

Do Female Politicians Influence Public Spending? Evidence from Taiwan

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Abstract: Taiwan is at the top of the list among Asian countries when it comes to the number of female legislators in national parliament. However, whether the increasing level of female politicians has an effect on policy outcomes is unclear. This is because female politicians' work on women's issues is often restricted by party discipline with the flourishing development of political parties and the politically fanatic electorates in Taiwan. To answer this question, this study first investigates the effects of female mayors on public spending while controlling for the incumbent party and gender mix in the council at each county, and then introduces the idea of a close election to examine the effect of female politicians. Results suggest that female mayors propose a higher share of government funding for social welfare.

Keywords: female politicians, policy outcomes, close election

JEL Classification: D78, H50, J16

1. Introduction

Previous research on politician identity and descriptive representation suggests that politician gender is a factor in policy determination. Differences in the behavior and priorities of male and female elected officials have been well documented (Thomas (1994), Davis (1997), and Wängnerud (2005)). Edlund and Pande (2002) suggested that the reason why women have different preferences than men is likely because women have default rights to children and men only get part of the right if they sign a marriage contract, in which they promise to provide for wife and children. Nevertheless, wives have not been legally subordinate to their husbands since the 1970s, and the obligation to provide for the family no longer rests solely on the husband. Women may therefore favor policies related to children and family more than men when they participate in the decision-making process (Edlund, Haider, and Pande, 2005).

Politicians tend to decrease the time and energy requirements of policy decision-making when time is constrained and leisure is normal goods. It is therefore reasonable to predict that legislators have a preferred position on legislation, and consequently make choices based on these preferences. As a result, female politicians are more likely to support soft issues, such as health and social welfare, since they have relatively more experience in these fields (Swigonski, 1994).

Moreover, electorates that elect women seem to have different political beliefs than those that do not, and the economic theories of policy formation in representative democracy provide differing predictions as to whether (and how) the gender of democratically elected politicians influences policy. Politician gender may influence policy outcomes through various channels regardless of differences in male and female politicians' preferences. Politicians often rely on the noisy signals

of voter preferences. If politicians interpret an increasing number of women in elected office as a signal of a shift in the priorities of the electorate toward issues traditionally associated with women and adjust their actions accordingly, then a change in gender composition may well affect policy (Lee et al., 2004; Rehavi, 2007; Svaleryd, 2009).

However, little is known about the causal effect of women's representation on policy decisions. The available evidence, based on cross-sectional comparison, measures the average effect of female politicians on policy decisions. The fact that women are better represented in a particular country or locality may reflect the political preferences of the group that elects them, which makes it difficult to interpret the results. In this case, the correlation between policy outcomes and women's participation may not imply a causal effect of female participation.

Using reservation policies as an exogenous event may help interpret the causal effect of female participation. Chen (2010) investigated the effects of gender quotas on policy decisions using cross-country data, and concluded that quotas for women's representation are likely to be translated into an increasing ratio of government expenditures on social welfare. Nevertheless, there are ambiguous evidence about gender difference in public choices for individual countries. For example, Chattopadhyay and Duflo (2004) analyzed the reservation of one-third of Village Council head positions for women in the states of West Bengal and Rajasthan in India in a randomized policy experiment. They found that this reservation for female leaders has a positive effect on investment in infrastructure related to women's needs, such as drinking water and roads. Campa (2011) uses a Regression Discontinuity Design combined with a Before/After estimation to explore the effect of legislated candidate gender quotas on the election of female politicians and on public finance decisions in Spanish municipalities. But the estimates of the effect of gender quotas on the size and composition of local government expenditures are not statistically different from zero. Rigon and Tanzi (2012) use an instrumental variable approach, based on a temporary change in Italian law that reserved a gender quota in party lists for municipal elections, and suggest that politicians' preferences and personal characteristics do not matter in public choices.

Another line of empirical studies explores the political data of close elections, which yield quasi-experimental election outcomes, to study the causal effect of politician gender. For example, Clots-Figureas (2012) found that primary educational attainment is higher in urban areas of India when female political representation is higher. Rehavi (2007) found that the movement of women into US state houses over the past quarter century was responsible for a rise in state health spending, and women elected in close races have a larger effect on spending priorities than the average female office holder.

Agreeing with these empirical findings, other researchers have shown that politician preferences are a factor in policy determination if the candidates cannot commit to specific policies once in office (Besley and Coate, 1997; Osborne and Slivinski, 1996). This set of models yields different policy predictions than the median voter model, which states that political decisions should reflect the preferences of the median voters if the candidates only care about winning the elections, and can make commitments about policies once elected (Downs, 1957). Nevertheless, there are testable implications for divergence in the policies enacted by male and female leaders and the interaction of politician gender and gender mix in the legislature.

The reserved-seat system for women mandated both by the constitution and by the electoral law in Taiwan reflects the higher level of women's representation in politics in Taiwan. Women parliamentary representation in Taiwan was 30.09% in 2009, compared to Singapore's 24.47%, South Korea's 13.75%, and Japan's 9.38%. The protection of women's right to participate in the formal political arena not only encourages more women to enter politics, but also promotes women's social status. In other words, the reserved-seat system in Taiwan arouses the feminist consciousness. The Gender Empowerment Measure of Taiwan, which is ranked number 24 in the world and number 2 in Asia in 2008, confirms this.¹

Even though the representation of female politicians in Taiwan has reached a historically high level, it remains unclear whether the increasing level of female politicians has affected policy outcomes. Female politicians' work on women's issues is often limited by party discipline in Taiwan since the development of political parties is flourishing and most of the electorate is fanatically political. Therefore, this study investigates the average effect of female mayors on public spending while controlling for the incumbent party at the county. Assuming that councilwomen usually consider themselves as the representative of other women, more councilwomen may increase the influence of female mayors on public spending decisions. Therefore, this study includes gender mix in the council when investigating the influence of female politicians.

