performance) is between 12% and 13%. The control group has a slightly higher ROA than the treatment group. Both groups can be considered good performance firms. The control groups have a higher investment for R&D (12%) than certified firms (9.6%).

2.4 Econometric Analysis

Our identification strategy addresses to understand the mechanism by which certification affects employment and firm performance. The association between policy changes and subsequent outcome is often evaluated by pre-post assessment. We use both an event-study approach and a difference-in-differences approach to compare FFP certified vs. non-certified firms before and after when the FFPs went into effect. The difference-in-differences study design. Thus, we compare changes in outcomes in the treatment firms to the same outcomes in the control firms. The treatment firms are ones that receiving certification between 2008 to 2019. The control firms are the rest of the firms which had not yet receiving certification. To examine the impact of the family-friendly certification on female employment and firm's performance, this paper use a difference-in-difference model, specified as follows:

$$Y_{it} = \beta_0 + \beta_1(Treatment_i \times Post) + \beta_2 Treatment_i + \beta_3 Post_t + \theta X_{it} + \eta_i + t_i + \epsilon_{it} \quad (2.1)$$

where y_{it} is the outcome of interest (i.e. the female employment, the firm performance) for each firm i in year t. $Treatment_{it}$ is an indicator equal to one if the firm receives a certification and zero otherwise. $Post_t$ is an indicator variable that equals one if period t is in the post-certification year of 2008 or later. $(Treatment_i \times Post_t)$ is an interaction between $Treatment_{it}$ and $Post_t$. We include two fixed effects in the model: the firm fixed effect η_i, and the year effect t_i. ϵ_{it} is the error term. Controlling for these fixed effects eliminates the concern of firm-level heterogeneity or time trends. X_{it} is the set of control variables, such as current sales, region, industry, company

age, investment in R&D, taxes, and labor unions. These control variables ensure that our results are robust against any individual characteristics or regional macroeconomic characteristics. In this specification, β_1 captures the effect of the post-certification period.

The identifying assumption of the difference-in-differences model is that the outcomes would follow similar trends in certified firm and non-certified firm in the absence of the certification, conditional on the covariates. Although this assumption can not be directly tested because the true counterfactual is never known, its likelihood is able to test by including a set of interaction terms between certified firms and each year. Given that this assumption holds, the key coefficient of interest is θ_1, which shows the response due to certification. In order to see how the treatment effect changes over time, we estimate aggregate effects using an event-study model (Equation 2.2) in order to assess how firms evolved before and after the family friendly policies were implemented.

$$Y_{it} = \alpha_i + \sum_{t=2006}^{2019} \theta_t(Y_t \times CF_i) + X_{it}^{'}\beta + \eta_t + \gamma_s + \epsilon_{it} \tag{2.2}$$

where Y_{it} is the outcome of interest for each firm i in year t. Y_t is an indicator for whether year t is 2006, 2007, ..., 2019, with 2008 being the omitted reference year. CF_i is an indicator equal to one if firm i received certification and zero otherwise. $X_{it}^{'}$ is a vector of control variables such as locations and industry variables that may influence the likelihood of adopting certification. η_t and γ_s are year and firm fixed effects. Our main interest is θ_t, the coefficients on the year fixed effects interacted with the certified firm indicator. We omit the interaction term for 2008 so that estimates are normalized to the year before certification took effect. This event-study model allows us to assess whether our difference-in-differences estimates capture a change in employment rate that is credibly related to certification. This paper also performs the sensitivity of my main results to various modifications of the model or the sample. We test for the falsification to see my conclusions are sound.

2.5 Results

In this section, we present results on the effect of family-frienly certification on two different outcomes: female employment and firm's performances obtained from the difference-in-differences model specification. Additionally, sensitivity analyses are also reported.

2.5.1 Main Results

When implementing the family-friendly certification, firms face many sources of uncertainty that influence their decision to hire more employees or to be more profitable. The firms must further choose if they hire more female employees or hire less female employees. In addition, the firms also consider their performance by increasing labor productivity though beneficial of family-friendly certification.

