Will Korean Husbands Do More Housework When Wives Work Outside the Home?

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Abstract

The paper examines the gender division of household labor in South Korea using panel data from the Korean Longitudinal Survey of Women and Families (2007, 2008, 2010, 2012, 2014). OLS regressions with fixed effects on panel, district, and year indicate that a working wife spends 5.5 to 7.5 less hours on housework per week on average, compared to a full-time homemaker (4.7 to 6.5 hours for a part-time worker and 6.2 to 8.0 hours for a full-time worker). On average, a husband spends about 1 more hour on housework when his wife works (43 to 50 minutes for a part-time working wife and more than 1 hour for a full-time working wife)**.** According to the results, the time availability approach is the most appropriate one that explains Korean couple's contribution to housework, while the relative resources approach is applicable only for wife's contribution. Neither husband's wages nor wife's attitudes have significant association with their household chores. Going beyond earlier studies, we also find that institutional care, rather than unofficial care from grandparents, can substantially decrease a demand for housework caused by preschool children. In addition, being in good relationship with spouse may make husband work more for household chores, but it does not have any effects on wife.

Introduction

South Korea (hereafter Korea) has been a historical model of extraordinary economic takeoff with
human capital development. From the poorest countries in 1960 with GDP per capita of USD 158, Korea has drastically developed into one of the world top 15 economies with GDP per capita of USD 27,539 in 2016 (World Bank, current US$). This tremendous achievement is concerned with investment in education and family policies to curb birth rates in the 1960s to facilitate greater investment per child (Lee et al., 1994). Along with economic development, education and socio-economic status of women has also improved. 40.0% of total women held bachelor's degrees in 2015, which was only 1.6% in 1970. In 2017, college entrance rate of women was estimated at 73.5% for women, even higher than men (66.3%). The labor force participation rate of Korean women aged 15 to 64 increased to 59.1% in 2017 from 51.9% in 2000, while employment rate of them also increased to 56.9% from 50.1% in 2000 (Statistics Korea, 2017).

However, Korean women still have difficulty in reconciling work and family life. Statistics Korea (2017) showed that 1.8 million (20.0%) out of 9.1 million married women aged 15 to 54 had to quit their jobs because of marriage and childbirths. This is particularly due to historical and social context of Korea, where strong patriarchal values and customs were firmly established under Confucianism. It has been an influential sociopolitical ideology for 500 years in the country, clearly defining hierarchical role of men working outside the home and the women doing housework and looking after children at home (Fuchs, Kasahara, & Sven Saaler, 2018). Even though Korea has accepted Western notion and culture in recent decades, traditional gender roles are still expected. This is well shown in the OECD data, which reported more than one-third of Koreans believed that men had more of a right to a job than women when labor demand was weak (OECD, 2015). The OECD also explained that Korea had very strong discriminatory social conventions, reinforcing the role of men as the primary breadwinners and female employment as secondary. Furthermore, the stereotype that taking care of household was not men's work made men feel uncomfortable with housework and childcare, and be less involved in them. New fathers at the birth of a child are reluctant to use mandatory parental leave: among people who used parental leave at childbirth, only 8.5% of them were turned out to be males (Statistics Korea, 2016). The study of Oshio, Nozaki, &

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Kobayashi (2013) also pointed out that Korean wives had much more difficulties in balancing work and household chores than those in other East Asian countries. In comparison with China and Japan, employed Korean wives were likely to work much longer, whereas the division of housework was the least egalitarian as Korean husbands were in favor of traditional specialization in household work.

As more women are educated and employed, conflicting with traditional gender role, the questions arose: Will husbands be more likely to share household responsibility when wives work outside the home? How much time do husbands spend on housework to help their wives to hold down a job and take care of family simultaneously? Which factors make the amount of their contribution different? Since 1980, researchers from diverse academic fields started to examine unpaid household labor, and three major theoretical approaches were established and tested: the time availability approach, the relative resources approach, and the gender role attitudes approach.

According to the relative resources perspective, households seek efficiency by allocating their resources to achieve the greatest possible well-being. The person with more resources would do less domestic work. This theory is a kind of a measure of the differential power of spouses, and negotiations regarding domestic work would be based on this relative power (McFarlane, Beaujot, & Haddad, 1998). Using data from American Couples Survey, Kamo (1988) concluded that the husband's share of domestic work was negatively related to his earnings and positively related to his wife's earnings. Nakhaie (1995) found that relative income and resources were significantly associated with the amount of housework of women and men. In a comparative study of East Asian countries, the relative resources approach had explanatory power particularly in Taiwan (Hsu, 2008).

The time availability approach examines the extent to which people are available to do housework given paid work, and family's demands on their time given the number and ages of children (McFarlane, Beaujot, & Haddad, 1998). Kamo (1998) found evidence that the share of housework done by husband decreased with his full-time work and increased with part-time work, while it increased with full-time working wife but decreased with part-time working wife. Similarly, Presser (1994) supported that employment schedules were significant determinants of a husband's share in domestic work, using National Survey of Families and Households. Tsuya, Bumpass, and Choe (2000) compared employment and division of housework in Japan, Korea, and the United States using each national survey conducted in 1988 or 1994. The study found husbands' total workload increased somewhat when their wives had long hours in the labor market— more than 41 hours per week in Japan and the United States and more than 48 hours in Korea. Recent study of Nagase and Brinton (2017) also proved that Japanese male university graduates in large firms did a smaller share of household labor than other men, because these men were subject to workplace norms which influenced their allocation of time between the workplace and the home. In addition, several studies concluded that having children and children's ages were important factors in hours of household tasks by husbands (Douthitt, 1989; Hersch & Stratton, 1994; Tsuya, Bumpass, Choe & Rindfuss, 2012).

The gender ideology or gender role attitudes approach suggests that the division of household work is determined by the attitudes toward gender equality and family roles (Aassve, Fuochi & Mencarini, 2014). Greenstein (1996) explained unequal division of housework using perceptions of gender ideology. Haddad (1996) and Hartmann (1981) argued that men exerted their patriarchal power over women's labor at home, and unequal division of household work was a major element in sexual inequality. By comparing unequal division of household labor in East Asian countries based on three major theoretical approaches, Hsu (2008) found that the gender role attitudes approach provided greater explanatory power in China and Taiwan than in Japan and Korea.

Several empirical studies on this topic have been explained by combination of three theories rather than by only one theory (Blair & Lichter 1991; Goldscheider & Waite, 1991; Kamo, 1988; Ross, 1987). More recently, Iwai (2017) provided the analysis for China, Japan, Korea, and Taiwan using cross-national survey data from East Asian Social Survey (EASS). It indicated that a husband' housework frequency was associated not only with working hours of wife and husband, but also with the presence of alternative resource such as husband's mother. Wife's housework frequency was strongly related with their own employment condition, but weakly with gender role attitudes. According to the study, the longer wives worked, the more frequently their husbands did housework. On the other hand, wives did not necessarily decrease their housework time as they worked longer.

There have been a few studies that examined the gender division of household labor in Korea. Lee (2004) found that married men with employed wives did housework for 2 hours per week, whereas those with non-employed wives did for 1.7 hours per week. The analysis based on three theoretical approaches showed mixed results as well. Heo (2008) supported that time use for housework of married women and men was significantly related with working hours of wives and husbands as well as gender ideology approach. However, Eun (2009) concluded the gender ideology

approach was not adequate to explain gendered division of housework using cross-sectional time use data of 2004, while the time availability theory and the resources theory were more applicable.

Although the previous studies have explored unequal division of housework with cross-sectional data, none of them examined longitudinal changes within the couples over time. To bridge the gap, we examine the effects of wife's employment on husband's time spent on household chores within the couples using panel data for 10 years, while controlling unobserved heterogeneity among people. Wife's employment will be divided into full-time and part-time workers to examine whether the association is different. The analysis includes representative variables for each theory - the time availability approach, the relative resources approach, and the gender role attitudes approach. In addition, we test institutional help and unofficial help from couple's parents can decrease the demand for housework.

Method

Data

We pool panel data from the Korean Longitudinal Survey of Women and Families (KLoWF) conducted by the Korean Women's Development Institute in 2007, 2008, 2010, 2012, and 2014. The KLoWF contains information regarding economic activities, education, attitudes, family and daily life of 9,997 women aged from 19 to 64 who live in the selected households across 16 provincial level districts of Korea. With CAPI (Computer Assisted Personal Interviewing) methodology, it investigates basic demographic characteristics and family dynamics such as the division of domestic work or partnership conflicts, as well as specific changes in women's employment status like wage, workplace benefits, and vocational values. Through the survey, the KLoWF attempts to identify thoughts and behavior of females, as well as any changes in family structure and in relationships between family members. From the unbalanced panel data, only married couples with spouse present are included in the analysis, since divorced or bereaved couples have different time constraints. Waves one to five are all included in our data analysis. Not only the panels surveyed since 2007, but also new panels involved later are included in the analysis. The sample size used in the analysis is smaller mainly because of missing values in independent variables.

Variables

Our main dependent variable is minutes spent on housework by husband such as cleaning and cooking, but we firstly investigate those by wife. In both regression models, woman's employment is used as the main independent variable. The employment indicates all types of jobs including wage earner, non-wage worker, and independent subcontractors. According to working hours, the employment is divided into full-time (more than 40 hours per week) and part-time employment (less than 30 hours per week). For the relative resources theory, the analysis includes wage of the couples in the regression models. Moreover, whether couples are receiving childcare services from their parents and having a helper for housework is examined as well. For representatives of the time availability theory, variables for working hours of the couples are added. Time spent on housework, wage and working hours are recalculated on a weekly basis. For the gender role attitudes theory, a measure for wife's attitudes toward marriage[3] is examined. The measure includes four questions: "Everyone must get married", "I must marry someone with a similar family background", "It is good to marry early", and "It is good to have children early when married". Yoon (2014) used these variables for a measure of gender equity as well, suggesting that individual-oriented attitudes over family-oriented attitudes could be assumed to reflect more egalitarian ideas of gender equity. Response of the questions, responded as 'strongly agree', 'agree', 'disagree', or 'strongly disagree', are summed to generate attitudes scale, of which Cronbach's alpha is acceptable (0.67). Higher score of the measure indicates that a wife has more gender equitable attitudes. However, as respondents are all women, a measure that represents attitudes toward gender equality of husband is not available in data. Hence, wife's attitudes about gender equality is examined instead when looking into effects on hours spent on housework done by husband.

To control time varying variables, several covariates are included in the regression models. As men who are least committed to relationships with spouses are likely to spend the least time on housework (Ciabattari, 2004), we include a measure for couple's relationships. The measure has four

[3] These questions are examined as attitude toward traditional gender ideology in several published papers (Chung, Y.K. & Choi, J. H, 2010; Kim, H.D. & Kim, M.H., 2011; Min, C.K. & Jeon, H.J., 2010; Moon, S.H., 2012).

questions: “How often do you watch movies, performance, and sports game together with your husband?”, “How often do you go for a walk, hiking, and exercise together with your husband?”, “How often do you meet parents-in-law or siblings of spouse together with husband?”, “How often do you meet your parents or siblings together with husband?”. Response of the questions, responded as ‘more than twice every week’, ‘once every week’, ‘once every two weeks’, ‘once every month’, or ‘less than once every month’, are summed to generate relationship scale, of which Cronbach’s alpha is acceptable (0.60). Higher score of the measure indicates that couples spend less time together. Moreover, since the presence of children increases household work demands (Douthitt, 1989; Hersch & Stratton, 1994; Tsuya, Bumpass, Choe & Rindfuss, 2012), we add variables for the number of preschool (aged 0 to 6) and adolescent children (aged 7 to 18), as well as childcare services provided by grandparents and by institutions such as kindergartens or nurseries. Furthermore, having any helper for household chores, family income and demographic characteristics such as age and years of education for the couples are included.