To obtain the causal evidence of female politicians, this study applies the idea of a close election. There are two major political parties in Taiwan: the Kuomintang (KMT) and the Democratic Progressive Party (DPP). These parties compete against each other in elections. Both of political parties compose a pool of aspiring candidates at the first stage and decide the final candidates through opinion poll and other approaches at the second stage. There is usually one candidate left for each party in the election of county mayor, and the winner is determined by the plurality voting system. Counties in which the electorates do not have an overwhelming majority preference for the KMT or the DPP before the election are likely to have the characteristics of close election, which may help reveal the causal effect of female leaders on policy outcomes. If potential candidates have some expectations regarding the competitiveness of the race they are considering entering, and if it takes greater effort to win this type of competitive race, then one would also need a higher payoff to induce potential candidates to enter competitive races. Therefore, only candidates whose policy preferences are relatively far apart are willing to stand for election in more difficult races.

The remainder of the paper is organized as follows. Section 2 provides a brief sketch of the background of women in politics in Taiwan. Section 3 provides empirical specifications and describes the data. Section 4 presents the baseline results and the causal evidence of female politicians on public spending. Section 5 discusses the findings. This section first checks if Chiayi City, a city with numerous female mayors, drives the results, and then compares public spending in counties with male leaders to check robustness of female mayor influences. Section 6 offers a conclusion.

2. Women in Politics in Taiwan

The number of female politicians in Taiwan has gradually increased in both national and local elections for decades. Congresswomen occupied less than 20% of seats before 1998, and reached 30.09% of seats in the latest election in 2008. A similar pattern appears in local elections. The proportion of councilwomen in all cities and counties was below 25% before 1998, while the average proportion rose to 27.7% in 2010.

The participation rates of female candidates and elected female politicians in all nine election categories were relatively low and stable during the decade following 1987, the year when the martial law was terminated.² It was not until 1998 that both of these rates began to grow. This situation was very likely the result of the fact that the DPP, the largest political competitor to the KMT, approved a party policy guaranteeing that one-fourth of candidates nominated would be women in 1997. This not only forced other political parties to promote the representation of women, but also influenced the legislation. For example, the Additional Articles of the Constitution, amended in April 2000, requires a number of seats to be allotted to female representatives in the legislative election. The Local Government Act, which was firstly promulgated in January 1999 and finally amended in 2010 through 8 various amendments, also requires that in a councilmen election, an additional female shall be among the elected for every additional four persons elected if the total number of the seats to be elected exceeds four.

Although reserved-seat system has been argued to be the determinant for the relatively higher representation of women in politics in Taiwan, it is less likely to be perpetually essential. The proportion of congress women and the average proportion of councilwomen exceed 25%, which is the lower limit in the reserved-seat system. Besides, the change of electoral system to the single-district two-vote system in the election in 2008, which revoked the reserved-seat for district female members, did not decrease the representation of women in the Legislative Yuan.³ There were about 30% of female candidates and more than 30% of the elected in 2008. In other words, the feminist consciousness in Taiwan has been aroused in recent decades with the implementation of a reserved-seat system, and more women are considering entering politics.

Nevertheless, the proportion of female city mayors is not as high as that in the Legislative Yuan or local councils. Most female candidates participating in mayoral elections are in the central and southern part of Taiwan, which may reflect the local political environment and landscape. For instance, the mayors of Chiayi City have been women ever since 1968, with the first eleven terms of city mayors belonging to the Hsu Family. Even though the following city mayors are no longer members of the Hsu Family, the political consequence of the Hsu Family may help to nurture the political power of women in Chiayi City. Another county with numerous female candidates is Changhua County. Since Ching-Yu Chou was elected as the mayor of Changhua County in 1989, many women have run in the county mayor election regardless of whether the current mayor is female. As a result, nominating a woman in the election may not only reveal the strategy of political parties, but also expose electorate preferences.

Chiang (2008) investigated the performance of female legislators in the 4th Legislative Yuan in Taiwan, and attempted to identify how female legislators are responsive to their gender standpoints in the legislative process. Statistical analysis shows that congresswomen speak for healthcare and welfare policies more frequently than education and crime prevention policies.

Moreover, “party identification” is apparently not an influential variable in legislation that concerns women’s issues. If Chiang’s findings typify female politicians’ attitudes and behavior in Taiwan, female politicians in small districts, i.e., female mayors and councilwomen, should stand for more government spending in functions related to health and social welfare.

3. Empirical Strategy and Data

3.1 Empirical Specification

To examine the influence of female politicians on public spending, consider the following empirical specification:

$$EXP_{i,t} = \alpha_i + \beta_t + \gamma_1 Head_{i,t} + \gamma_2 FEM_{i,t} + \gamma_3 Head_{i,t} * FEM_{i,t} + \gamma_4 X_{i,t} + \varepsilon_{i,t} \quad (1)$$

where i denotes county indices, and α_i and β_t indicate county and year effects, respectively. EXP denotes the proportion of public expenditures on different functions to the total government spending. $Head$ is a binary indicator, denoting the gender of the county head. $Head$ takes a value of 1 in the year when the mayor is female, and 0, otherwise. FEM is the fraction of councilwomen in the county. The proposed model includes the $Head$ and FEM interaction terms to see if more women in the council augment the effects of female mayors on certain policies.