Table 2.2 presents the results from the estimating Equation (1) difference-in-differences regression on the female employment. Reading from left to the right, columns (1) and (2) show two separate difference-in-differences estimates for the female employment. Column (1) presents the difference-in-difference estimate without controls and fixed effects. Female employment measures the number of peoples are newly hired during the survey year. This estimate implies an increasing in the female employment by 12.8% post-certification. Column (2) presents the results when firm characteristics are added to the regression as controls and fixed effects. Based on these results, the female employment increased by 14.8%. The results show that receiving certification increases a firm's propensity to hire female workers significantly.

Table 2.3 shows how family-friendly certified firm in the post-certification period experienced a statistically significant increasing in firm's performance relative to non-certified firms with and without controls and fixed effects. Column (1) shows the results of using Return On Assets (ROA) as a proxy for firm performance without controls. We can see that the coefficient is significant and economically sizable. Family-friendly certified firms saw a 23% increase in profits. Column (2)

Table 2.2: Difference-In-Differences : The Effect of Certification on Female Employment

Dep. Variable	Female Employment (1)	Female Employment (2)
Post × Certified	0.128***	0.148***
	(0.008)	(0.008)
Certified	2.625***	2.624***
	(0.019)	(0.019)
Post	3.468***	.
	(0.135)	.
Dep.Var.Mean	42.50	42.50
Fixed effects		
Firm	No	Yes
Year	No	Yes
Controls	No	Yes

Standard errors are in parenthesis
*** p<0.01, ** p<0.05, * p<0.1

Note: Each estimate shows the coefficient on the difference-in-differences term (Post x Certified). All specifications include year and firm fixed effects. Column (1) is difference-in-difference without controls. Column (2) specification includes firm and year fixed effects, and full set of controls. Outcome is the firm's performance receiving a family friendly certification.

Table 2.3: Difference-In-Differences : The Effect of Certification on Firms Performance

Dep. Variable	Organization Performance (1)	Organization Performance (2)
Post × Certified	0.235***	0.246***
	(0.006)	(0.006)
Certified	2.118***	2.129***
	(0.095)	(0.095)
Post	3.537***	.
	(0.006)	.
Dep.Var.Mean	7.68	7.68
N	75,197	75,197
Fixed effects		
Firm	No	Yes
Year	No	Yes
Controls	No	Yes

Standard errors are in parenthesis
*** p<0.01, ** p<0.05, * p<0.1

Note: Each estimate shows the coefficient on the difference-in-differences term (Post x Certified) from a separate regression. All specifications include year and firm fixed effects. Column (1) is difference-in-difference without controls. Column (2) specifications include firm and year fixed effects, and full set of controls. Outcome is the organizational performance receiving a family friendly certification.

Table 2.4: Difference-In-Differences - Firm Size Sub-Sample Analysis

Panel A: Effect on Female Employment				
	Small to Medium	Large	Small to Medium	Large
	(1)	(2)	(3)	(4)
Post × Certified	.0537**	.0439**	.0539**	.0444**
	(0.047)	(0.035)	(0.047)	(0.035)
Certified	3.339**	6.294 **	3.383**	6.295**
	(0.024)	(0.011)	(0.024)	(0.011)
Post	5.397**	7.737**	·	·
	(0.927)	(0.900)	·	·
Dep.Var.Mean	33.01	37.65	33.01	37.65
Observations	60,350	10,475	60,350	10,475
Panel B: Effect on Organizational Performance				
	Small to Medium	Large	Small to Medium	Large
	(1)	(2)	(3)	(4)
Post × Certified	.1804**	.1212**	.1804**	.1244**
	(0.123)	(0.112)	(0.123)	(0.112)
Certified	1.086***	1.637**	1.087**	1.1638**
	(0.011)	(0.020)	(0.011)	(0.020)
Post	2.889***	2.394***	·	·
	(0.001)	(0.001)	·	·
Dep.Var.Mean	8.54	14.91	8.54	14.91
Observations	60,350	10,475	60,350	10,475
Controls	No	No	Yes	Yes
Fixed effects	No	No	Yes	Yes

Standard errors are in parenthesis
*** p<0.01, ** p<0.05, * p<0.1

Note: Each estimate shows the coefficient on the difference-in-differences term (Post × Certified). Column (1) and (2) are difference-in-difference without controls. Column (3) and (4) specifications include firm and year fixed effects, and full set of controls.