Results

Descriptive statistics

Table 1 reports the descriptive statistics of married women and their husbands for five waves (2007, 2008, 2010, 2012, 2014) from the KLoWF. On average, 40.4% to 55.4% of women are working, while 79.7% to 87.8% of their husbands are working. For full-time employment, 24.2% to 26.9% of wives and 57.0% to 74.3% of husbands are working more than 40 hours per week. Weekly working hours and hours for housework include all wives and husbands who are employed and not employed. As women have lower employment rate than husbands, weekly working hours of all married women are estimated at 19.9 to 24.4 hours, much lower than their husbands (38.5 to 45.8 hours). However, when considering only women and men who are employed full time and part time, weekly working hours of wives are estimated at 43.6 to 49.5 hours, which are similar with those of husbands (47.5 to 52.6 hours). Wives spend 17.5 to 29.6 hours for housework per week on average, while working wives spend 16.0 to 20.7 hours per week on average. Husbands spend only 2.2 to 3.2 hours for housework per week, which are not much different from hours of housework done by working husbands (2.1 to 3.2 hours per week).

Table1. Descriptive Statistics of Married Women and Their Husbands, South Korea, 2007-2014.

	2007	2008	2010	2012	2014
Wives’ Characteristics					
Age group (%)					
19-29	9.6%	7.3%	4.1%	2.5%	1.5%
30-39	37.1%	35.6%	31.7%	25.7%	20.4%
40-49	27.0%	27.3%	29.1%	31.8%	33.3%
Over 50	26.4%	29.8%	35.2%	39.9%	44.9%
Education (%)					
Less than high school	28.4%	29.7%	30.0%	30.0%	29.8%
High School	41.0%	39.8%	39.3%	38.9%	38.1%
More than College	30.6%	30.5%	30.7%	31.2%	32.2%
Weekly working hours (all women)	19.9	21.7	22.6	23.1	24.4
Weekly housework hours (all women)	29.6	26.9	24.4	18.5	17.5
Employed (%)	40.4%	44.6%	49.4%	53.1%	55.4%
Weekly working hours (only employed[4])	49.5	48.7	45.6	43.6	43.9
Weekly housework hours (only employed)	20.7	19.6	19.1	16.3	16.0
Full-time employed (%)	24.5%	26.9%	25.4%	24.2%	25.2%
Husbands’ Characteristics					
Age group (%)					
19-29	4.5%	3.1%	1.4%	0.9%	0.7%
30-39	31.3%	29.5%	24.1%	18.3%	12.9%
40-49	30.3%	30.0%	31.0%	32.3%	32.0%

[4] It includes full-time and part-time workers.

Over 50	33.9%	37.4%	43.5%	48.5%	54.4%
Education (%)					
Primary	22.1%	23.1%	23.4%	23.3%	23.0%
High School	36.3%	35.7%	35.5%	35.7%	35.3%
More than College	41.6%	41.1%	41.0%	41.0%	41.7%
Weekly working hours (all husbands)	45.8	43.9	42.8	38.5	38.9
Weekly housework hours (all husbands)	3.2	2.9	2.6	2.2	2.3
Employed (%)	87.4%	83.7%	87.8%	79.7%	82.5%
Weekly working hours (only employed[5])	52.6	52.4	49.8	48.3	47.5
Weekly housework hours (only employed)	3.2	2.9	2.5	2.1	2.2
Full-time employed (%)	68.5%	74.3%	64.4%	58.3%	57.0%

Source: Korean Longitudinal Survey of Women and Families (KLoWF), 2007, 2008, 2010, 2012, 2014.

Regression Results

To figure out how less wife does housework when she is employed, we firstly estimate the following equation:

$$Y_{ist} = \beta_0 + \beta_1 X_{ist} + \beta_2 \text{ Wife's Employment}_{ist} + \beta_3 \text{ Wage}_{ist} + \beta_4 \text{ Husband's working hours}_{ist} + \beta_5 \text{ Wife's gender role attitudes}_{ist} + \eta_i + \gamma_t + \delta_s + \varepsilon_{ist}$$

In addition to wife's employment status, wages of couple, weekly working hours of husband and gender role attitudes of wife are included as independent variables. X_{ist} are log of total family income, husband's housework (minutes), number of preschool children (aged 0 to 6) and adolescent (aged 7 to 18), institutional and grandparental preschool children care services multiplied by the number of the children, having a helper for housework, as well as demographic controls such as age and years of education of wife and husband. η_i, γ_t, and δ_s, are wife, year and district fixed effects respectively. The dependent variable Y_{ist} indicates minutes of housework done by wife per week.

Table 2. Effect of Wife's Employment on Her Housework with Fixed Effects, South Korea, Married Couples, 2007-2014.

Dependent variable: Wife' s time spent on housework per week (minutes)					
	(1)	(2)	(3)	(4)	(5)
Wife's employment	-446.7***	-378.4***	-330.9***	-330.9***	-327.7***
	(32.60)	(31.26)	(33.64)	(33.64)	(33.59)
Working hours of husband	2.627***	2.869***	2.637***	2.637***	2.657***
	(0.558)	(0.547)	(0.579)	(0.579)	(0.579)
Wage of wife			-1.487***	-1.487***	-1.451***
			(0.442)	(0.442)	(0.436)
Wage of husband			0.175	0.175	0.183
			(0.237)	(0.237)	(0.237)
Wife's gender role attitudes	0.0302	1.024		-0.381	-0.373
	(5.165)	(5.021)		(4.984)	(4.981)
Housework of husband	0.568***	0.519***	0.522***	0.522***	0.520***
	(0.0686)	(0.0662)	(0.0672)	(0.0672)	(0.0672)
Preschool children	304.1***	630.4***	638.7***	638.7***	638.6***
	(35.86)	(42.15)	(42.47)	(42.48)	(42.46)
Adolescent children	-171.6***	-74.94***	-75.48***	-75.50***	-74.90***
	(19.16)	(17.24)	(17.36)	(17.38)	(17.34)
Preschool*institutional care		-541.3***	-548.8***	-548.8***	-550.6***
		(41.49)	(41.28)	(41.27)	(41.36)
Preschool*grandparental care		-37.55	-70.05	-70.04	-51.55

[5]It includes full-time and part-time workers.

		(65.56)	(65.85)	(65.84)	(65.83)
Having a helper		-135.1***			-118.3***
		(44.00)			(44.32)
Scale of couple relationships	0.264		-1.161	-1.147	-1.222
	(3.781)		(3.713)	(3.721)	(3.716)
Log of income	-71.46***	-58.49***	-53.51***	-53.56***	-52.77***
	(19.80)	(19.51)	(20.22)	(20.19)	(20.21)
Constant	-19,192***	-28,070***	-28,522***	-28,493***	-28,633***
	(2,719)	(2,680)	(2,680)	(2,693)	(2,656)
Age and education controls	YES	YES	YES	YES	YES
R-squared	0.295	0.323	0.327	0.327	0.328
Number of wives	7,126	7,126	7,089	7,089	7,089
Wife FE	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES
District FE	YES	YES	YES	YES	YES

Source: Korean Longitudinal Survey of Women and Families (KLoWF), 2007, 2008, 2010, 2012, 2014. *Note*: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 2 presents the estimates from the OLS regression with fixed effects on wife, year and district. All coefficients on *Wife's Employment* are statistically significant at the 0.01 level. Compared to a stay-at-home wife, an employed wife spends 327.7 to 446.7 less minutes (5.5 to 7.5 hours) on housework, holding other variables constant. Wife's attitudes toward gender equality does not have significant effects on her housework minutes. Moreover, wife's time spent on housework is negatively associated with her wages, whereas it is positively associated with housework time and working hours of her husband. As expected, having a housework helper significantly decreases her time spent on housework by 118.3 to 135.5 minutes (2.0 to 2.3 hours). Preschool children aged 0 to 6 increase a demand for housework, but it is considerably reduced if they are attending kindergartens or nurseries. Based on the regression results, we can see that a husband needs to spend more time on housework when his wife works.

Table 3. Effect of Wife's Full-time and Part-time Employment on Her Housework with Fixed Effects, South Korea, Married Couples, 2007-2014.

Dependent variable: Wife' s time spent on housework per week (minutes)

	(1)	(2)	(3)	(4)	(5)
Wife's full-time employment	-479.6***	-415.7***	-373.4***	-373.4***	-369.8***
	(33.80)	(32.37)	(34.42)	(34.42)	(34.34)
Wife's part-time employment	-388.9***	-313.5***	-282.4***	-282.5***	-280.8***
	(36.70)	(35.54)	(37.06)	(37.06)	(37.05)
Working hours of husband	2.676***	2.922***	2.708***	2.708***	2.726***
	(0.558)	(0.547)	(0.580)	(0.581)	(0.580)
Wage of wife			-1.215***	-1.214***	-1.182***
			(0.418)	(0.418)	(0.413)
Wage of husband			0.155	0.156	0.163
			(0.237)	(0.237)	(0.237)
Wife's gender role attitudes	-0.252	0.798		-0.632	-0.621
	(5.162)	(5.017)		(4.981)	(4.979)
Housework of husband	0.568***	0.520***	0.522***	0.522***	0.520***
	(0.0690)	(0.0665)	(0.0675)	(0.0675)	(0.0675)
Preschool children	301.4***	628.0***	636.9***	636.9***	636.8***
	(35.80)	(42.05)	(42.38)	(42.40)	(42.38)
Adolescent children	-173.3***	-76.54***	-76.42***	-76.46***	-75.86***
	(19.17)	(17.24)	(17.36)	(17.37)	(17.33)
Preschool*institutional care		-542.4***	-550.0***	-549.9***	-551.7***

		(41.41)	(41.23)	(41.22)	(41.31)
Preschool*grandparental care		-37.09	-69.33	-69.30	-51.05
		(65.47)	(65.75)	(65.74)	(65.77)
Having a helper		-133.3***			-116.8***
		(43.75)			(44.08)
Scale of couple relationship	0.651		-0.789	-0.766	-0.846
	(3.785)		(3.717)	(3.726)	(3.721)
Log of income	-68.13***	-54.85***	-51.09**	-51.16**	-50.42**
	(19.74)	(19.46)	(20.19)	(20.16)	(20.18)
Constant	-18,800***	-27,659***	-28,088***	-28,040***	-28,181***
	(2,703)	(2,658)	(2,660)	(2,675)	(2,638)
Age and education controls	YES	YES	YES	YES	YES
R-squared	0.296	0.325	0.328	0.328	0.329
Number of wives	7,126	7,126	7,089	7,089	7,089
Wife FE	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES
District FE	YES	YES	YES	YES	YES

Source: Korean Longitudinal Survey of Women and Families (KLoWF), 2007, 2008, 2010, 2012, 2014. *Note*: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

When we divide the analysis into full-time and part-time working wives, the results are also similar (Table 3). Compared to a full-time homemaker, a wife working for less than 40 hours per week spends 280.8 to 388.9 less minutes (4.7 to 6.5 hours) on housework, whereas a wife working more than 40 hours does 373.4 to 479.6 less minutes (6.2 to 8.0 hours), which are all significant at the 0.01 level. Wife' time spent on housework is positively and significantly associated with housework time and working hours of her husband, and the magnitude of them is similar with that from Table 2. The negative coefficients on wage of wife and having a helper are also significant, but the magnitude of them is slightly smaller compared to Table 2.