Factors which may influence the distribution of government expenditures in each county should also be considered. X is a set of control variables, including political factors and demographic factors. Since it has been suggested that party control makes a difference in determining fiscal policies, one of the political factors is the incumbent party in the county, which refers to the political party holding relative more seats than others do (Pettersson-Lidbom, 2008; Ferreira and Gyourko, 2009). $Incumbent$ takes a value of 1 if the KMT is the incumbent party at the county, and 0, otherwise. Another political factor is vote shares of women winning the councilmen election, which may reflect the extent of gender consciousness and the electorate’s policy preference at the county. Similarly, more women enter the labor market may parallel to the fact that more women participate in the politics. Therefore, this study also controls for female labor participation rate. In addition, fiscal dependency on central government grants should be taken into account because it may affect the distribution of local government funds. Here the fraction of self-financing resource to total government spending is used as a proxy for fiscal dependency on central government grants.⁴ Demographic factors include population density, and the proportion of population under age 15, above age 65, in agricultural sector and in low-income households. Since an area with higher population density is likely to have higher degree of regional development, local government may allocate funds in different ways from that of other local governments. Moreover, government seems to propose a higher fraction of funds on social welfare if there are more dependents and a larger fraction of disadvantaged minority in the society. Finally, regression analysis also controls for the unemployment rate and time trend.⁵

Based on the survey by political scientists, female politicians tend to concentrate on the investments dealing with issues related to traditional concerns of women, i.e., issues about children and family. Therefore, there γ_1 and γ_2 should be positively related to government expenditures on social welfare. The directions of the signs of women’s influence on other public expenditures are not clear.

3.2 Data

The dataset covers 23 counties, including Changhua County, Chiayi City, Chiayi County, Hsinchu City, Hsinchu County, Hualien County, Kaohsiung City, Kaohsiung County, Keelung City, Miaoli County, Nantou County, Pingtung County, Penghu County, Taichung City, Taichung County, Tainan City, Tainan County, Taipei City, Taipei County, Taitung County, Taoyuan County, Yilan County, and Yunlin County, between 1994 and 2008.

The measure of female mayors, councilwomen and political factors mainly comes from the database of the Central Election Commission.⁶ Table 1 presents the descriptive statistics of female politicians in each county. All the mayors of Chiayi City were female from 1994 to 2008, while most mayors of other counties were men. However, the fraction of councilwomen has grown over time. Most counties had a proportion of councilwomen exceeding 20% in 2008, and some counties gave more than 30% of seats to women in the last election.

Public expenditures refer to the settled account of local government expenditures by function, including general administration, education and culture, economic development, social welfare, community development and environmental protection, police service, and obligations.⁷ The reason for considering a settled account, instead of a budget account, is because the government usually must propose the budget for the next year based on the implementation during the current year. Therefore, a settled account is likely to provide information not only about the governmental inclination for the distribution of public spending, but also about the effectiveness of enforcement. The data for government expenditures are reported in the *Statistical Yearbooks* issued by each county. The figures for total government spending were multiplied by 100.

Table 2 shows the average proportion of local government expenditures and the related standard deviation on each function by year. Although the allocation of government funds is different in each county, it is clear that spending on education and culture accounts for the most government spending. This ratio continues to grow in counties like Taipei City and Kaohsiung County, which may reflect the extent of economic development and population density. In addition, the share of spending on social welfare for most of the counties increased over the sample period. This is likely the result of the implementation of national health insurance in 1995, forcing local government to propose funds for public health. Moreover, the increasing respect for social benefits due to wealth effect may also explain the enlarged social welfare spending. In contrast, spending on obligations takes a smaller portion of total government funds in the 21st century than that in 1990s. The fractions of spending on other functions do not vary significantly.

Finally, demographic factors, female labor participation rate, unemployment rate, and the fraction of self-financing resource are also collected from the *Statistical Yearbook* issued by each county.

4. Results

4.1 Baseline Results

Do female politicians have different policy preferences other than men? Table 3 shows the relationship between female politicians and government expenditures on different functions without the controls for other variables, except for county and year effects. Panel A presents the

influence of female mayors on government expenditures. In general, counties with a female mayor spend 2.238 percentage points more government funds on social welfare rather than counties with a male mayor. This effect is statistically significant, and is very likely response result of women's traditional concerns about family, since female mayors exert insignificant influence on other government expenditures. On the other hand, panel B shows that more women holding seats in local councils are associated with more social welfare spending, even though the effect is not relevant. Moreover, male councilmen seem to support more spending on community development and environmental protection. Panel C includes both female mayor and proportion of councilwomen to investigate if government spending would be allocated more to certain functions when more female politicians appear in the county. These results suggest that a county with a female mayor distributes 2.210 percentage points more government funds to social welfare, and this proportion increases 0.045 percentage points by increasing one percentage point of councilwomen. In other words, social welfare concerns women in politics generally, and female mayors are likely to be concerned more on related policies.

Table 4 presents an estimation of Eq. (1) including all controls. On average, female mayor yields significant impact on government expenditures on social welfare and police service. Column (4) shows that counties with female mayor tend to spend 7.099 percentage points more on social welfare than counties with male mayor. Even though the interaction term of female mayor and the proportion of councilwomen presents a negative effect on social welfare spending, the effect of female mayor is still positive and relevant at 5% significant level based on the joint test. Moreover, more councilwomen are not associated with more spending on social welfare, but the coefficient is insignificant. The inconsistent performance between female mayors and councilwomen on social welfare may be due to the fact that legislators in local councils are usually strictly restricted by party discipline, which consequently binds councilwomen to be representative of women.

Column (6) shows that counties with female mayor tend to spend 3.125 percentage points lower on police service, which is at the same direction as the influence of councilwomen. Given that the crime rate in counties with female mayor is 0.015 percentage points lower than that in counties with male mayor, female mayors may propose budget with a rather small share on police service than male mayors do. Nevertheless, increasing the proportion of councilwomen by one percentage point in a county with female mayor increases the share of police service spending to total government funds by 0.108 percentage points. This may imply that women, on average, take life safety as an important issue for women, children and family, and consequently demand more police service once take part in political decision.

Female mayors appear to have no significant influence on other government spending. For instance, female mayors yield a negative effect on education and cultural, which may be contradicted one's expectation. However, Chiang (2008) found that female parliamentarians speak less frequently for education than social welfare. Also, there is noisy information contained in such a function of government expenditures that the R&D investment, a category used to be men's policy preference, is included in government funds on education and cultural.