Table 2.5: Difference-in-Differences - CEO's Gender Sub-Sample Analysis

Panel A: Effect on Female Employment				
	Female CEO	Male CEO	Female CEO	Male CEO
	(1)	(2)	(3)	(4)
Post × Certified	.0423***	.0339***	.0439***	.0344***
	(0.007)	(0.005)	(0.007)	(0.005)
Certified	2.231***	4.284***	2.238***	4.258***
	(0.004)	(0.011)	(0.004)	(0.011)
Post	3.397**	4.737**	·	·
	(0.027)	(0.190)	·	·
Dep.Var.Mean	49.7	37.65	49.8	37.65
Observations	10,623	60,202	10,623	60,202
Panel B: Effect on Organizational Performance				
	Female	Male	Female	Male
	(1)	(2)	(3)	(4)
Post × Certified	.0614***	.0312***	.0627***	.0314***
	(0.023)	(0.012)	(0.023)	(0.012)
Certified	2.076***	2.577***	2.088***	2.563***
	(0.001)	(0.002)	(0.001)	(0.002)
Post	2.889***	2.394***	·	·
	(0.001)	(0.001)	·	·
Dep.Var.Mean	11.54	13.91	11.54	13.91
Observations	10,623	60,202	10,623	60,202
Controls	No	No	Yes	Yes
Fixed effects	No	No	Yes	Yes

Standard errors are in parenthesis
*** p<0.01, ** p<0.05, * p<0.1

Note: Each estimate shows the coefficient on the difference-in-differences term (Post × Certified). Column (1) and (2) are difference-in-difference without controls. Column (3) and (4) specifications include firm and year fixed effects, and full set of controls.

shows the result of firm performance with fixed effects and controls. FFP certified firms had a 24% increase in firm performance.

Table 2.4 presents the results of a sub-sample analysis where Equation 2.1 is estimated for small-to-medium sized firms (up to 300 employees) and large firms (>300 employees). Panel A shows the results when the outcome variable is the female employment, and Panel B shows the results when the outcome variable is firm performance (i.e. Return On Assets(ROA)). Across both tables, Column (1) displays the results for small to medium-sized corporations, and Column (2) displays the results for large firms. Columns (3) and (4) present the same results as Columns (1) and (2) but with the added control variables and fixed effects. Family-friendly certified small-to-medium sized firms had a 5.4% increase in female employment. Certified large firm had a 4.4% increase in female employment. Family-friendly certified large firm had a 12.4% increase in firm performance and the small-to-medium-sized firm had a 12.1% increase.

Table 2.5 represents the results of the relationship between the CEO's gender and the certification firms to use our data. Panel A shows the results when the outcome variable is the female employment, and Panel B shows the results when the outcome variable is firm performance (i.e. Return On Asset). Across both tables, Column (1) displays the results for female CEO corporations, and Column (2) displays the results for Male CEO. Columns (3) and (4) present the same results as Columns (1) and (2) but with the added control variables and fixed effects. Family-friendly certified firms with female CEO had a 4% increase in female employment. Family-friendly certified with male CEO had a 3% increase in firm performance and the firm with female CEO had a 6% increase.

2.5.2 Event Study Result

Figure 2.1 and 2.2 plots the dynamic coefficients of the regression in equation 2.2 with corresponding confidence intervals over time. The event graphs for female employment and firm's performance are shown in Figure 2.1 and 2.2, respectively. Appendix Table B1 reports the coefficients and standard errors associated with these graphs. The event study graphs do not show statistically significant for

both outcome prior to the family-friendly policy certification. This provides some evidence that the parallel trends assumption is satisfied.

The same general patterns observed in the difference-in-differences results can be seen in the event study graphs. Figure 2.1 shows that female employment has increased since 2009. Figure 2.2 shows that firms' performance (ROA) dropped once in 2009, just after the family-friendly certification, but gradually increased and stayed on an upward trend.