Now we estimate the following equation to examine the effect of wife's employment on husband housework:

$$Y_{ist} = \beta_0 + \beta_1 X_{ist} + \beta_2 \textit{ Wife's Employment}_{ist} + \beta_3 \textit{ Wage}_{ist} + \beta_4 \textit{ Working hours}_{ist} + \beta_5 \textit{ Wife's gender role attitudes}_{ist} + \eta_i + \gamma_t + \delta_s + \varepsilon_{ist}$$

Wife's employment status, wages of couple, weekly working hours of husband and gender role attitudes of wife are included as independent variables. X_{ist} are log of total family income, wife's housework (minutes), number of preschool children (aged 0 to 6) and adolescent (aged 7 to 18), institutional and grandparental preschool children care services multiplied by the number of the children, having a helper for housework, as well as demographic controls such as age and years of education of wife and husband. η_i, γ_t, and δ_s, are husband, year and district fixed effects respectively. The dependent variable Y_{ist} indicates minutes of housework done by husband per week.

Table 4. Effect of Wife's Employment on Husband's Housework with Fixed Effects, South Korea,
Married Couples, 2007-2014.

Dependent variable: Husband' s time spent on housework per week (minutes)					
	(1)	(2)	(3)	(4)	(5)
Wife's employment	67.33***	68.33***	59.85***	59.90***	60.48***
	(8.645)	(8.737)	(9.501)	(9.501)	(9.532)
Working hours of husband	-0.918***	-0.896***	-0.794***	-0.796***	-0.790***
	(0.175)	(0.175)	(0.190)	(0.190)	(0.190)
Wage of wife			0.218	0.218	0.223
			(0.141)	(0.141)	(0.141)
Wage of husband			-0.0857	-0.0867	-0.0858
			(0.125)	(0.125)	(0.126)
Wife's gender role attitudes	2.014	1.700		1.958	1.957

	(1.706)	(1.691)		(1.728)	(1.728)
Housework of wife	0.0597***	0.0572***	0.0582***	0.0581***	0.0579***
	(0.00514)	(0.00521)	(0.00528)	(0.00527)	(0.00529)
Preschool children	7.721	21.65*	21.09*	21.25*	21.31*
	(10.13)	(11.81)	(11.78)	(11.77)	(11.77)
Adolescent children	-21.13***	-15.60**	-15.62**	-15.49**	-15.39**
	(6.094)	(6.203)	(6.251)	(6.247)	(6.244)
Preschool*institutional care		-33.93***	-30.79**	-30.89**	-31.30**
		(13.12)	(13.14)	(13.14)	(13.14)
Preschool*grandparental care		28.59*	25.38	25.31	28.91*
		(15.79)	(15.54)	(15.55)	(16.07)
Having a helper		-22.57			-23.27
		(14.28)			(14.51)
Scale of couple relationships	-5.216***		-5.116***	-5.187***	-5.206***
	(1.194)		(1.206)	(1.213)	(1.212)
Log of income	2.645	4.120	2.268	2.562	2.714
	(6.608)	(6.599)	(7.284)	(7.295)	(7.300)
Constant	-2,188***	-2,734***	-2,473***	-2,626***	-2,664***
	(759.2)	(801.4)	(791.3)	(804.3)	(793.7)
Age and education controls	YES	YES	YES	YES	YES
Observations	16,205	16,205	15,984	15,984	15,984
R-squared	0.092	0.092	0.094	0.094	0.095
Number of husbands	7,038	7,038	7,001	7,001	7,001
Husband FE	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES
District FE	YES	YES	YES	YES	YES

Source: Korean Longitudinal Survey of Women and Families (KLoWF), 2007, 2008, 2010, 2012, 2014. *Note*: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

The OLS regression results with fixed effects on husband, year, and district are presented in Table 4. Relative to a husband with a full-time homemaker, a husband with an employed wife spends about 67.3 more minutes on housework, when his working hours, family income, wife's attitudes and times spent on housework, number of children, scale of couple's relationships and demographic characteristics are controlled (column 1). With variables for childcare help and housework help, the husband spends 68.3 more minutes on housework per week (column 2). He spends 59.9 minutes on housework for working wife, when variables for wages are included in the model, instead of help for household chores and wife's attitudes toward gender equality (column 3). Increase in demands for housework by preschool children are offset by institutional care for them. When considering all covariates, husband's contribution for working wife is estimated at 60.5 minutes per week (column 5). In all models, he is more likely to spend time on household chores if his wife works, but less likely to do if he works for more hours, which are statistically significant at 0.01 level. Neither variables for wages nor wife's attitudes have significant association with husband's contribution to housework. Interestingly, the more couple spend time together in daily life, the more husband is likely to work for household chores.

Table 5. Effect of Wife's Full-time and Part-time Employment on Husband's Housework with Fixed Effects, South Korea, Married Couples, 2007-2014.

Dependent variable: Husband' s time spent on housework per week (minutes)					
	(1)	(2)	(3)	(4)	(5)
Wife's full-time employment	71.90***	71.88***	63.82***	63.92***	64.60***
	(9.487)	(9.526)	(10.51)	(10.52)	(10.55)
Wife' part-time employment	47.89***	50.41***	42.79***	42.86***	43.18***
	(10.15)	(10.24)	(10.83)	(10.83)	(10.84)

Working hours of husband	-0.932***	-0.909***	-0.807***	-0.810***	-0.804***
	(0.175)	(0.175)	(0.190)	(0.190)	(0.190)
Wage of wife			0.200	0.199	0.203
			(0.141)	(0.141)	(0.142)
Wage of husband			-0.0840	-0.0850	-0.0841
			(0.125)	(0.125)	(0.126)
Wife's gender role attitudes	2.043	1.721		1.983	1.982
	(1.707)	(1.693)		(1.730)	(1.730)
Housework of wife	0.0598***	0.0574***	0.0583***	0.0583***	0.0580***
	(0.00515)	(0.00522)	(0.00529)	(0.00528)	(0.00530)
Preschool children	7.996	21.21*	20.57*	20.73*	20.78*
	(10.13)	(11.79)	(11.76)	(11.75)	(11.75)
Adolescent children	-20.71***	-15.41**	-15.51**	-15.38**	-15.28**
	(6.087)	(6.194)	(6.243)	(6.239)	(6.236)
Preschool*institutional care		-32.91**	-29.70**	-29.80**	-30.20**
		(13.12)	(13.14)	(13.14)	(13.14)
Preschool*grandparental care		28.70*	25.45	25.37	29.01*
		(15.79)	(15.54)	(15.55)	(16.07)
Having a helper		-22.74			-23.52
		(14.28)			(14.51)
Scale of couple relationships	-5.296***		-5.180***	-5.252***	-5.273***
	(1.194)		(1.205)	(1.212)	(1.211)
Log of income	2.160	3.724	1.929	2.225	2.372
	(6.609)	(6.603)	(7.284)	(7.295)	(7.300)
Constant	-2,235***	-2,752***	-2,493***	-2,648***	-2,687***
	(765.4)	(805.9)	(796.0)	(809.2)	(798.3)
Age and education controls	YES	YES	YES	YES	YES
R-squared	0.092	0.092	0.094	0.094	0.095
Number of husbands	7,038	7,038	7,001	7,001	7,001
Husband FE	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES
District FE	YES	YES	YES	YES	YES

Source: Korean Longitudinal Survey of Women and Families (KLoWF), 2007, 2008, 2010, 2012, 2014. Note: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Then how will the results be different, if a wife works outside the home for more than 40 hours per week? According to Table 5, a husband with a part-time working wife spends 42.8 to 50.4 more minutes and one with a full-time working wife does 63.8 to 71.9 more minutes on housework per week with seven covariates (column 1). When adding variables for childcare help and housework help, he spends 50.4 more minutes for part-time working wife and 71.9 more minutes for full-time working wife (column 2). The time decreases to 43 minutes and 64 minutes respectively when wages are considered (column 3 to 5). On average, a husband with a part-time working wife is likely to spend more time on housework by 43 to 50 minutes, whereas the time increase additionally by 21 to 24 minutes if his wife works for full time. Neither wages nor wife's attitudes have significant association with husband's contribution to housework, but a scale for couple relationship does.

Discussions

The analysis shows the longitudinal changes within couples of their contribution to housework when a wife works outside the home. On average, an employed wife spends about 5.5 to 7.5 less hours on housework, which can be subdivided into 4.7 to 6.5 hours for a part-time worker and 6.2 to 8.0 hours for a full-time worker. Husbands who have working wives spend more hours on household chores than those who have full-time homemakers. On average, the husband spends about 1 more hour per week on housework for the working wife, which can be subdivided into 42.8 to 50.4 minutes

for the husband whose wife works part time, and 1 more hour for the one whose wife works full time. We may not interpret the coefficients as direct causal effects, since it is not able to control all unobservable time-varying characteristics or randomly assign employment to women. Nonetheless, the results suggest that variations in husband's spending time on housework can be partly accounted for wife's employment. The analysis also indicates the couple's contribution to housework is significantly related with husband's working hours outside the home. Only for the analysis of women's housework, the wife is less likely spend time on it if she earns more wages. However, there is no significant association with husband's wage or wife's attitudes to gender role in all regression results.

Among three traditional theories, the time availability approach is the most appropriate one that explains Korean couple's contribution to housework, while the relative resources approach is applicable as well when it comes to woman's contribution. Wages of husband and wife's attitudes do not have significant association with the division of household labor. This finding is consistent with studies of Eun (2009) and Hsu (2008) to some extent. Going beyond earlier studies, we also find that external resource - institutional care, rather than unofficial care from grandparents, can substantially decrease a demand for housework caused by preschool children. In addition, if the husband spends more time on housework, the wife also does more, and vice versa, suggesting they work more together for a higher demand on housework. Being in good relationship with spouse makes husband work more for household chores, but it does not have any effects on wife.

Limitations

One limitation of the study is that we use wife's attitudes toward gender equality, instead of husband's attitudes, in the analysis of husband's contribution to housework. The attitudes to gender equality are important variables to examine whether the division of household labor is determined by family members' perspective on traditional gender roles. This limitation is mainly because the survey was conducted through self-reporting only by wives, and the data for husbands' attitudes was not available. As younger couples are more likely to have egalitarian perspective on gender roles at home as well as at workplace, recently married husband's attitudes may increase his time use for households. Another limitation is that a couple's time use on childcare is not available in the survey as well. It will be better to control this variable in the analysis, since it is also one of major works that the couple should share at home.

Policy implications

Although more women are participating in the labor market after high education than before, the gender equality may be delayed in the household work. To alleviate a housework burden on dual-income couples, more resources and support are needed from governments and companies. Our finding suggests that external resources such as institutional help can considerably decrease a demand for housework. However, according to the Ministry of Health and Welfare (2017), only 36.0% of nursery for babies aged 0 to 2 and 13.0% of kindergartens for children aged 4 to 6 were operated by national and local governments. Public childcare centers with affordability and accessibility should be more established, particularly in the area where many young couples are living. Otherwise, national and local governments may develop 'official childminders' system, who come to home and take care of young children at affordable price instead of working mothers. Furthermore, companies should change their working culture toward family-friendly. The large corporations must be obliged to operate childcare centers in their buildings, while companies in the same business district may manage the centers jointly. In addition to maternal leave, paternal leave should be also guaranteed and encouraged with full wage in all large and small companies through subsidy and strengthened regulations, particularly for low-income or multi-child households.