Another function that female mayors yield a negative effect and may be anomalous is police service. Given that the crime rate in counties with female mayor is 0.015 percentage points lower

than that in counties with male mayor, female mayors may propose budget with a rather small share on police service than male mayors do. Nevertheless, increasing the proportion of councilwomen by one percentage point in a county with female mayor increases the share of police service spending to total government funds by 0.074 percentage points. It may imply that women, on average, take life safety as an important issue for women, children and family, and consequently demand more police service once take part in political decision.

For political control variables, it is interesting that a county with higher vote shares of women winning the councilmen election is associated with more government spending on social welfare. It is likely that the electorate taking social welfare into account may vote for female candidates, whom are believed to be the representative of women and more likely to care about the related issues. Moreover, if the KMT holds relative more seats than other political parties in a county, then the county may spend more on police service, but less on economic development. Since the KMT has long held the power in northern counties, where the economy is well developed, counties with the KMT as the incumbent party may allocate government funds in different ways from other political parties, say, the DPP.⁸ For other control variables, it is understandable that demographic factors are important for interpreting the spending on social welfare.

In summary, a female mayor is very likely to exert a positive and relevant influence on government expenditures for social welfare, which traditionally affect women. However, more women taking seats in the council is less likely to be associated with more spending on the same function.

4.2 Causal Effect of Female Politicians

An estimation of Eq. (1) provides a general picture of the relationship between female politicians and government expenditures. However, this relationship cannot be concluded as a causal effect of female politicians since omitted variables can be correlated both with female politicians and with government spending on specific function in the county. This study uses the instrument variable method to identify the causal effect of female politicians.

A county mayor position won in a close election is very likely to be a valid instrument for a female mayor. This is because in elections where there is no *ex ante* overwhelming majority preference for two candidates, the winner will be determined by chance, such as turnout rate or other factors related to the election day. In elections involving two candidates of different genders, either the female or the male candidate could have won the election with very small vote difference from the competitor and, thus, the fact that the female candidate won the seat instead of male is probably random. In other words, this situation provides quasi-experimental evidence, and may therefore make it possible to compare government expenditures in local governments with others in which male candidates win in a close election against a woman/man or in which female candidates win in a close election against a woman.

Empirically, close elections are elections in which the difference of the votes between the winner and the runner-up is less than 5% of the total votes in that constituency.⁹ In addition, counties are separated into three different groups according to the gender mix of candidates running into the county mayor election as the winner and the runner-up, i.e., the competition between the same genders and between different genders. The value is 0 for two male candidates, 1 for two female candidates, and 2 for candidates of different genders. Close election is then multiplied by gender

mix of candidates in the election. All of the three variables close election, gender mix and their interaction, are used as instruments for female mayor. This approach is likely to address the influence of candidates' identities.

Table 5 provides an estimation of Eq. (1) using the two stage least square method. Column (1) presents the results at the first stage, showing that all three instruments are relevant and jointly significant. The positive coefficient of close election implies that a close election is positively correlated to female mayors. Besides, female candidates seem to win the race if two candidates with different genders run in an election as the winner and the runner-up. However, given a close election, women are less likely to win if their competitors are men.

In the second stage, where female mayor is instrumented, there is significant effect of female mayor on social welfare spending that local governments with female mayors invest 13.219 percentage points more of government funds in social welfare compared to others with male mayors. This effect suggests causal relationship. However, more councilwomen do not increase the influence of a female mayor.

5. Discussion

This section concentrates on the discussion of female mayors' influence on social welfare spending, provided that the effect is significant and social welfare is more related to women's traditional needs.

5.1 Does Chiayi City Matter?

Even though the evidence suggests that female mayors have a significant effect on social welfare, it is unclear if the results are driven by certain cities, say, Chiayi City. As mentioned above, the mayors of Chiayi City have either belonged to the Hsu family or were supported by the Hsu family since 1968, and all elected mayors have been female since 1982. The political environment in the city favors female politicians, with a long cultivation of the electorate's policy preference. Besides, four of nine female mayors in the dataset are from Chiayi City (see Table 1). Therefore, this section reexamines the effect of female mayors on social welfare excluding Chiayi City.¹⁰

Table 6 provides an estimation of Eq. (1), showing that counties with a female mayor tend to spend 8.341 percentage points more on social welfare than counties with male mayor, which is relevant and larger than the effect including Chiayi City. The result of applying 2SLS presents evidence consistent with that in Table 5.¹¹

5.2 Does Gender Matter?

Government funding of social welfare has increased over time, and the same trend appears in women's representation in politics. Although there is average effect of female mayors on social welfare investment, it is worth exploring the individual cases.

Figure 1 (a) compares the proportion of social welfare spending in Chiayi City and Tainan City since both cities possess similar conditions in geography, demography, and administrative resources. The main difference between the two cities is that the elected mayors were all female and all male in Chiayi City and in Tainan City, respectively, during the sample period. The government of Chiayi City spends 7.82 percentage points of total funds on social welfare on

average, which is higher than the 6.73 percentage-point in Tainan City. Figure 1 (b) provides a similar comparison between Taipei City and Kaohsiung City. The mayor has been given to the candidates with different gender in the two cities in the election of 2005. The share of government funds on social welfare decreased from 2006 to 2008 in Taipei City with a male mayor, but increased in Kaohsiung City with a female mayor during the same period. Both of these cases suggest a gender effect on government spending even without careful examination.

Additionally, having one term of female mayor may not be associated with the political power of women. Figures 1 (c) and (d) illustrate the pattern of the proportion of social welfare spending in Changhua County and in Taichung City, respectively. Changhua County has long been renowned for the active participation of women in politics. However, the mayors of this country in the sample period were not always women, except in the 14th mayor election. Yet, there is an obvious boost in the share of social welfare expenditures since the first female mayor was elected in 2001, and an upward movement continued even in term of the subsequent male mayor.¹² This seems to reflect the development of women's political power, which reflects the electorate's policy preference. On the other hand, in Taichung City there was also one term of female mayor during the sample period, which is from 1998 to 2001, but no female candidates nominated by the political parties ran in the mayor election thereafter. Figure 1 (d) suggests that female politicians may not significantly influence the political atmosphere in Taichung City. In summary, gender may matter for policy outcomes if female politicians have an influence on the political environment.