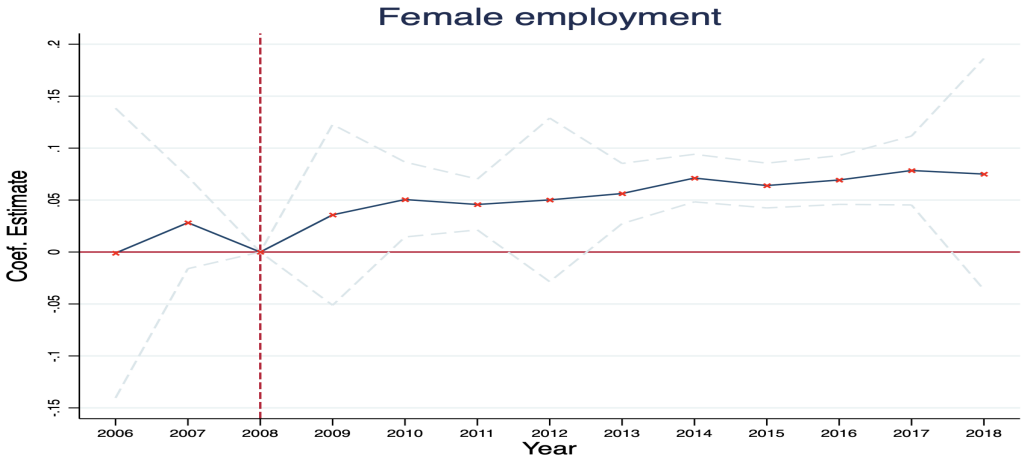
In the difference-in-differences model, we assume common counterfactual trends in outcomes (female employment rate and firm's performance) between receiving certification firms and the control firms in the post period in the absence of certification. A common way to indirectly test this assumption is to look for differences in trends for the outcome interest in the pre-period (i.e testing the parallel trends assumption). A causal interpretation of my estimates depends on the validity of this assumption. Therefore, we check this identifying the assumption of my econometric model by conducting an event study analysis (i.e. estimating Equation 2.2).

The results of the event study are presented in Appendix Table B1. The coefficient estimates on the interaction between the treatment group indicator and the pre-year indicator (2006 and 2007) indicate pre-treatment trends for the outcome. The estimates suggest that the pre-treatment trends are not significantly different between certification received firms and control firms for any of the outcomes of interest. Therefore, the result validate the key assumption of my econometric model, which provides causal effects of the impact of family friendly policy certification.

2.5.3 Sensitivity Analysis : Falsification Test

We test falsification to support our results. A fundamental assumption of the difference-in-differences identification strategy is that no other events are driving the firms to receive certification before and after the effective date. Although the study previously illustrates the lack of differential trends prior to the effective date (Figure 2.1 and 2.2), our study performs an additional test following Equation 2.1 based on false effective dates. The false effective dates are set to one year, two years, three years, and five years after to the actual starting dates. Results presented in Appendix Table

Figure 2.1: Event Study: Female Employment



4

Figure 2.2: Event Study: Firm's Performance

5

B2 provide no evidence of any significant effect at alternative dates. Thus, this falsification test supports that the estimated effect is exclusively due to the receiving of certification.

2.6 Discussion

The main purpose of incentivizing family-friendly policies (FFPs) was to increase female employment by reducing the conflict between work and family life. In addition, Family-friendly policies can help parents balance jobs and responsibilities at home and go a long way toward making it possible for women with children to remain in the workforce. In line with the expectations, our results suggest that FFP certified firms have led to a 0.10% increase in the female employment. One possible explanation for this finding is that certified firms may encourage employers from hiring female employees because of the government subsidies which offset the cost of maternity leave. It may become easier to justify equally hiring women workers.

However, the female employment in our dataset are restricted to full-time workers, so the results may change if we also include informal and part-time workers. The percentage of female employees who work part-time increased from 13.9% in 2000 to 22.3% in 2012 (ILO, 2019) in South Korea. In addition, a UNICEF (2019) study (using data from 78 countries) reported that while female labor force participation may increase because of FFPs, women are more likely to engage in informal, flexible, or part-time work as opposed to full-time work. Also, Fernández-Kranz and Rodríguez-Planas (2011) showed that in Spain FFPs caused more women to enter the lower segment of the labor market with bad-quality, unprotected jobs where their rights cannot be enforced. Also, in a study of 22 countries, (Chung, 2019) found that generous family-friendly policies like long maternity leaves and part-time work protections in Europe made it possible for more women to work, but were more likely to be in dead-end jobs and less likely to be managers. In sum, women were more likely to be in less stable, short-term contract jobs, which are not required to provide FFP benefits.