The balance between work and family life is still not equal for women. Unequal division of household labor is also important for Korea to overcome low birthrate, which its government has been trying to increase for a decade. General gender inequality at home as well as at society makes women avoid marriage and childbirth. We should stop holding women in the role of primary caretakers for households, and support husbands to share more responsibility at home to allow them to keep their work and family at the same time.

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Women Empowerment and Economic Growth:
A spatial econometric analysis in a global perspective

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Abstract

This study analyzes the nexus between women empowerment and economic growth for a global sample. Furthermore, it also explores whether the effect women empowerment differs in different economies characterized by income levels. Moreover, we also used the spatial econometric tools to correctly identify the direct, indirect and feedback effects of women empowerment from neighboring countries. By using the data for 171 countries over the period 1960 to 2016 the results show that women empowerment stimulates economic growth. However, the effect is heterogeneous across different groups of countries characterized by income levels. The results from spatial analysis show that neighborhood of women empowerment is 75% while country's own effect from women empowerment is only 25%. The results of this study are consistent with the EU policy about women empowerment where joint effort in promoting women empowerment could increase economic growth.

JEL codes: I30, C30, O10, B54
Keywords: Women Empowerment; Poverty; Economic Growth; Spatial Dependence

Introduction.

Women empowerment means that women have the same rights as men and they are not discriminated for being women. The empowerment of women stimulates economic growth if women can flourish and freely develop their full capabilities as talented and efficient workers, mothers, caregivers, and often more productive managers of households than men in both developed and developing (King & Mason, 2001) (Sen, 1999). Women's economic empowerment can bring long lasting benefits across multiple dimensions. The UN Secretary-General's High-Level Panel on Women's Economic Empowerment recently recognizes that:

"Empowering women economically is not only the "right thing" to do to honor the world's commitments to human rights. It is also the "smart thing" to do for development, economic growth and business".(Klugman & Tyson, 2016).

According to Abigail and Moizza (2017), equal opportunities for gender have substantial positive impact on capita income, economic development, and national competitiveness. For instance, (Woetzel, 2015) reports suggest that gender equality could increase the global gross domestic product (GDP) by between $12 trillion and $28 trillion by 2025. Reducing gender gaps in education and employment also positively affects economic development, which depends on labor market growth and skills development. Domestic unpaid work mainly carried out by women is also vital to the social well-being and maintenance of the labor force. In spite of having intrinsic economic value, this effort is not always measured productive and remains unconsidered in many national accounts and therefore in official GDP calculations. Nevertheless, estimates in some countries already measuring unpaid workplace its value at between 20 to 60 percent of GDP.

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The gain of human growth of individuals, families, and societies are significant and well-established in the world. However, increasing the women's contribution in household income, through working, has been shown to prosper children through improved investments in education and health. Increasing the level and stability of women's income also reduces household poverty, and reduces family weakness to economic up and downs. Women's economic empowerment is very important to gender equality and women's human rights. As a result, reducing constant gender gaps and safeguarding equal economic outcomes for women and men is crucial for the realization of international standards for women' s human rights, as well as globally established international policy frameworks. Many studies have shown that gender diversity in the board of a company reduces risk, increases productivity and has a positive effect on firm value (Campbell & Mínguez-Vera, 2008).

The main aim of this paper is to explore the nexus between women empowerment and economic growth in a global perspective. Furthermore, the study will also identify whether the effect women empowerment differs in different economies characterized by income levels. Moreover, the study uses the spatial econometric tools to correctly identify the direct, indirect and a feedback effect of women empowerment since economic development in many countries not only depends on its own women empowerment but also on the women empowerment of the neighboring countries through the globalization, FDI and international trade (Elson, 1999; Neumayer & De Soysa, 2011; Wichterich, 2000). This interdependence among countries is formally known as spatial dependence in the literature which needs to control for the appropriate analysis (Anselin (1988) LeSage (2008). By using the data for 171 countries over the period 1960 to 2016 the results show that women empowerment stimulates economic growth in the global sample. However, the effect is heterogeneous with respect to the income level of the countries. The results from spatial analysis find that neighborhood of women empowerment is 75% while country's own effect from women empowerment is only 25%.

The remainder of the article is structured as follows. Section 2 describes studies related to women empowerment and economic growth. Methodology and empirical specification are explained in section 3. Section 4 provides data description. Results are explained in section 5, whereas the study is concluded in section 6.

Literature Review

This section will provide an overview of some recent and important literature related to the economic impact of gender equality and women economic empowerment.

Rowland (2011) examined the influence of improved status on economic development for 126 countries in every five years from 1980 to 2005. In addition, this study also developed the mechanism of the relationship of the women status and economic development by using the pooled time series cross-section analysis. This analysis incorporated the several measures to assess the status of women such as education, labor force participation, fertility, and infant mortality. The data is collected from the World Bank for all selected countries. They found that the effect of education and labor force participation on development was mediated by fertility and infant mortality.

Oztunc *et. al.* (2015) examined how women's education affects long-term economic growth in the Asia-Pacific countries over the period of 1990 to 2010. Using the Panel regression analysis based on theoretical and empirical literature, this study found that fertility rate, female labor force participation rate and female education had significant contribution in annual per capita income growth. On the empirical side, the women education is a significant factor in the economic growth.

Hassan and Cooray (2015) examined the long-run growth effects of education using a panel of eighteen Asian countries over the period 1970–2009. They also argued that female education had robust and relatively high growth effects by using both endogenous and exogenous growth frameworks. In addition, the study found that the average female enrolment ratios at the primary, secondary and tertiary levels are 83, 41 and 15 percent respectively as opposed to 98, 49 and 20 percent respectively for males so significant gender gab also exist in male and female enrollment ratio in Asian countries.

Klasen (2000) found that the gender inequality in education and employment has a negative impact on economic growth. The industrialized and developing economies was used from East Asia and Sub-Saharan Africa, South Asia and Middle East countries The cross-sectional and panel data is used which include the. The impact is greater in Sub Saharan Africa.

According to Seguino (2000) GDP growth is positively related to the wage inequality through its positive effect on investment. This study considers semi-industrialized export-oriented economies during

1975-95. On the other hand, Fatima (2011) study showed that there is no strong relationship between female education and GDP growth by using OLS technique. The data is collected on GDP, investment, male education, female education and labor force participation from 1980-2006. Similarly, Cuberes and Teignier (2014) revealed that economic growth has significantly positive impact on gender.

Klasen (2000) investigated to what extent gender inequality in education and employment may reduce growth and development by using cross-country and panel regression over the period of 1960 to 1992. The result found that gender inequality in education has a direct impact on economic growth through lowering the average quality of human capital and indirect impact on economic growth through investment and population growth.

Kabeer and Natali (2013) reviewed the impact of gender equality on economic growth and the impact of economic growth on gender equality. They argued that gender equality is an essential aspect of human dignity and social justice and is an effective means to achieve the other development goals.

Methodology and Empirical specification

Following Solow (1956) Griliches (1979) Barro and Sala-i-Martin (1992), our methodology is based on traditional neoclassical model in the form of Cobb-Douglas production function,

$$Y = F(K, AL) = K^{\alpha}.(AL)^{(1-\alpha)} \quad (1)$$

Where Y denotes the output which is a function of effective labor output (AL) and capital (K). Furthermore, A represents given technology, and α denotes the share of capital that lies between 0 and 1 (for convenience we drop the subscript t).

For empirical purpose, we use panel data model and the regression equation takes the following form

Empirical specification takes the following form,

$$log\left(\frac{y_{i,t}}{y_{i,t-1}}\right) = a - \lambda.log[y_{i,t-1}] + \delta \times WECON_{i,t} + \gamma X_{i,t} + \eta_i + \tau_t + \mu_{it},$$

Or,

$$grGDP_{pc,\ it} = a + \lambda.logGDP_{pc,t-1} + \delta\, WECON_{i,t} + \gamma X_{i,t} + \eta_i + \tau_t + \mu_{it}, \quad (2)$$

where $log\left(\frac{y_{i,t}}{y_{i,t-1}}\right)$ is the growth rate of output per capita, WECON is women economic rights used as a proxy for women empowerment. δ is the coefficient which captures the effect of women empowerment on growth. X represents the set of control variables that measures the observable heterogeneity across different countries and γ measures the effect of control sets on growth rates. η is an unobserved individual effect that is constant overtime but varies across countries, τ is a time-specific factor constant for all countries and represents the global shocks, e.g., a decline in economic activity or a technology shock, and μ is a random error term. λ is the coefficient of lagged value of output per capita ($logy_{i,t-1}$). The detail definition of all variables is discussed in the data section.

Empirical specification

For empirical estimation purpose, we use random effect model by using MLE (maximum likelihood estimator) method of estimation by following the standard procedure as explained by Baltagi (2013) Semykina and Wooldridge (2013) and Allison (2009). There are too many parameters in the FE (fixed effect) model and the loss of degrees of freedom can be avoided if the error term μ_{it} can be assumed as random Baltagi (2013). The standard form of panel data is,

$$y_{it} = \alpha + X_{it}\,\beta + u_{it} \quad (3)$$

$$u_{it} = \mu_i + v_{it} \quad (4)$$

Where i denoting countries, and t denoting time. α is a scalar, β is K × 1 and X_{it} is the i tth observation on K explanatory variables. μ_i denotes the unobservable individual-specific effect and v_{it} t denotes the remainder disturbance. In the FE model, the v_{it} is independent and identically distributed and X_{it} are assumed independent of the v_{it} for all i, and t. In the case of FE model too many parameters are need to be estimated which is actually a loss of degrees of freedom. Whereas in random effect model μ_i are independent of the v_{it}. Additionally, the X_{it} are assumed independent of the μ_i and v_{it} for all i, and t. therefore, random effect model is an appropriate specification if we are drawing N individuals randomly from a large population.

Spatial Econometrics

Moreover, we are also interested in testing the spatial dependence in our analysis of women empowerment. As we know that many countries are connected to each other geographically and with trade relations. There a possibility that level of women empowerment in one location which we might label i (country i) depends on the level of women empowerment at location j (another country which is located close or far). Formally we might state (for detail see Anselin (1988) LeSage (2008):

$$y_i = \mathrm{f}(y_j), i = 1, \dots, n \quad j \neq i \quad (5)$$

The present study uses Spatial Autoregressive (SAR) and Spatial Durbin Model (SDM).[4] The SAR model with can be represented by the following equation:

$$Y = \rho_1 W_1 Y + \gamma X + \mu \quad (6)$$

Where, Y is $(n \times 1)$ a vector of the dependent variable representing growth rate, W_1 is $(n \times n)$ spatial weight matrices, ρ_1 is a spatial parameter. X is $(n \times k)$ the matrix of exogenous variables and μ is the traditional disturbance term. The *W*1 weight matrix (or spatial dependence) captures the spillover effect from neighboring countries. The reduced form of the extended SAR model along with its likelihood can be shown in the following form:

$$Y - \rho_1 W_1 Y = X\gamma + \mu$$
$$u = (1 - \rho_1 W_1)Y - X\gamma$$
$$L(\gamma, \sigma, \rho_1, \rho_2) = (2\pi\sigma^2)^{-\frac{n}{2}} \parallel 1 - \rho_1 W_1 \parallel exp(-\tfrac{1}{2\sigma^2}\mu'\mu) \quad (7)$$

This Spatial Durbin Model (SDM) includes a spatial lag of the dependent variable $W_1 Y$, as well as the explanatory variable vector X, and a spatial lag of the explanatory variable $W_1 X$. The SDM model can be expressed by the following equation:

$$Y = \rho_1 W_1 Y + \gamma X + \gamma_1 W_1 X + \mu \quad (8)$$

Where, W_1 is $(n \times n)$ spatial weight matrix, ρ_1 is spatial parameters attached to the spatial lagged dependent variable $W_1 Y$. γ_1 is the parameter attached with the spatial lagged explanatory variables $W_1 X$. Where γ usual coefficient attached with the control variables and γ_1 captures the neighborhood effect from a set of control variables.