6. Conclusion

This study investigates whether female politicians have increased expenditures on groups that benefit from the mandate. Specifically, this study examines the individual effects of female mayors and councilwomen, and the effect of their interaction. Results suggest that female mayors designate a higher share of government funds in social welfare, to which women pay much attention traditionally. This is causally evident. However, councilwomen have a negative effect on the same type of spending. This may be because legislators in local councils are usually restricted by party discipline, which consequently binds councilwomen to represent women. In addition, there is no evidence that more councilwomen strengthen the effect of a female mayor.

This is the first paper to analyze the causal effect of female politicians on government expenditures in Taiwan using the concept of a close election. This paper contributes to the literature on the effects of the identity of politicians by separately estimating the effects of mayor and councilmen on different government spending. An interesting topic for future research would be to investigate whether more councilwomen improve the efficiency of budget implementation.

Endnotes

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1. The Gender Empowerment Measure is a measure of inequalities between men's and

women's opportunities in a country. It combines inequalities in three areas: political participation and decision making, economic participation and decision making, and power over economic resources.

2. Taiwan has nine election categories. The two elections at the central government level are the President – Vice President Election and Legislators Election. The seven elections at the local level are for Municipal Mayors, Municipal Councilmen, County Magistrates (City Mayors), County (City) Councilmen, Township Chiefs, Township Councilmen, and Village Heads.

3. The single-district two-vote system means that only one member shall be elected from each constituency, and that voters cast one ballot for a district member and another for a political party.

4. Self-financing resource is defined as the total revenue of local government excluding grants from the central government and subsidization.

5. To avoid the potential endogenous problem of control variables, I used one-period lagged data for female labor participation rate, unemployment rate, and the proportion of population under age 15, above age 65 and in agricultural sector.

6. The early series was collected from the Statistical Yearbook issued by each county.

7. There are also expenditures for retirement and pension, but is not included in this paper. It is because missing values before year 1999 may reduce the statistical and economic significance. Besides, spending analyzed here may include some detailed items. For example, government spending on general administration contains expenditure for public function, administrative expenditure, civil affairs expenditure, and financial expenditure. Spending on economic development consists of expenditures for agriculture, industry, communication, and other economic service. Social welfare spending refers to expenditures for social insurance, social relief, beneficial service, employment service, and public health. Obligations include expenditures for sinking fund and interest payment.

8. I have also checked the effect of female mayors taking into account the event whether the mayor and the majority of council are from the same political party. The results are consistent.

9. In order to use close election as an instrument I need to choose a cut-off point to define elections that are close. I chose 5% to have a sufficient number of close elections and because 5% difference in the election is usually taken as a keen competition.

10. The results for female mayors' influence on other government expenditures depend on requests.

11. The chi-squared value of Anderson-Rubin Wald test is 11.40 with a degree of freedom equal to 3, which indicates that the instruments are jointly significant. Nevertheless, given that Chiayi City accounts for an important portion of the information for instruments, raising doubts about weak instruments after withdrawing the observations of Chiayi City.

12. The boost in 2001, the year before the new term starts, may be partly resulted from that the current mayor proposes a rather beneficial budget to draw the votes in the coming mayor election at the end of the year.

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Table 1. Descriptive statistics of female politicians from 1994 to 2008

	Numbers of female mayors	Proportion of councilwomen (%)				
		mean	min	max	2008	std
Changhua County	1	23.70	18.52	29.63	29.63	4.27
Chiayi City	4	21.62	8.70	33.33	33.33	9.34
Chiayi County	0	25.22	13.51	35.14	35.14	9.06
Hsinchu City	0	20.42	11.54	25.81	25.00	5.90
Hsinchu County	0	19.20	17.65	20.59	20.59	1.24
Hualien County	0	24.24	18.18	36.36	36.36	7.93
Kaohsiung City	1	19.39	11.36	36.36	36.36	10.09
Kaohsiung County	0	16.05	9.26	25.93	25.93	7.02
Keelung City	0	16.53	10.71	21.88	18.75	4.16
Miaoli County	0	19.83	15.79	26.32	18.42	4.21
Nantou County	0	20.90	16.22	24.32	24.32	3.14
Pingtung County	0	17.70	9.09	25.45	23.64	6.85
Penghu County	0	12.28	5.26	15.79	15.79	5.18
Taichung City	1	18.67	13.33	26.09	26.09	5.60
Taichung County	0	22.34	15.79	29.82	29.82	5.36
Tainan City	0	21.79	17.07	26.83	26.83	4.07
Tainan County	0	19.33	14.00	22.00	20.00	3.44
Taipei City	0	30.90	23.08	36.54	36.54	5.11
Taipei County	0	22.15	15.38	29.23	29.23	5.48
Taitung County	0	19.11	10.00	23.33	23.33	5.84
Taoyuan County	1	21.21	11.67	32.20	32.20	7.90
Yilan County	0	12.97	11.76	14.71	14.71	1.28
Yunlin County	1	20.93	16.28	27.91	27.91	4.65

Source: the Central Election Commission.