To the best of our knowledge, this is the first study that looks at the impact of FFP certification on the female employment in South Korea. As a result, we cannot compare our estimates to similar

Korean studies. However, we can compare results from other countries. Companies in Chile were 6 percent less likely to hire women of childbearing age than men, 37 percent less likely to promote them, and 45 percent more likely to dismiss them (Prada, Rucci, and Urzúa, 2015). In Spain, a policy to give parents of young children the right to work part-time has led to a decline in full-time, stable jobs available to all women - even those who are not mothers (Fernández-Kranz and Rodríguez-Planas, 2021). Also, they found that the probability of women of childbearing age not being employed climbed by 20 percent in Spain. (Tremblay, 2018; Mahon, Bergqvist, and Brennan, 2016) suggest that the most successful way to devise family-friendly policies, in order to avoid such unintended consequences, is to make them gender-neutral. For instance, in places like Sweden and Quebec, parental leave policies encourage both men and women to take time off for family plans. Another suggestion is to make sure policies are generous but not too generous. For example, three month of maternity leave is helpful, but that are more than nine months begins to hurt women's career prospects.

In line with previous studies (Lee and Hong, 2011; Bae and Goodman, 2014), our study finds that FFPs certification increases firm performance by 4%. Firm performance in our paper is measured by firm profit. Firm performance would be expected to increase because FFPs are designed to reduce employees' conflict between work and family life. Arthur, 2003 found that, on average, firms' stock prices rose in the days following announcements of work-life balance initiatives. Such evidence indicates that flexible practices boost investors' perceptions of the value of a firm, which may derive from their beliefs about the impact of the policies on worker productivity. It may also be due to a perception about the value of working parents and caregivers in the company and the effects of the work-life balance initiative on these employees. In this sense, the results of our analysis suggest that firm performance increases after receiving certification. This is because family-friendly policies may boost employee engagement via benefits that promote work-life balance and flexibility so that workers can reconcile between work and their private life more easily. Workers can be more focused on their job duties. It indirectly may lead to increase firm performance (Kelly and Voydanoff, 1985).

The results from the analysis of the sub-samples are mostly consistent with the earlier findings of a positive effect of FFP certification on organizational performance and female employment. Regardless of Firm size, FFP certification increase firm performance. But, the female employment has a different magnitude by firm-size. FFP certification slightly increase the female employment if the firms are Small-to-Medium size. Family-Friendly Policies for SMEs may present challenges. If a key member of a small team is out of the office for an extended time, the vacancy may have trouble navigating to make long-term plans. Thus, in particular, small businesses would less hire new female employees as an essential role (Dex and Scheibl, 2001; Bevan et al., 1999).

Using a CEO's gender as a sub-analysis is a source of good exogenous variation to research on the firm's decision to adopt family-friendly policies since, as Goodstein (1994) argues, that female manages tend to be positively associated FFP adoption. This is not only because rank-and file female employees are likely to be considered 'important' employees by top management, but also because employees who want to implement these practices are more likely to overcome resistance by top management to implement these practices. In other hands, a rich of studies argued that In line with this, the CEO's gender may have impactful decision for receiving the certification. Our result suggests that firms managed by female CEO, on average, increases female employment by 4%, and firms managed by male CEO increases female employment by 3%. Also, we found that regardless of the gender of the CEO, certified firms have a positive association with firms' performance.

2.7 Conclusion

For the past two decades, Korea has had a declining fertility rate, an increasing elderly population, and a diminishing labor force. These trends could lead to a decline in economic growth similar to that seen in Japan over the last decade. To combat these issues, the Korean government has provided subsidies for certified companies who implement family-friendly policies (FFPs), which are policies designed to allow more people to simultaneously work and raise families. In this paper, we use Korean Enterprise Data (KED) data from 2006 to 2019 to examine how firm performance and female employment have changed at companies that received certification for adopting FFPs.

In this paper, we empirically examine the effect of FFPs certification in South Korea on firms' female employment and performance. We find that receiving family-friendly certification is positively associated with female employment and organizational performance. The results suggest that receiving FFP certification increases the female employment by 12% and increases firm's performance by 23%. In addition, regardless of firm size, the certified firms increase female employment by 8% (large firm) and 4% (small-to-medium sized firm) and increases firm's performance by 10% in large firm and 15% in small-to-medium sized firm. The certified firm with female CEO has a larger impact on the female employment to compared to the male CEO's firms. Firm's performance are positively associated with female and male CEO. All this suggests that family-friendly policy may have beneficial for the employees and firms who obtained family-friendly certification.