After considering the spatial analysis in our model, the equation (2) has been transformed as following,

SAR specification:

$$grGDP_{pc,\ it} = a + \lambda . logGDP_{pc,t-1} + \rho_1 W_1\ logGDP_{pc,t-1} + \delta\, WECON_{i,t} + \gamma X_{i,t} + \eta_i + \tau_t + \mu_{it}, \quad (9)$$

SDM specification:

$$grGDP_{pc,\ it} = a + \lambda . logGDP_{pc,t-1} + \rho_1 W_1\ logGDP_{pc,t-1} + \delta\, WECON_{i,t} + \delta_1 W_1 WECON_{i,t} + \gamma X_{i,t} + \gamma_1 W_1 X_{i,t} + \eta_i + \tau_t + \mu_{it}, \quad (10)$$

Data

An unbalance panel dataset, for 171 countries from1960 to 2016, is used for the analysis. The main variable used is the measure of women's economic and social empowerment. We used the variable constructed by Cingranelli and Richards (2010). This dataset is also known as CIRI Human Rights Database. This data has been used in many recent studies, see, for example, Dreher, Gassebner, and Siemers (2012), Gutmann, Pfaff, and Voigt (2017), Blanton and Peksen (2016).

The dataset is very comprehensive and unique. Women's economic and social rights variable is based on the following internationally recognized rights.

- Equal pay for equal work
- Free choice of profession or employment without the need to obtain a husband or male relative's consent
- The right to gainful employment without the need to obtain a husband or male relative's consent

[4] For detail about the basic SAR and SDM model see, LeSage (1998) and Anselin and Griffith (1988).

- Equality in hiring and promotion practices
- Job security (maternity leave, unemployment benefits, no arbitrary firing or layoffs, etc...)
- Non-discrimination by employers
- The right to be free from sexual harassment in the workplace
- The right to work at night
- The right to work in occupations classified as dangerous
- The right to work in the military and the police force

The women economic right index is constructed by using the information from above variables. This index is used as a proxy for women empowerment which has the value from 0 to 3. Where the value 0 indicates no rights, 1 specifies some rights, 2 shows rights under the law while 3 indicate that women's economic rights were guaranteed by the law and by the government (for detail see, Cingranelli & Richards, 2010). We have also used many other social and international rights variables as a control set from a same data source (detail is given in the appendix). World Development Indicator (WDI, 2016) is the second data source we used to collect the data for GDP per capita and other related variables. An overview of the main variable is in the following Table 1.

Table 1: Variables and data sources

Variable	Data Source
Final consumption expenditure	WDI
International trade	WDI
GDP per Capita	WDI
Life Expectancy at birth	WDI
Political Regime	CIRI
Country Identifier	CIRI
Disappearance	CIRI
Extra-judicial Killing	CIRI
Political Imprisonment	CIRI
Torture	CIRI
Freedom of Assembly and Association	CIRI
Women economic Empowerment	CIRI
CIRI: available at http://www.humanrightsdata.com/ compile by Cingranelli & Richards, (2010)	
WDI: World Development Indicator (2016)	

Results

This section presents the empirical results for the impact of women empowerment on growth in a global perspective. As define earlier our dependent variable is GDP per capita growth and the main variable of interest is women empowerment (women economic right) which has a value from 0 to 3. Therefore, the effect of women empower is not an absolute effect on growth but we have one reference group and three treatment groups as following,

Reference group: Level-0 (no women empowerment or no economic rights for women)
Treatment groups: women empowerment in three levels

- Level-1 (specifies some rights)
- Level-2 (shows rights under the law)
- Level-3 (shows women's economic rights were guaranteed by the law and by the government

Table 2: Women Empowerment and Growth (OLS and MLE results for Global Sample)

Variables	OLS	OLS	MLE	MLE
Women Economic Empowerment	0.634***	0.555***	0.595***	0.415***
	0.109	(0.119)	(0.138)	(0.140)
Lag of Log GDP Per Capita	-0.444	-0.873***	-1.262***	-1.392***
	0.0658	(0.0978)	(0.151)	(0.151)
Trade	0.0117***	0.0113***	0.0167***	0.0166***
	0.00148	0.00159	0.0025	0.002
Consumption expenditure	-0.0516	-0.0505***	-0.064***	-0.0551***
	0.0051	0.005	0.007	0.006
Life expectancy		0.0705***	0.070***	0.127***
		0.0104	0.0132	0.0162
	(Human Rights variable)			
Political Regime	--	Yes	--	Yes
Country Identifier	--	Yes	--	Yes
Disappearance	--	Yes	--	Yes
Extrajudicial Killing	--	Yes	--	Yes
Political Imprisonment	--	Yes	--	Yes
Torture	--	Yes	--	Yes
Freedom of Assembly and Association	--	Yes	--	Yes
Regional dummies	--	Yes	--	
Time dummies	No	No	Yes	Yes
Constant	7.842***	6.466***	10.17***	7.388***
	0.779	(0.911)	1.258	(1.511)
Observations		5756		5756

Note: Robust Standard errors in parentheses by using MLE method of estimation
Where *, ** and *** represents the level of significance at 1%, 5% and 10% p
Panel dimension: Time=1960-2016, Countries: 171 in total
Definition of human rights variables is given in data section**.**

Table 2 report the results for a global sample by using pooled OLS and Random effect model by using MLE (maximum likelihood estimator) methods. The effect of women empowerment is the average effect across three different levels of women economic rights on GDP per capita growth. The results of equation (2) are presented in Table 2 where first two columns show the OLS results by estimating the model without the panel. The effect of women empowerment is quite large which shows that if a country has women empowerment (average of 3 levels); the growth rate will be 0.55% higher than the country with no women empowerment (level-0). Results reported in column 3 and column 4 employ the panel data model with random effect model by using MLE method. Additional, column 3 and column 4 also control for the other types of individual and country-specific observable characteristics such as human rights variables. Based on the results in column 4, the impact of women empowerment on GDP per capita growth is 0.42% higher

than the countries with no women empowerment. These results for women economic empowerment are quite robust to different specifications (for other specification, see results tables in the appendix).

Subsample (high and low income countries)

We also estimate the model for a different group of countries characterized by the level of income. Results from low (low and lower middle income) and high income (high and higher middle income) countries are reported in Table 3. The effect of women empowerment for high-income countries is significant but not for the low-income counties. After controlling for different types of observable individual and country-specific heterogeneity, there is 0.45% higher growth for countries with full women economic rights compare to those with zero women economic rights. These results are robust with the findings in Table 1 but not for low-income countries. These results also show that there is not enough level of women empowerment exists in low and lower middle-income countries.

Women empowerment and relative growth

As defined earlier that our main variable women empowerment is categorized between 0 and 3. Where the value 0 indicates no rights, 1 specifies some rights, 2 shows rights under the law while 3 indicate that women's economic rights were guaranteed by law and by the government (Cingranelli & Richards, 2010). Even with in the high-income groups there is a difference in growth effect. In the following Table 4, we have estimated the absolute growth and difference in growth rate for the high-income group (based on the estimates from Table 3). There is a significant difference in relative growth rates with respect to the different level of women empowerment. For instance, countries with some economic power have 1.29% higher growth rate than the countries with no economic power. Similarly, countries with economic power under the law have 2.6% higher growth than the treatment group with no power. The countries with full women rights have 3% higher growth than the first group. Figure 1 represents the relative growth rates against the different levels of women empowerments.

Table 3: Women Empowerment and Growth (OLS and MLE results for High & Low Income Countries)

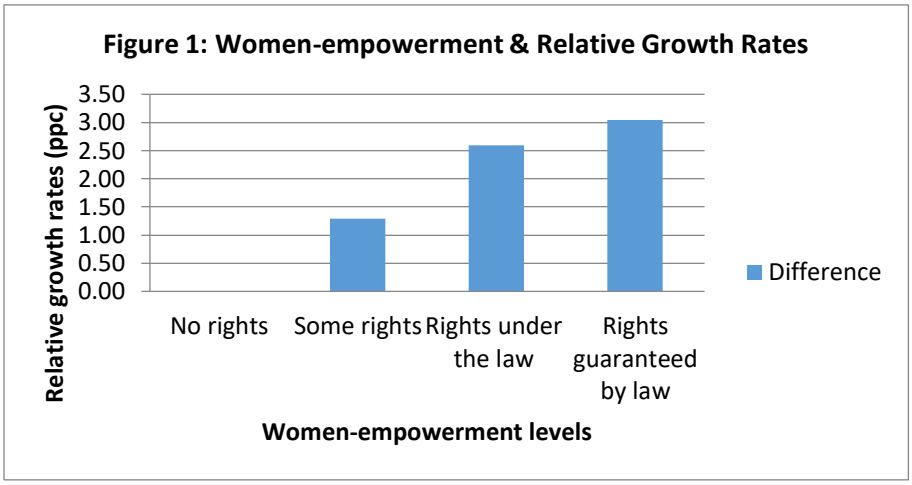
	Low income	**High**	**High**	**High**
Women Economic Empowerment	0.204	0.606***	0.570***	0.449**
	(0.239)	0.188	0.171	(0.175)
Lag of Log GDP Per Capita	-1.874***	-1.491***	-2.341***	-2.294***
	(0.289)	-0.233	-0.288	(0.331)
Trade	0.019***	0.0150***	0.0224***	0.0208***
	0.005	0.003	0.003	0.003
Consumption expenditure	-0,075***		-0.0692***	-0.0653***
	0.009		-0.0094	0.009
Life expectancy	0.096***			0.00586
	0.017			0.023
	(Human Rights variable)			
Political Regime	Yes	--	--	Yes
Country Identifier	Yes	--	--	Yes

Disappearance	Yes	--	--	Yes
Extrajudicial Killing	Yes	--	--	Yes
Political Imprisonment	Yes	--	--	Yes
Torture	Yes	--	--	Yes
Freedom of Assembly and Association	Yes	--	--	Yes
Regional dummies	Yes	--	--	Yes
Time dummies	Yes			Yes
Constant	13.68***	13.60***	26.38***	25.28***
	(2.358)	(2.111)	(3.07)	(2.943)
Observations	2896	2860	2860	2860

Note: Robust Standard errors in parentheses by using MLE method of estimation
Where *, ** and *** represents the level of significance at 1%, 5% and 10% p
Panel dimension: Time=1960-2016, Countries: 171 in total
High income group=46, Low income group (lower middle+ low income)=88
Definition of human rights variables is given in data section.