Table 2. Average proportion of government expenditures by function

(%) Observations = 23 per year	General Administration (1)	Education & and Culture (2)	Economic Development (3)	Social Welfare (4)	Community Development & Environmental Protection (5)	Police Service (6)	Obligations (7)
1994	10.39 (2.09)	38.09 (5.66)	18.30 (4.85)	7.12 (1.88)	4.70 (2.85)	10.61 (3.55)	2.94 (3.18)
1995	9.98 (4.00)	36.04 (5.43)	17.45 (4.52)	10.72 (3.93)	3.65 (2.71)	10.84 (3.00)	3.12 (3.69)
1996	9.44 (2.00)	36.60 (5.90)	19.59 (4.81)	10.77 (3.77)	3.14 (2.65)	10.63 (2.96)	2.73 (3.16)
1997	9.05 (2.31)	36.61 (7.21)	20.05 (5.62)	11.21 (3.31)	3.38 (2.81)	10.70 (3.12)	3.00 (3.93)
1998	9.57 (2.15)	37.64 (6.02)	17.04 (5.64)	10.74 (4.41)	3.63 (3.15)	11.04 (3.10)	3.72 (5.78)
1999	10.70 (2.71)	36.87 (5.87)	16.61 (4.86)	11.12 (4.46)	3.55 (2.94)	11.26 (3.27)	3.54 (3.67)
2000	11.94 (2.44)	37.71 (6.86)	15.43 (6.27)	9.53 (3.53)	3.61 (2.93)	11.43 (3.24)	1.30 (1.62)
2001	10.63 (2.48)	35.64 (6.77)	15.05 (4.63)	13.93 (9.02)	3.57 (2.69)	10.68 (3.18)	1.93 (1.84)
2002	10.90 (2.34)	37.05 (7.65)	16.73 (6.36)	10.57 (3.08)	3.48 (2.28)	10.75 (2.15)	1.85 (1.38)
2003	10.37 (2.21)	37.11 (6.39)	16.21 (3.81)	10.64 (3.26)	4.34 (3.16)	11.33 (1.97)	1.23 (1.01)
2004	10.21 (2.33)	34.82 (7.54)	17.73 (5.51)	10.41 (2.91)	4.48 (2.94)	10.51 (1.69)	0.99 (0.93)
2005	10.93 (2.40)	34.60 (6.48)	17.35 (5.69)	11.18 (3.02)	3.86 (1.95)	10.64 (2.09)	1.14 (1.08)
2006	11.04 (2.21)	35.07 (6.33)	16.24 (5.12)	11.36 (2.94)	3.88 (2.44)	10.95 (2.13)	1.27 (0.79)
2007	10.62 (2.20)	35.18 (6.03)	16.04 (5.14)	11.33 (2.67)	3.80 (2.69)	10.64 (1.89)	1.55 (0.91)
2008	10.32 (1.94)	33.68 (5.19)	18.33 (5.26)	11.35 (2.72)	4.16 (2.34)	10.16 (1.82)	1.74 (0.97)

Note: Standard deviation in parentheses.

Table 3. The relationship between female politicians and government expenditures

	General Administration (1)	Education & and Culture (2)	Economic Development (3)	Social Welfare (4)	Community Development & Environmental Protection (5)	Police Service (6)	Obligations (7)
Panel A							
Female mayor	0.718 (0.495)	-1.019 (1.186)	-0.206 (0.488)	2.238 (1.071)**	-0.205 (0.426)	0.066 (0.335)	-0.706 (0.633)
R-squared	0.64	0.63	0.41	0.51	0.76	0.79	0.63
Observations	345	345	345	345	345	345	342
Panel B							
Proportion of councilwomen	0.017 (0.048)	0.112 (0.079)	0.043 (0.082)	0.054 (0.038)	-0.065 (0.025)**	0.019 (0.024)	-0.011 (0.044)
R-squared	0.64	0.63	0.42	0.50	0.76	0.76	0.63
Observations	341	341	341	341	341	341	338
Panel C							
Female mayor	0.712 (0.506)	-1.181 (1.154)	-0.228 (0.449)	2.210 (1.085)*	-0.112 (0.339)	0.008 (0.305)	-0.716 (0.599)
Proportion of councilwomen	0.014 (0.049)	0.117 (0.079)	0.044 (0.083)	0.045 (0.039)	-0.065 (0.024)**	0.019 (0.024)	-0.008 (0.040)
R-squared	0.64	0.63	0.42	0.51	0.76	0.76	0.64
Observations	341	341	341	341	341	341	338

Note: 1. Standard errors in parentheses. One, two and three * indicate significance at the 10, 5, 1% level, respectively. 2. Standard errors are corrected for clustering at the county level. 4. All the regressions control for county and year dummies.

Table 4. The effect of female politicians on government expenditures

	General Administration (1)	Education & Culture (2)	Economic Development (3)	Social Welfare (4)	Community Development & Environmental Protection (5)	Police Service (6)	Obligations (7)
Female mayor	-0.236 (1.365)	0.980 (6.035)	-0.110 (3.980)	7.099 (1.945)***	-0.092 (1.542)	-1.971 (1.287)	1.289 (1.370)
Proportion of councilwomen	-0.032 (0.068)	-0.017 (0.244)	0.404 (0.149)**	-0.275 (0.220)	-0.129 (0.066)*	0.008 (0.071)	0.066 (0.074)
Female mayor × proportion of councilwomen	0.019 (0.051)	-0.152 (0.231)	-0.022 (0.188)	-0.249 (0.080)***	-0.001 (0.070)	0.074 (0.054)	-0.052 (0.054)
Female labor participation rate	-0.020 (0.110)	-0.141 (0.222)	-0.075 (0.271)	0.188 (0.181)	-0.051 (0.099)	-0.074 (0.059)*	-0.054 (0.120)
Vote shares of women	0.070 (0.077)	0.234 (0.248)	-0.347 (0.191)*	0.535 (0.269)*	0.044 (0.073)	-0.031 (0.069)	-0.067 (0.076)
Incumbent party (KMT = 1)	0.627 (0.674)	2.767 (1.970)	-6.884 (2.209)***	-0.232 (1.276)	0.320 (0.676)	0.739 (0.476)	-0.217 (0.796)
Self-financing resource	0.003 (0.017)	0.149 (0.069)**	-0.208 (0.071)***	-0.014 (0.038)	-0.005 (0.026)	0.056 (0.184)***	0.073 (0.041)*
Unemployment rate	0.190 (0.309)	0.410 (1.271)	-2.639 (0.994)**	2.136 (1.190)*	0.734 (0.276)**	-0.233 (0.509)	0.206 (0.447)
Population in agricultural sector	0.014 (0.096)	-0.093 (0.591)	0.000 (0.297)	-0.136 (0.166)	0.025 (0.115)	-0.134 (0.100)	-0.293 (0.242)
Population in low-income households	0.792 (0.527)	1.627 (1.405)	-1.539 (0.925)	2.828 (0.963)***	-0.054 (0.457)	-0.440 (0.537)	-0.191 (0.506)
Population above 65	0.131 (0.379)	1.287 (1.563)	-0.681 (1.136)	1.753 (0.969)*	-0.688 (0.694)	0.616 (0.430)	-1.275 (0.647)*
Population under 15	0.125 (0.560)	0.678 (1.472)	-1.631 (1.030)	1.207 (0.926)	0.042 (0.698)	-0.823 (0.493)	0.631 (0.690)
Density of population	-0.005 (0.002)***	-0.005 (0.006)	0.013 (0.003)***	0.007 (0.003)*	-0.003 (0.003)	0.002 (0.002)	-0.003 (0.003)
Trend	0.101 (0.385)	-0.129 (0.936)	-0.956 (0.503)*	-0.578 (0.645)	0.296 (0.305)	-0.471 (0.282)	0.534 (0.301)*
R-squared	0.75	0.73	0.60	0.57	0.82	0.84	0.63
Observations	253	253	253	253	253	253	252