This study is the first to look at the impact of family-friendly certification on female employment and firm performance. However, this study has some limitations. Unlike studies from other countries, our study is not able to look at the wages for female workers because the wage information does not contain in our dataset. Thus, using wage information to disentangle the effects of the various limbs of the family-friendly certification may be an area of future research.

Appendices

Appendix A. Chapter 1 Tables

Table A1: Evaluation Points Criteria 1

	Legal requirements (Minimum requirements)	
Policy	Details	Enterprise
1	Comply with the 40-hour workweek standard	Labor standard Act Article 50
2	Restriction on night and holiday work for workers under the age of 18 and pregnant women	Article 70 of the Labor Standards Act
3	Health leave (or Menstrual leave)	Article 73 of the Labor Standards Act
4	Pregnant women's labor protection	Labor Standards Act Article 74, Enforcement Decree Article 43
5	Reduction of working hours during pregnancy	Labor Standards Act Article 74
6	Guaranteed time for fetal examination	Labor Standards Act Article 75
7	Guaranteed paid feeding time	Labor standards Act Article 75
8	Fertility treatment leave	Article 18-3 of the Act on Equal Employment of Men and Women and Support Work-Family Balance
9	Prohibition of sexual harassment in the workplace	Article 12 of the Act on Equal Employment of Men and Women and support work-family balance
10	Workplace sexual harassment prevention training	Article 13 of the Act on Equal Employment of Men and Women and support Family-Balance
11	Spouse Maternity leave	Article 18-2 of the Act on Equal Employment of Men and Women and support Work-Family Balance
12	Parental Leave system	Article 19 of the Act on Equal Employment of Men and Support for Work-Family Balance
13	Request for reduction of working hours during childcare period	Article 19-2 of the Act on Equal Employment of Men and Women and Support for Work-family Balance
14	Family care leave and leave system	Article 22-2 of the Act on Equal Employment of Men and Women and Support for Work-Family Balance
15	No Harassment in the Workplace	Labor Standards Act Article 76-2

Source: Ministry of Gender Equality and Family

Table A2: Evaluation Points Criteria 2

16	Whether the following obligations are fulfilled (reason for exclusion from certification)	
1	Only for public institutions that implement mandatory education for prevention of violence	
2	(Only applicable to those subject to the obligation to establish workplace daycare centers) Whether or not the list of workplaces that have not implemented workplace daycare facilities is published	
3	(Only applicable to those subject to Affirmative Action (AA)) Whether or not the list of workplaces that did not meet the criteria for active employment improvement measures for 3 consecutive years is published	
4	Violation of work-family reconciliation laws (within the last 2 years)	* What are the laws related to work-family balance? Labor Standard Act, Act on Equal Employment of Men and Women and Support for Work-Family Balance, Frame Work Act on Gender Equality, Act on Prevention of Prostitution and Victim Protection, etc, Act on Prevention of sexual violence and protection of victims, etc, Family Act on the Prevention of Violence and Protection of Victims, etc, and the National Public Officials Act