Table 4: Women empowerment and growth accounting (Rich countries)

Levels	Women economic power	Absolute	Difference in Growth
Level 0	No rights	45.19	--
Level 1	Some rights	46.49	1.29
Level 2	Rights under the law	47.80	2.60
Level 3	Rights guaranteed by law	48.24	3.04



Spatial analysis results

Before estimating the spatial model, we used a Moran 'I' test for spatial dependence. The results are reported in Table 5. Based on Moran test, null hypothesis of no spatial dependence is rejected which gives an indication of spatial dependence in the relationship being observed. It means that we must consider the spatial models as an alternative specification to the classical linear regression model otherwise the results will be biased (Anselin & Griffith, 1988; Arbia, 2014; LeSage, 2008). After testing the spatial dependence, remaining section explains the results of two spatial regression models (SAR and SDM).

Table 5: Test Results of Spatial Dependence			
	Moran- I	Statistics	P-values
GDP per capita	0.194	2.803	0.005
Lag GDP per capita	0.752	10.367	0.000
Trade	0.153	2.42	0.016
Women Economic Empowerment	0.454	6.341	0.000
Note: weigh matrix type: distance-based (binary) based on 3 nearest neighbor Moreover, weight matrix is row-standardized			

Table 6 reports the results of spatial regression based on specification in equation (9) and (10) of SAR and SDM models respectively. Furthermore, we have two panels in Table 4: Panel (A) reports the average results while panel (B) represents direct, indirect and total effect from women empowerment on growth. In total, we have four regressions with different specifications for comparison. Column (1) and column (2) reports the results from SAR and SDM model but without controls, while column (3) and column (4) are more promising specification as it includes both observable (control sets) and unobserved heterogeneity (random effect). Based on panel (A), spatial parameter estimate from SAR and SDM model is significant as denoted by "Rho (spatial dependence)" which confirms the existence of spatial dependence.
Based on results from SAR specifications (column 3), the parameter estimate of women empowerment is significant with the value of 0.296 and total effect of women empowerment on GDP growth is also significant with the magnitude of 0.38% (in panel (B). It implies that if there is 1 level increase in women empowerment would result in a 0.379% increase in per capita growth. Out of this around 20% is neighborhood effect comes from neighboring countries (indirect effect) and remaining 80% comes from countries owns level of women empowerment (direct impact). It confirms that women economic empowerment is dependent on the level of empowerment in neighboring countries.
SDM specifications (column 4) include a spatial lag of the dependent variable (*WY*), as well as the explanatory variable vector *X*, and a spatial lag of the explanatory variables (*WX*). The parameter estimate of women empowerment is not significant but the parameter estimates from spatial lag of women empowerment is significant with value of 0.526 which confirms the spatial dependence and neighborhood effect. It implies that the level of women empowerment in current country is positively affected by the level of women empowerment by its neighboring countries. Moreover, in SDM specification, we can see that neighborhood (indirect) effect 75% while country's own effect from women empowerment is only 25%. It further highlights the importance of spatial spillover from neighboring countries. Additional implication of our findings is that collaborative efforts by the neighboring countries regarding women empowerment can benefit every country in the regions. Our results support the efforts by European Union regarding women empowerment in the region (Cichowski, 2004; Ellina, 2004)

Spatial Analysis on sub-sample (High and low income groups)

We also estimate the model for a different group of countries characterized by the level of income. Results from low (low and lower middle income) and high income (high and higher middle income) countries are reported in Table 7.[5] The effect of women empowerment for high-income countries is significant but not for the low-income counties. Table 7 reports the direct, indirect and total effects of women empowerment on growth. With regard to high income countries, the direct effect from SAR model is greater than indirect (spillover) effect while in SDM model; indirect (spillover) effect is greater than direct effect. The results are also consistent with Table 4 with regards to SDM specification. Insignificant results for developing countries could be due to heterogeneous impact of women empowerment. In addition, further investigation can be carried out on the subsample of the group of low income countries. The group can be divided into different geographical regions and/or ethnic background.

Table 6: Women Empowerment and Growth (Spatial analysis: SAR and SDM models)

[5] Full results for high and low income countries can be found in the appendix Table A2.

Variables	**SAR**	**SDM**	**SAR**	**SDM**
	(1)	(2)	(3)	(4)
Panel (A): average results				
Women Eco-empowerment	0.428**	0.303	0.296*	0.195
	(0.199)	(0.210)	(0.154)	(0.156)
***W*x[Women Eco-empowerment]**		0.483		0.526**
		(0.313)		(0.237)
Lag of Log GDP Per Capita	-0.275**	-0.400**	-1.490***	-1.551***
	(0.116)	(0.164)	(0.158)	(0.182)
ρ_1 ***W*x[Lag of Log GDP Per Capita]**		0.0471		0.0452
		(0.191)		(0.241)
Trade	0.00953***	0.00923***	0.000381	0.000737
	(0.00313)	(0.00312)	(0.00265)	(0.00257)
Consumption expenditure			-0.104***	-0.114***
			(0.0112)	(0.0116)
Life expectancy			0.152***	0.133***
			(0.0200)	(0.0284)
Rho (Spatial dependence)	0.129***	0.128***	0.216***	0.223***
	(0.0250)	(0.0250)	(0.0231)	(0.0237)
Panel (B): Direct, Indirect and total effects:	**Direct effect**			
Women Eco-empowerment	0.433**	0.319	0.301*	0.228
	(0.203)	(0.210)	(0.157)	(0.157)
	Indirect effect			
Women Eco-empowerment	0.0627**	0.567*	0.0782*	0.684**
	(0.0319)	(0.343)	(0.0418)	(0.283)
	Total effect			
Women Eco-empowerment	0.495**	0.886**	0.379*	0.912***
	(0.232)	(0.348)	(0.198)	(0.325)
Direct effect %	87%	36%	80%	25%
Indirect effect %	13%	64%	20%	75%
Observations	2400	2400	2328	2328

Note: Robust Standard errors in parentheses by using MLE method of estimation for SAR and SDM models.Control variables for specification (2) and (4) of SDM models: human rights variables (Political Regime, Country Identifier, Disappearance Extrajudicial Killing, Political Imprisonment, Torture, Freedom of Assembly and Association), Regional dummies, Time dummies. Definition of human rights variables is given in data section**.** Where *, ** and *** represents the level of significance at 1%, 5% and 10%. Panel dimension: Time=1991-2014, Countries: 100 in total.

Table 7: Women Empowerment and Growth (SAR and SDM models for high income group)

	High income countries		**Low income countries**	
Variables	**SAR**	**SDM**	**SAR**	**SDM**

Direct, Indirect and total effects:				
	Direct effect			
Women Eco-empowerment	0.406***	0.373***	0.00256	0.0143
	(0.148)	(0.143)	(0.308)	(0.305)
	Indirect effect			
Women Eco-empowerment	0.255**	0.640*	0.00147	-0.0496
	(0.0994)	(0.342)	(0.0426)	(0.599)
	Total effect			
Women Eco-empowerment	0.662***	1.013***	0.00404	-0.0353
	(0.244)	(0.389)	(0.349)	(0.696)
Direct effect %	61%	37%	63%	40%
Indirect effect %	39%	63%	37%	60%
Observations	1200	1200	1128	1128

Note: Robust Standard errors in parentheses by using MLE method of estimation for SAR and SDM models. Control variables for specification (2) and (4) of SDM models: human rights variables (Political Regime, Country Identifier, Disappearance Extrajudicial Killing, Political Imprisonment, Torture, Freedom of Assembly and Association), Regional dummies, Time dummies. Definition of human rights variables is given in data section**.** Where *, ** and *** represents the level of significance at 1%, 5% and 10%. Panel dimension: Time=1991-2014, Countries: 100 in total.

Summary and Conclusion

This study tries to explore the nexus between women empowerment and economic growth. Particularly, the hypothesis that the women empowerment leads to economic growth is tested. However, economic growth in many countries no only depends upon their own level of women economic empowerment but also on the level of women empowerment in the neighboring countries through, foreign direct investment, international trade, social and cultural linkages and globalization (Elson, 1999; Neumayer & De Soysa, 2011; Wichterich, 2000). Therefore, in order to correctly identify the impact of women economic empowerment this study employs the spatial econometric tools to correctly identify the impact of women economic empowerment from own and neighboring countries. For empirical analysis, we used panel data over the period 1960 to 2016 for a global sample of 171 countries. For estimation purpose, we employ OLS, MLE with robust standard error, as well as the spatial models (SAR and SDM).

The results of this study show that women economic empowerment significantly increases the economic growth in the global sample. This relationship is significant regardless if we use estimation techniques (pooled OLS and MLE) or the one that take cares of spatial dependence (SAR and SDM).

From OLS and MLE, we find that the effect of women empowerment on economic growth differs among economies characterized by income. In particular, we find that the effect for high income countries is statistically significant while there is insignificant effect for low income countries. The reason could be that the level of women economic empowerment in developed countries is already high while it is low in developing counties. In sum, results of the study show that women empowerment stimulates economic growth. However, the effect is heterogeneous with the different levels of women empowerment within the high-income group.

With regards to spatial analysis, we find that there is significant spatial dependence exists among the group of countries in our sample. In particular in the SDM model, we find that neighborhood (indirect) effect is 75% while country's own effect from women empowerment is only 25%. It confirms that spatial spillover from neighboring countries is significant which imply that collaborative efforts by the neighboring countries regarding women empowerment can benefit every country in the regions. The results with regards to economies characterized by income are robust where the effect of women empowerment is stronger in developed countries than developing countries. Our results support the efforts by European Union regarding women empowerment in the region (Cichowski, 2004; Ellina, 2004).

For future consideration, it would be interesting to further investigate the women economic empowerment for sub-sample of developing countries. For instance, group of ASEAN, GCC or ASEAN sample.

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Does exposure of female politicians yield electoral benefit for women? Evidence from Taiwan

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Abstract

Voters' prejudice toward female politicians may explain women's rarity of representation in politics. The view has been that if women were to be elected, they could demonstrate themselves be effective. Consequently societal opinions about women as politicians would change, and old stereotypes as to their limited competence would break down as more frequent positive female politicians are encountered. This is a demand side problem, different from the supply-side prospects in the rich literature on women's representation in politics. This study thus attempts to study the effects of the exposure of female politicians on women's electoral outcomes in the context of Taiwan. The results show that the participation of women in politics helps lessening gender prejudice toward female politicians and yields electoral benefits for women.

Key words: voter bias, female politicians, electoral outcomes.

Introduction

To recruit women into political positions is the goal pursuit for both developed and developing countries since the nature of public sphere is very likely to be improved by incorporating women's concerns in decision-making (Chattopadhyay and Duflo, 2004; Chen, 2010). Even though the evidence is indefinite, voter bias is likely to make female politicians less favored due to perceived incongruity between the female gender role and headship roles (Rosenwasser et al., 1987; Huddy and Terkildsen, 1993; Eagly and Karau, 2002). Women have been supposed to take charge of family responsibilities and display fewer of abilities that are required for a policymaker, especially in the field of "masculine" issues. Such kind of prejudice may explain women's rarity of representation in politics.