Note: 1. Standard errors in parentheses. One, two and three * indicate significance at the 10, 5, 1% level, respectively. 2. Standard errors are corrected for clustering at the county level. 4. All the regressions control for county and year dummies.

Table 5. The effect of female politicians on government expenditures – close election as an IV for female mayor

	(1)	General Administration (2)	Education & Culture (3)	Economic Development (4)	Social Welfare (5)	Community Development & Environmental Protection (6)	Police Service (7)	Obligations (8)
Close election × gender mix in the close election	-0.126 (0.032)***							
Close election	0.137 (0.034)***							
Gender mix in the close election	0.161 (0.080)*							
Female mayor		-1.798 (2.399)	-10.913 (9.066)	-2.205 (6.229)	13.219 (6.012)**	0.200 (1.298)	-1.151 (1.784)	0.456 (1.628)
Proportion of councilwomen	-0.009 (0.007)	-0.042 (0.054)	-0.091 (0.239)	0.391 (0.127)***	-0.237 (0.188)	-0.127 (0.061)**	0.014 (0.061)	0.060 (0.063)
Female mayor × proportion of councilwomen	0.032 (0.006)***	0.075 (0.088)	0.279 (0.376)	-0.054 (0.248)	-0.471 (0.225)**	-0.012 (0.055)	0.044 (0.064)	-0.022 (0.061)
Female labor participation rate	-0.011 (0.006)*	-0.043 (0.100)	-0.312 (0.206)	-0.105 (0.289)	0.276 (0.206)	-0.048 (0.087)	-0.062 (0.055)	0.042 (0.101)
Vote shares of women	-0.001 (0.005)	0.057 (0.077)	0.138 (0.235)	-0.364 (0.188)*	0.585 (0.259)**	0.046 (0.062)	-0.024 (0.064)	-0.074 (0.068)
Incumbent party (KMT = 1)	-0.144 (0.064)**	0.499 (0.539)	1.797 (2.012)	-7.055 (1.881)***	0.267 (1.276)	0.343 (0.574)	0.806 (0.402)**	-0.282 (0.687)
Self-financing resource	-0.002 (0.001)**	-0.003 (0.016)	0.105 (0.057)*	-0.216 (0.069)***	0.008 (0.037)	-0.004 (0.023)	0.059 (0.018)***	0.070 (0.035)
Unemployment rate	-0.007 (0.015)	0.190 (0.283)	0.408 (1.156)	-2.640 (0.887)***	2.137 (1.073)**	0.734 (0.246)***	-0.233 (0.458)	0.205 (0.384)
Population in agricultural sector	0.006 (0.005)	0.018 (0.087)	-0.064 (0.523)	0.005 (0.268)	-0.151 (0.164)	0.024 (0.103)	-0.136 (0.091)	-0.291 (0.214)
Population in low-income hhs	-0.009 (0.016)	0.757 (0.454)*	1.362 (1.218)	-1.586 (0.829)*	2.964 (0.872)***	-0.048 (0.401)	-0.422 (0.479)	-0.214 (0.459)
Population above 65	-0.050 (0.026)*	0.101 (0.327)	1.061 (1.447)	-0.721 (1.019)	1.869 (0.852)**	-0.682 (0.609)	0.632 (0.376)*	-1.289 (0.580)**
Population under 15	-0.078 (0.036)**	-0.032 (0.522)	-0.514 (1.261)	-1.841 (1.009)*	1.820 (0.785)**	0.072 (0.595)	-0.741 (0.414)*	0.549 (0.612)
Density of population	-0.000 (0.000)*	-0.006 (0.002)***	-0.010 (0.007)	0.012 (0.004)***	0.009 (0.004)**	-0.002 (0.002)	0.002 (0.002)	-0.003 (0.002)

Trend	-0.030 (0.019)	-0.249 (0.500)	-1.153 (0.869)	0.310 (0.888)***	0.357 (0.487)	0.609 (0.399)	-0.765 (0.307)**	1.006 (0.356)***
Weak IV F statistic		5.69	5.69	5.69	5.69	5.69	5.69	5.49
Observations	253	253	253	253	253	253	253	252

Note: 1. Standard errors in parentheses. One, two and three * indicate significance at the 10, 5, 1% level, respectively. 2. Standard errors are corrected for clustering at the county level. 4. All the regressions control for county and year dummies. 5. Weak IV F statistics denotes Kleibergen-Paaprk Wald F statistic, and Stock-Yogo weak ID test critical value is 5.39 at 30% maximal IV relative bias.