Source: Ministry of Gender Equality and Family

Table A3: Firm Characteristics with FFP Adoption in 2007 and 2009

VARIABLES	Full adoption (LM)	Any adoption (LM)	Number of adoptions (OLS)	Full adoption (LM)	Any adoption (LM)	Number of adoptions (OLS)
Firm size	0.0002***	0.0018***	0.0007***	0.0001*	0.0044***	0.0006***
	(0.000)	(0.001)	(0.000)	(0.000)	(0.001)	(0.000)
% of Female workers	-0.0018	0.0210***	0.0205***	-0.0092	0.0142***	0.0181***
	(0.008)	(0.006)	(0.005)	(0.008)	(0.005)	(0.005)
% of Professional workers	0.0180*	0.0475**	0.0403***	0.0177*	0.0017	0.0249***
	(0.010)	(0.023)	(0.009)	(0.010)	(0.012)	(0.009)
% of General Managers	0.2097	0.0545	0.1885**	-0.0546	0.0465	-0.1645*
	(0.199)	(0.093)	(0.092)	(0.137)	(0.087)	(0.092)
% of Fixed-time workers	-0.0110	-0.0107	0.0074	0.0039	-0.0156	-0.0206*
	(0.018)	(0.013)	(0.011)	(0.016)	(0.013)	(0.012)
% of Part – Time Workers	-0.0144	-0.0225	-0.0219	0.0036	0.7118	0.0561**
	(0.042)	(0.020)	(0.023)	(0.031)	(0.442)	(0.023)
Age of the Establishment	0.0066	-0.0024	0.0013	-0.0033	-0.0164**	0.0087
	(0.008)	(0.007)	(0.007)	(0.008)	(0.006)	(0.006)
Public institution	1.1290**	1.3281**	1.1073***	1.1158*	1.6644***	1.3014***
	(0.560)	(0.524)	(0.406)	(0.584)	(0.524)	(0.385)
Private company	-0.9278**	-1.1823***	-1.7851***	1.9533***	1.3034***	2.3546***
	(0.436)	(0.322)	(0.273)	(0.427)	(0.381)	(0.297)
For profit	-0.9306*	-1.3158***	-2.4394***	1.8680***	0.4464	2.4600***
	(0.522)	(0.474)	(0.355)	(0.504)	(0.396)	(0.414)
Non-Profit	1.6183***	0.7846*	1.9581***	1.5488***	1.4025***	1.6171***
	(0.444)	(0.401)	(0.342)	(0.461)	(0.424)	(0.319)
Seoul	0.0238	0.1959	0.5720**	0.3257	0.2312	0.6900***
	(0.311)	(0.221)	(0.223)	(0.278)	(0.215)	(0.225)
Observations	1,735	1,735	1,735	1,770	1,770	1,770

Standard errors are in parenthesis
*** p<0.01, ** p<0.05, * p<0.1

Table A4: The Effect of FFPs on Turnover: Poisson, ZIP, and lagged ZIP

Dep.Var						
	Female Turnover					
	Poisson	Inflated	lagged	Poisson	Inflated	lagged
	(1)	(2)	(3)	(4)	(5)	(6)
Extensive margin	-.2212***	-1.0450**	-0.9937***	-.2193***	-1.0430**	-0.9913***
	(0.020)	(0.093)	(0.094)	(0.030)	(0.093)	(0.095)
	Poisson	Inflated	lagged	Poisson	Inflated	lagged
Intensive margin	-.0174***	-.0897**	-.0820***	-.0180***	-.0900**	- 0.0830***
	(0.001)	(0.007)	(0.007)	(0.001)	(0.007)	(0.007)
Fixed effects						
Region	Yes	Yes	Yes	Yes	Yes	Yes
Firm	Yes	Yes	Yes	Yes	Yes	Yes
Year	No	No	No	Yes	Yes	Yes
Observations	7,002	7,002	7,002	7,002	7,002	7,002

Standard errors are in parenthesis
*** p<0.01, ** p<0.05, * p<0.1

Note: Control variables include Total employment, Age of establishment, The percentage of female worker, The percentage of professional worker, and The male voluntary turnovers.

Table A5: The Effect of FFPs on Turnover - Subgroup Analysis

Panel A: Female-Specific Effect on Female Turnover						
	(1)	(2)	(3)	(4)	(5)	(6)
	Poisson	Inflated	lagged	Poisson	Inflated	lagged
FFPs	-.0203***	-.0725***	-0.0656***	-.0201***	-.0724***	-.0656***
	(0.002)	(0.009)	(0.009)	(0.002)	(0.009)	(0.009)
Observations	5,757	5,757	5,757	5,757	5,757	5,757
Panel B: Non-Female-Specific Effect on Female Turnover						
	(1)	(2)	(3)	(4)	(5)	(6)
	Poisson	Inflated	lagged	Poisson	Inflated	lagged
FFPs	-.3413***	-.4047***	-.3442***	-.2718***	-.4072***	-.3442***
	(0.015)	(0.072)	(0.072)	(0.015)	(0.072)	(0.072)
Observations	1,245	1,245	1,245	1,245	1,245	1,245
Fixed effects						
Region	Yes	Yes	Yes	Yes	Yes	Yes
Firm	Yes	Yes	Yes	Yes	Yes	Yes
Year	No	No	No	Yes	Yes	Yes

Standard errors are in parenthesis
*** p<0.01, ** p<0.05, * p<0.1

Note: Control variables include Total employment, Age of establishment, The percentage of female worker, The percentage of professional worker, and The male voluntary turnovers.