Voters often make choices consistent with their ideology if they are in a low-information context (McDermott, 1997). Undecided voters, specifically, are confirmed to come to a clear voting decision following their implicit attitudes toward candidates (Arcure et al., 2008). Cues such as past experience and stored knowledge may help them to found the understandings about candidates. If candidates are stereotyped based on group link, then demographic features would provide information associated with frequently held social typecasts. Therefore, voters' perception about a candidate's gender-linked personality is likely to drive expectations that women are less competitive than men.

The longstanding hypotheses that the presence of additional female candidates and officeholders helps close gender gaps in politics by empowering other women to vote or run for office themselves (Dolan, 2006; Broockmen, 2014). Moreover, the view has been that if women were to be elected, they could demonstrate themselves be effective. Consequently societal opinions about women as politicians would change, and old stereotypes as to their limited competence would break down as more frequent positive female politicians are encountered (Matland, 1994; Dasgupta and Asgari, 2004). Therefore, to legitimate gender quotas is suggested in Beijing Conference in 1995 as the first step to ensure a substantially increase in women of a body, which has been proved to be in effect across countries (e.g., Jones, 2004; Chen, 2010). Nevertheless, quotas may be taken as another symbol of gender discrimination against men so that voters may dislike female candidates. If this argument is true, the effect of quotas *per se* on increasing women's representation will be hampered and unsustainable.

Essentially, the high levels of exposure to a positive counter stereotypic exemplar can result in a decrease in implicit prejudice. Empirical studies reveal that barriers to entry confronted by potential female candidates cause higher average candidate quality for female incumbents than their male counterparts (Milyo and Schosberg, 2000; Black and Erickson, 2003; Berch 2004). Once voters have learnt about female politicians' capability, gender bias in politics is believed to diminish. Beaman et al. (2009) investigate the influence of reservation policy for female leadership on the electoral results of subsequent councilor elections. Although it is difficult to influence deep preferences and social norms, voters' beliefs on effectiveness of female politicians are improved, which helps to shape their voting

decisions. As a result, prior exposure to a female leader is associated with electoral gains for women in the context of India village councils.

The number of female politicians in Taiwan has gradually increased in both national and local elections. The average proportion of female legislators is below 22% before 2008, and above 26% since 2012, partly due to a switch in the system from a single non-transferable vote with a multimember district system to a single district two-vote system that political parties need to take gender issue into account when only one candidate can be nominated for each party. Similar pattern is found in councilor election that the average proportion of female councilors is below 25% before 1998, and above 27% since 2009, as a result of the reserved-seat system. In addition to the improved representation, there is an increase in women who are considering entering either national parliament or councils. Compared to 16.2% in 1998, 22~26% of legislator candidates are female during the last decade. Even though more women participating in politics responds to the legislative amendment, which belongs to the change of supply side, it is also possible that the demand side for female politician increases, i.e., voters' attitudes toward female politician progress attributable to the exposure of female representatives. For instance, the mayors of Chiayi City have been women ever since 1968, except for the last election in 2014, and women takes 33.3% of councilor seats, 6% higher than the average in Taiwan. At the same year, 37.88% of councilor seats won by women in Kaohsiung City, where Miss Kiku Chen has served the leadership position for more than 10 years. A continuous exposure and a high level of representation of female politicians seem to improve voter evaluation of female politicians in these two cities. Therefore, this study attempts to investigate whether the participation of women in politics helps lessening gender prejudice toward female politicians and yields electoral benefits for women beyond the reservation system in the context of Taiwan.

This study plans to employ the dataset of electoral results in 7 national legislator elections of 4514 villages in 6 Taiwanese cities over the period 1994-2014. I firstly estimate the relationship between the participation of women in the previous election and the current electoral outcomes for female candidates to understand voters' average attitude toward female politicians in the society. Besides, the estimation for the impact of lagged electoral outcomes on current outcomes may help capture the dynamic effects of repeated exposure of female candidates, and verify if there exists voting persistence among voters. Given that there is a dynamic effect of the electoral outcomes in terms of share of female candidates' votes, I then evaluate the policy impact on the change of attitudes toward female candidates when gender issue on candidate list concerns electorates and the seat share disquiets political parties. In the end of this paper, I expect to constitute a policy suggestion for encouraging women entering the public life in order to change voters' attitudes for female politicians and improve the public sphere.

The remainder of the paper is organized as follows. Section 2 provides a brief literature review and gives the main hypothesis in this study. Section 3 provides empirical specifications and describes the data. Section 4 presents the evidence of female leader on electoral gain for women. Section 5 offers a conclusion.

Does exposure of female politicians benefit female candidates?

Previous researches suggest that women's access to public office is at least partly restricted by voter and party bias that favor male politicians. This gender gap may rise from several factors, such as individual-level differences between men and women, differential media coverage, and cultural stereotypes (Bligh et al., 2012).

Even though the innate personalities may explain the existence of gender bias in preferences and behaviors, gender stereotypes are usually believed as an important determinant of perceptions of women's political representation and actual voting decision. Voters use gender stereotypes to infer candidates' ideological orientation and issue positions. Mostly, women suffer from ratings of experience and competence, but enjoy a benefit for their perceived ability to handle social issues (Koch, 2000). Therefore, women who hold political positions tend to exhibit more stereotypically masculine characteristics, including high self-confidence, dominance, and high levels of achievement. Women politicians may also attempt to expand their areas of activity to nontraditional issues, while simultaneously maintain a concern for their gender (Dolan and Ford, 1997).

Social welfare has been believed to be improved if different groups of policymakers can be admitted given their diverse considerations in making decisions. Nevertheless, gender role attitudes are in the initial evaluation of lesser known female candidates when there is sparse information about candidates or the cost of information is high, which may result in fewer female representatives. Hence, how to expand voters' information about candidates and modify their pre-existing attitudes toward women in political positions is an essential matter to women's representation in politics.

Bligh et al. (2012) argue that the increasing impact of the internet and media may augment a wider dissemination of campaign information and allow female candidates to present their political views in a nuanced way, which potentially alleviates voters' reliance on gender-role attitudes. Beaman et al. (2009) show that prior exposure of female politicians is associated with electoral gains for women since gender bias in politics shrinks when voters have learnt that women can effectively make decisions. However, Broockman (2014) find no causal effects of electing additional women on breaking down the underlying barriers for American women. In other words, whether there is female exposure effect or not is very likely to depend on the context.

Given these prior researches, it follows that female candidates, compared to their male competitors, are likely to be prejudiced perceived, particularly if voters hold traditional attitudes about women in positions of political authority. Nevertheless, voters' attitudes towards female candidates may adjust as more women have run for office and demonstrate their abilities in decision making. Thus, this study constitutes the hypothesis as the following

Hypothesis. The participation of women in politics may help lessening gender prejudice toward female politicians and yields electoral benefits for women.

Empirical strategy and data

Empirical strategy

The presence of female politicians may directly inspire other women to participate in politics and make the public sphere less intimidating for women. To understand voters' attitudes toward female candidates in general, this study starts by investigating how the electoral outcome of female candidates in the previous election relates to the current competition between female candidates and their male counterparts. The following specification with the data describing 7 national legislator elections of 4514 villages in 6 Taiwanese cities is considered:

$$VS\_Fem_{i,t} = \alpha_i + \beta_t + \gamma VS\_Fem_{i,t-1} + + \mathrm{X}'_{i,t}\delta + \varepsilon_{it}, \qquad (1)$$

where i denotes village indices, t denotes time indices VS_Fem denotes the share of female candidates' votes. Roughly, a city with electorates more congenial to female politicians will be associated with more ballots casted to female candidates if women are showed to be an effective representative. X_{it} is a set of control variables including electorate size, voter turnout and trend. Finally, election fixed effects are included to account for systematic variation across elections, and district fixed effects are also controlled for unobserved permanent differences in female candidates' vote share that may exist among districts. In addition, it is also allowed for the possibility that the shocks $\mathcal{E}$ are an MA(1) due to the lagged dependent variable. The spatial correlation among the error terms is accounted for by clustering results at the village level. Through the estimation of equation (1) will also provide an insight into the question that whether there exists voting persistence among voters.

Since the national election for legislators has seen a switch in the system from a single non-transferable vote with a multimember district system to a single district two-vote system, with one vote for candidates and one for political parties, following the amendments to the Additional Articles of the Constitution in 2005, it gives a special circumstance to evaluate the policy impact on the change of implicit attitudes toward female candidate when gender issue on candidate list concerns electorates and the seat share disquiets political parties. Assume that there is lagged effect of female electoral outcome, the following empirical specification using data at the village level is employed:

$$VS\_FEM_{i,t} = \alpha_0 + \gamma_0 Post + \gamma_1 VS\_FEM_{i,t-1} + \gamma_2 Post \times VS\_FEM_{i,t-1} + \mathrm{X}'_{i,t}\delta + \epsilon_{i,t} \qquad (2)$$

where $Post = 1$ refers to the observation after 2010. Single district two-vote system is a relevant policy influencing the nomination strategy for political parties and consequently the electoral outcomes of female candidates if $\gamma_0 > 0$, and voters constitute their implicit attitudes toward women if $\gamma_1 > 0$. Moreover, if the lagged electoral outcomes for female candidates yields electoral benefits for women beyond the voting system, one will obtain a significant positive γ_2.

Data description

The dataset contains information about the voting decisions in 7 national legislator elections of 4514 villages in 6 Taiwanese cities over the period 1994-2014. These 6 cities, containing New Taipei County, Kaohsiung City, Taichung City, Tainan City, Taipei City and Taoyuan City, are municipalities directly under the jurisdiction of the central government.

Electoral data such as electorate size, votes cast and valid votes by gender at village level are collected from the Central Election Commission in Taiwan, and voter turnout and vote share of female

candidates are calculated thereafter.

Results

This paper studies voters' attitudes toward female candidates with the data of electoral outcomes in the legislator elections at village level in 6 major cities from Taiwan. Table 1 provides summary statistics for voter turnout and share of votes by gender. There are 29158 observations in total. Voter turnout rate varies a lot that it ranges from 13.97% to 92.41%, with an average of 66.88% in these areas, due to different electorate size and geographical characteristics. Even though observations are taken as missing values if no female candidates run for the election, there are still 24594 observations and the average share of female candidates' votes based on the available data is above 25%, except in New Taipei City. Benefited from the gender quotas, women won 31.5% of seats in Taiwan at 2016 election, compared to 9.47% in Japan at 2014 election and 17% in South Korea at 2016 election. The high representation of female politicians in Taiwan is likely to reveal the fact that voters modify their attitudes to female representatives and would like to cast their ballots to female candidates as more women have had been elected.

<Table 1 is inserted about here>

Before investigating voters' attitudes toward female candidates, the estimation of equation (1) by using voter turnout as dependent and lagged dependent variables are reported in Table 2 for the purpose to understand the extent of voters' participation in public life in general. It shows that voter behavior supports the hypothesis of habit formation that a village with a higher rate of lagged voter turnout is associated with a higher rate of current voter turnout when unobserved district factors are controlled for, as reported in column (2). With the concern of endogeneity problem, turnout rate lagged two-election is taken as the instrument for lagged turnout rate and the estimation is reported in column (3). Even though the standard errors get larger, the 2SLS estimate is consistent and significant. Since the panel data employed in this study is in the context of "small T (elections), large N (villages)" with one lagged dependent variable, dynamic panel-data estimation seems to be a proper approach to estimate the model (Roodman, 2009). The result in column (4) is consistent with what has been found in previous columns that voting behavior is correlated with past decision. In column (5), district fixed effects are replaced by village dummies to capture the social influence from the smallest administrative division. Although it is still relevant, lagged voter turnout yields a negative effect on current turnout rate. The reverse effect may reflect the different contextual influence, which needs to verify with more information.