Table 6. The effect of female politicians on social welfare excluding Chiayi City

	OLS (1)	2SLS	
		First Stage (2)	Second Stage (3)
Close election × gender mix in the close election		-0.133 (0.056)**	
Close election		0.148 (0.057)* *	
Gender mix in the close election		0.066 (0.059)	
Female mayor	8.341 (4.494)*		16.691 (8.680)*
Proportion of councilwomen	-0.287 (0.223)	-0.004 (0.003)	-0.252 (0.202)
Female mayor × proportion of councilwomen	-0.298 (0.161)*	0.037 (0.003)***	-0.621 (0.359)*
Female labor participation rate	0.214 (0.187)	-0.009 (0.003)**	0.274 (0.182)
Vote shares of women	0.556 (0.274)*	0.000 (0.003)	0.577 (0.247)**
Incumbent party (KMT = 1)	-0.054 (1.290)	-0.081 (0.034)**	0.262 (1.364)
Self-financing resource	-0.016 (0.037)	-0.002 (0.001)*	0.005 (0.038)
Unemployment rate	2.144 (1.193)*	-0.017 (0.008)**	2.170 (1.062)**
Population in agricultural sector	-0.139 (0.168)	0.005 (0.004)	-0.159 (0.166)
Population in low-income households	2.865 (1.083)**	-0.002 (0.014)	2.924 (0.789)***
Population above 65	1.820 (0.999)*	-0.033 (0.019)*	2.003 (0.911)**
Population under 15	1.322 (0.915)	-0.029 (0.026)	1.611 (0.828)*
Density of population	0.007 (0.004)	-0.000 (0.000)***	0.011 (0.006)**
Trend	-0.563 (0.645)	-0.007 (0.017)	0.201 (0.534)
R-squared	0.56		
Weak IV F statistic		4.27	
Observations	242	242	242

Note: 1. Standard errors in parentheses. One, two and three * indicate significance at the 10, 5, 1% level, respectively. 2. Standard errors are corrected for clustering at the county level. 4. All the regressions control for county and year dummies. 5. Weak IV F statistics denotes Kleibergen-Paaprk Wald F statistic, and Stock-Yogo weak ID test critical value is 5.39 at 30% maximal IV relative bias.

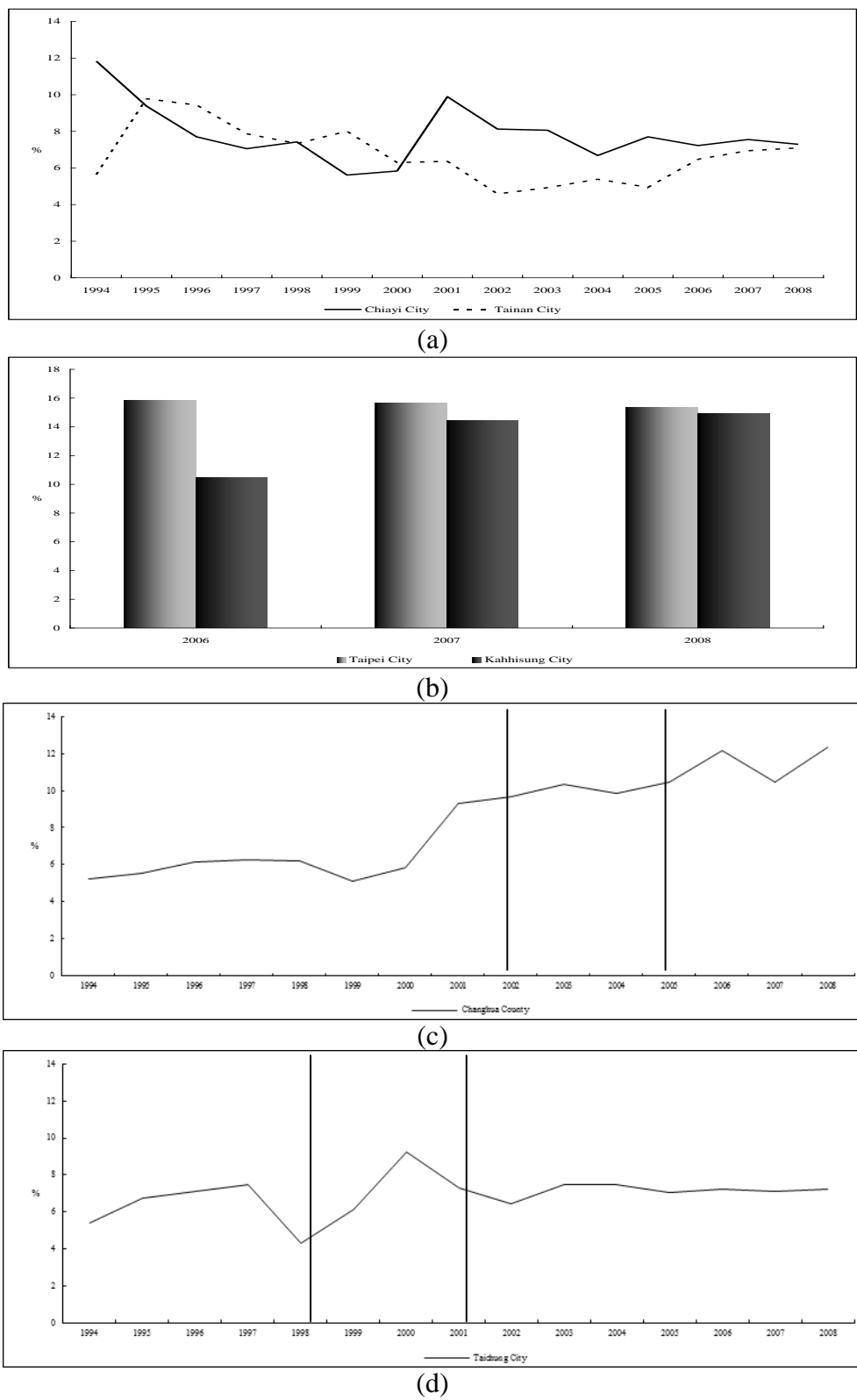


Figure 1. The comparison of government spending on social welfare