Table A6: Robustness Check

	Female Voluntary Turnover							
	ZINB				Two Part		Tobit	
		lagged		lagged		lagged	Probit	Regress
	(1)		(2)		(3)	(4)	(5)	
Family Policy	-.0408***	-.06127***	-.0358***	-.0399**	-.0601***	-.0617***	0.0191***	-.3233***
	(0.004)	(0.006)	(0.004)	(0.006)	(0.015)	(0.015)	(0.004)	(0.068)
Fixed effect								
Region	YES	YES	YES	YES	YES	YES	YES	YES
Year	NO	NO	YES	YES	NO	YES	NO	YES
Observations	7,002	7,002	7,002	7,002	7,002	7,002	7,002	7,002

Note: *** p<0.01, ** p<0.05, * p<0.1. Standard errors are in parenthesis. Control variables include Total employment, Average Education level of full-time worker, The percentage of female worker, and The male voluntary turnover.

Table A7: Observed Values and Predictions Probabilities in Poisson, ZIP, and ZINB

		Poisson		ZIP		ZINB	
Count	Actual	Predicted	—Difference—	Predicted	—Difference—	Predicted	—Difference—
0	0.329	0.089	0.240	0.318	0.011	0.401	0.072
1	0.001	0.156	0.155	0.041	0.040	0.083	0.082
2	0.003	0.159	0.156	0.061	0.059	0.075	0.072
3	0.000	0.128	0.127	0.070	0.070	0.063	0.062
4	0.003	0.093	0.090	0.068	0.065	0.052	0.049
5	0.003	0.067	0.064	0.060	0.058	0.042	0.040
6	0.002	0.049	0.048	0.051	0.049	0.035	0.033
7	0.000	0.038	0.038	0.042	0.042	0.029	0.029
8	0.001	0.030	0.029	0.035	0.034	0.024	0.023
9	0.000	0.025	0.025	0.029	0.029	0.021	0.021
Sum	0.342	0.834	0.972	0.775	0.456	0.824	0.482

Appendix B. Chapter 2 Tables

Table B1: Event Study

Dep.Var	Female employment	Firm performance
Pre-period		
treatyr2006	-0.0010	-1.023
	(0.0711)	(1.2767)
treatyr2007	0.0282	1.464
	(0.0285)	(1.4645)
Post-period		
treatyr2009	0.3577	-0.9243
	(0.0357)	(1.7844)
treatyr2010	0.05053	-0.618
	(0.04438)	(1.2691)
treatyr2011	0.04576***	0.373
	(0.01838)	(1.7825)
treatyr2012	0.05017	0.4364
	(0.04057)	(1.2784)
treatyr2013	0.0563*	0.8678
	(0.0567)	(0.9087)
treatyr2014	0.07118***	1.5598
	(0.0169)	(1.2843)
treatyr2015	0.06398***	1.1268
	(0.01478)	(1.4659)
treatyr2016	0.0784645***	1.7491
	(0.01838)	(1.4659)
treatyr2017	0.075037	1.7491
	(0.0524)	(1.7812)
Fixed effects		
Firm Fixed effects	Yes	Yes
Year Fixed effects	Yes	Yes
Observations	75,197	75,197

Standard errors are in parenthesis
*** p<0.01, ** p<0.05, * p<0.1

Table B2: Sensitivity Analysis : Falsification Test

Dep.Variable	Female employment			
	Alternative adopting date			
	1 years later	2 years later	3 years later	4 years later
	(1)	(2)	(3)	(4)
Post × Certified	- 0.001	-.028	-0.038	-.004
	(0.03)	(0.03)	(0.03)	(0.03)
Fixed effects				
Firm	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes

Standard errors are in parenthesis
*** p<0.01, ** p<0.05, * p<0.1

Note: These result from difference-in-differences specification that move the adopting certification date forward for a falsification test. Alternative adopting certification date refers to how many years the adopting date is shift forward.

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