<Table 2 is inserted about here>

Table 2 provides evidence about the habitual nature of voting decision in terms of voter turnout, which responds to the literature (e.g. Cutts et al., 2009; Denny and Doyle, 2009; Meredith, 2009; Górecki, 2013a; Górecki, 2013b; Coppock and Green, 2016; Fujiwara et al., 2016). The voting decision on candidates may also reveal the persistent feature due to the cost of making choice. Therefore, voters may cast their ballots to a candidate if they have consistent ideology or if past experience and stored knowledge demonstrates the ability of candidates. In other words, voters are likely to come to the decision following their implicit attitudes toward candidates. Specifically, voters' attitudes toward female candidates may improve as more women run for office. To test the hypothesis, the estimation of equation (1) is reported in Table 3.

<Table 3 is inserted about here>

In column (1), the lagged share of female candidates' votes is significantly correlated to the current share of female candidates' votes. When district fixed effects are included, as shown in column (2), the lagged effect of women's share of votes is smaller, but still significant that a one percentage point increase in the lagged share of female candidates' votes leads to a 0.304 percentage point rise in the current share of female candidates' votes. Take Taipei City as an example, female candidates will gain 1260 votes more in next election at 2020 if all other things being equal. Moreover, turnout rate also drives women's share of votes that more voters going to the poll station will benefit female candidates. This is likely to in concord with DeNardo (1980) that increases in voter turnout helps the minority group due to the increase in the number of peripheral voters, who are more likely to defect from their usual political belief.

The 2SLS and dynamic panel-data estimation results are given in columns (3) and (4), with the concern of endogeneity problem and unobserved heterogeneity problem, respectively. Both effects of the lagged female candidates' share of votes are relevant. When district fixed effects are replaced by village dummies, as shown in column (5), the lagged effect of female candidates' share of votes remains positive and significant, which is different from the findings of voter turnout in Table 2. This may be explained by the influence of social environment on voters' decision about certain types of candidates. While voter turnout is likely to be influenced by the competitive extent and political issues

of elections, to cast a vote to specific type of candidate is more likely to be impacted by social value system surrounding the voter, i.e., the formation of implicit attitudes.

Taiwan has applied a single district two-vote system since 2010, in which system the political parties are suggested to be more likely to nominate a candidate with better ability or clearly identified with the electorates. Besides, the relative simpler voting process may increase voter turnout. Therefore, I firstly estimate the equation (2) with turnout rate as the dependent variable to examine the effect of policy change on voting behavior. The results in columns (1) and (2) of Table 4 show that voters are encouraged to cast a vote after the implementation of new system, and there is still persistent voting behavior. However, the new system does not support lagged effect of turnout on current voting decision when 2SLS is applied, as shown in column (2).

<Table 4 is inserted about here>

Even though the single district two-vote system encourages turnout, it is argued that this system may be unfavorable for disadvantaged groups or small parties since only one winner exists in each constituency. Hence, it is uncertain whether female candidates would benefit from the new system or not. The estimation of equation (2) is reported in columns (3)-(5). It shows that the new system benefits the share of female candidates' votes, and there is lagged effect of female electoral outcomes. Nevertheless, the lagged female candidates' share of votes yields a negative effect on current electoral outcomes for female candidates after the introduction of new system. Consequently, the attitudes of voters toward female candidates become ambiguous when the new electoral system is taken into account. This is likely to reveal the conflict between implicit and explicit attitudes. While the electorates' implicit attitudes may remain show to favor female candidates due to women's continuous representation in politics, voters' explicit attitudes may stand for their supported political party if they are identified as party members (Hawkins and Nosek, 2012), especially when the new system has been believed to seriously impact the seat shares for political parties. In other words, whether female candidates will gain votes continuously depends not only on the development of voters' attitudes toward female politicians' effectiveness, but also other factors, such as political party's strategic nomination.

Conclusion

This study investigates whether the participation of women in politics helps lessening gender prejudice toward female politicians and yields electoral benefits for women beyond the reservation system in the context of Taiwan. The relevant lagged effect of female candidates' share of votes shows that the influence of social environment is very likely to yield effect on voters' decision about certain types of candidates, which is known as the formation of implicit attitudes. However, this effect may be declined when other issues occur to impact voters' explicit attitudes, such as the introduction of a single district two-vote system. Nevertheless, the results imply that to encourage women entering the public life continuously is very likely to change voters' attitudes toward female politicians, and consequently increase elected women, which is likely to raise the social welfare as suggested in the literature.

There are still some drawbacks required to solve for this study. When social environment is believed to be key factor to influence voting behavior, it is interesting to know its compositions. For example, a geographical constituency with a higher proportion of female voters is likely to be associated with more votes going to female candidates. Similarly, voters may care about economic affairs and support male candidates if their living area is belong to industrial zone. Therefore, a more sophisticated estimation with more control variables would be called for if the question about how the attitudes determine voters' decision is in interested. Moreover, this study takes voting persistence on female candidates as a representation for implicit attitudes, which is different from the literature that measures voters' implicit attitudes by standardized implicit attitude test (IAT). Implicit attitudes contain several kinds of information so that it would be more conclusive if an experimental design can be conducted in the future.

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Table 1. Descriptive statistics

	Observations	Mean	S. D.	Min	Max
All of samples (6 cities, 160 districts, 4514 villages)					
Turnout rate (%)	29158	66.88	7.51	13.97	92.41
Male vote share (%)	28966	79.17	22.51	0.00	100.00
Female vote share (%)	24594	25.31	23.35	0.00	100.00
Taipei City (12 districts, 459 villages)					
Turnout rate (%)	3114	68.44	7.58	47.76	87.18
Male vote share (%)	3053	75.92	18.45	14.38	100.00
Female vote share (%)	2997	26.56	20.86	0.00	100.00
Kaohsiung City (38 districts, 923 villages)					
Turnout rate (%)	6295	68.46	8.02	25.00	88.79
Male vote share (%)	6295	75.77	24.76	0.00	100.00
Female vote share (%)	5579	27.34	24.63	0.00	100.00
New Taipei City (29 districts, 1034 villages)					
Turnout rate (%)	7037	65.53	7.21	39.33	84.33
Male vote share (%)	7037	86.16	18.37	0.13	100.00
Female vote share (%)	5757	16.91	18.99	0.00	99.87
Taoyuan City (13 districts, 498 villages)					
Turnout rate (%)	3138	65.93	7.41	24.07	88.29
Male vote share (%)	3138	78.65	22.47	1.94	100.00
Female vote share (%)	2396	27.96	21.82	0.00	98.06
Tainan City (39 districts, 918 villages)					
Turnout rate (%)	5384	66.07	6.44	13.97	83.43
Male vote share (%)	5253	76.24	23.53	5.24	100.00
Female vote share (%)	4522	30.53	25.66	0.00	100.00
Taichung City (29 districts, 682 villages)					
Turnout rate (%)	4190	67.39	7.80	33.03	92.41
Male vote share (%)	4190	78.98	24.03	0.51	100.00
Female vote share (%)	3343	26.34	24.15	0.00	99.49

Table 2. The habit formation in voting behavior: Turnout rate

	(1)	(2)	(3)	(4)	(5)
Lag turnout	0.437***	0.282***	1.222***	0.038***	-0.022**
	(0.010)	(0.012)	(0.052)	(0.010)	(0.009)
Size	0.288***	-0.791***	0.561***	0.848**	0.715**
	(0.081)	(0.097)	(0.109)	(0.385)	(0.347)
Trend	-0.971***	-0.748***	-27.533***	-0.501***	-0.421***
	(0.028)	(0.029)	(0.848)	(0.030)	(0.031)
Year dummies	Yes	Yes	Yes	Yes	Yes
District dummies	No	Yes	Yes	Yes	No
Village dummies	No	No	No	No	Yes
Method	OLS	OLS	2SLS	Dynamic Panel-Data Estimation	OLS
R-squared	0.6091	0.6530	0.3851	-	0.6658
F-statistic	-	-	-	647.49	-
Observations	24644	24644	20189	20189	24639

Note: 1. Standard errors are in parentheses. One, two and three * denote significance at the 10, 5 and 1% levels, respectively. 2. Standard errors are corrected for clustering at the village level.

Table 3. The habit formation in voting behavior: the share of female candidates' votes

	(1)	(2)	(3)	(4)	(5)
Lag VS_Fem	0.540***	0.304***	0.329***	0.119***	0.231***
	(0.010)	(0.012)	(0.051)	(0.022)	(0.013)
Turnout	0.011	0.102***	-0.203***	0.241***	0.149***
	(0.022)	(0.022)	(0.043)	(0.033)	(0.031)
Lag turnout	-0.147***	-0.075***	0.087***	0.202***	-0.072***
	(0.021)	(0.020)	(0.026)	(0.026)	(0.027)
Size	-0.529***	0.401**	0.251	1.066	0.609
	(0.168)	(0.155)	(0.180)	(0.976)	(0.947)
Trend	2.079***	2.492***	-4.737***	3.189***	2.706***
	(0.105)	(0.109)	(0.992)	(0.248)	(0.115)
Year dummies	Yes	Yes	Yes	Yes	Yes
District dummies	No	Yes	Yes	No	No
Village dummies	No	No	No	No	Yes
Method	OLS	OLS	2SLS	Dynamic Panel-Data Estimation	OLS
R-squared	0.3993	0.5301	0.5448	-	0.6523
F-statistic	-	-	-	120.34	-
Observations	18284	18284	13186	13186	18281

Note: 1. Standard errors are in parentheses. One, two and three * denote significance at the 10, 5 and 1% levels, respectively. 2. Standard errors are corrected for clustering at the village level.

Table 4. The habit formation in voting behavior: the share of female candidates' votes

Dependent Variable	Turnout rate		Female candidates' vote share		
	OLS	IV	OLS	OLS	IV
	(1)	(2)	(3)	(4)	(5)
Post	33.350***	14.106***	9.231***	7.304***	35.846***
	(0.940)	(2.818)	(1.082)	(1.120)	(3.365)
Lag VS_Fem			0.473***	0.468***	1.264***
			(0.017)	(0.017)	(0.067)
Post X Lag VS_Fem			-0.231***	-0.227***	-1.292***
			(0.023)	(0.023)	(0.091)
Turnout				0.191***	0.044
				(0.023)	(0.044)
Lag turnout	0.105***	0.771***		-0.262***	-0.228***
	(0.012)	(0.040)		(0.024)	(0.028)
Post X Lag turnout	-0.224***	0.075			
	(0.016)	(0.050)			
Size	-1.103***	0.002	0.424***	0.299**	0.374
	(0.121)	(0.074)	(0.143)	(0.151)	(0.243)
Trend	-3.629***	-4.607***	2.429***	2.894***	4.314***
	(0.055)	(0.195)	(0.164)	(0.187)	(0.328)
R-squared	0.5845	-	0.5166	0.5230	0.4583
Observations	24644	20197	18284	18284	13190

Note: 1. Standard errors are in parentheses. One, two and three * denote significance at the 10, 5 and 1% levels, respectively. 2. Standard errors are corrected for clustering at the village level. 3. All the regressions control for district dummies.