Women Politicians and Economic Growth[*]

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Abstract

China implemented a gender quota rule for local politicians in 2001. From 2001 to 2018, we document that Chinese cities under the administration of female political leaders have a GDP growth rate of 0.3-0.5% lower than male-led cities. This gender-growth relationship holds even after including province*year fixed effects to account for time-varying provincial-level factors. The relationship also holds after including city fixed effects, which allows us to compare the same city but between female-led periods and male-led periods. The results are robust in a difference-in-differences test and an instrumental variable design. The price of local stocks decreases when news of female leader appointments becomes public, and the price stays flat for male appointment news. The gender-growth relationship becomes weaker in later years, likely due to the weakening of the gender quota rule constraint. The gender-growth relationship is stronger in regions likely with stronger gender discrimination. We also document that female leaders have lower qualifications and have a higher chance of being promoted than their male counterparts. Overall, the results show that both selection and the environment likely contribute to the gender-growth relationship.

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1. Introduction

There has been a notable rise in women assuming leadership roles across key economic and political arenas in recent decades.[1] Associated with this trend, a great deal of attention in economics and political science has been paid to understanding the role of women in decision-making. The collective research shows significant variations across cases but broadly suggests that women's leadership roles are not tokenism and make important differences (Chattopadhyay and Duflo, 2004; Wängnerud, 2009; Clayton, 2021). Yet, very few studies have examined how female politicians affect economic growth.

We fill this gap by studying a gender quota rule in China. In 2001, the Chinese State Council started to require the government to "actively ensure that there are women in leadership positions at all levels of government and that the proportion of women among heads of government departments is significantly increased." Although the requirement applies to all levels of government, in our paper, we study the prefecture-level cities (cities thereafter).[2] Specifically, we study how the gender of mayors or party secretaries of the cities affects local economic growth.

We propose and test three hypotheses about the relationship between a gender quota rule and economic growth. First, if the underrepresentation of women is due to discrimination against women in promotions or informal selection rules that favor members of male-dominated networks, a gender quota may improve administrative effectiveness by reducing the influence of gender discrimination and promoting better candidates. Second, restricting the free choice of politicians

[1] For example, in the United States, women's participation in mayoral elections increased from negligible numbers in the 1970s to about one-third of the elections in the 2000s (Ferreira and Gyourko, 2014). Across the world, the fraction of women in national parliaments increased from an average of 1-2% in the 1970s (Inter-Parliamentary Union, 1995) to 27% in 2024 (Inter-Parliamentary Union, 2024).

[2] In China's administrative system, a prefecture-level city is an administrative division, ranking below a province and above a county. We study cities instead of provinces or counties to balance statistical power and the feasibility of data collection. The number of provincial-level regions is too small for us to have enough statistical power. Data on county-level data are very costly to collect.

may result in the appointment of suboptimal candidates and lower administrative effectiveness of local governments. Candidates can be suboptimal due to their lower personal skills or the environment. The public or other politicians may discriminate against female politicians. The gender quota rule may reduce the influence of gender discrimination in promotions but may not affect other discrimination forces. If these forces are important, it does not guarantee that a gender quota rule will benefit economic growth even if the female appointees have personal skills on par with their male counterparts. Third, female politicians may prefer public goods, which may have long-term benefits but hurt short-term economic growth.

Our setting is especially suitable for studying the effects of politicians' gender on economic growth. First, Chinese city mayors and party secretaries are directly responsible for local economic development. Chinese local governments have enormous administrative capacity, and local political leaders have high-powered incentives (Li and Zhou, 2005; Yao and Zhang, 2015; Bai, Hsieh, and Song, 2020; Jin, 2023). Existing research on the gender of politicians predominantly focuses on legislators, who typically have a limited influence on local economic growth. Second, a typical Chinese prefecture-level city has an area of 15,000 square kilometers (about 5,800 square miles) and 3.5 million population, both comparable to the state of Connecticut. Gender quota rules applied to such high-stakes positions are rare. Third, detailed data on economic activities are available. However, many other studies examine much smaller areas (often villages and towns) and have to rely on much coarser measures of economic activities. Perhaps due to these reasons, most studies do not investigate economic growth and focus on other outcomes (e.g., Chattopadhyay and Duflo, 2004).

There were only 14 provinces (out of 27 provinces or autonomous regions) with at least one female mayor or city party secretary in 2000, the year before the adoption of the gender quota

rule.[3] Since 2013, almost all provinces have had at least one female mayor or city party secretary, except for the autonomous regions where ethnic minorities have a majority or a significant fraction of the population and two provinces (Qinghai and Hainan), which have a very small number (less than five) of prefecture-level cities. At the city level, the fraction of cities with at least one female leader (either the mayor or the party secretary) increased from 7.3% in 2001 to 17.4% in 2013. The ratio then plateaus afterward.

Using the panel of 238 cities from 2001 to 2018, we document a robust negative correlation between women politicians and the local GDP growth rate. On average, having a female mayor or party secretary is associated with an approximately 0.3 percentage point lower annual GDP growth rate. This correlation is little affected by adding the province*year fixed effects to compare female-led cities and male-led cities within the same province and in the same year. The correlation is also little affected by adding city fixed effects and year fixed effects, which allows us to compare the same city but between female-led periods and male-led periods.

One concern of the results is that female politicians may be assigned to cities with lower economic growth. Inconsistent with this conjecture, we find lagged economic growth is uncorrelated with the gender of the newly appointed politicians. The finding that the gender-GDP growth rate correlation is little affected by adding the city fixed effects also sheds doubt on the possibility of the concern. Another concern is that male politicians may be more aggressive in inflating the GDP growth rate. We find that female-led cities have lower growth rates in investments, consumption, and public revenue. Many of these measures are hard to manipulate, suggesting that the results are unlikely due to different styles of manipulation.

[3] We do not include the directly administrated cities as their next level of government is counties instead of prefecture-level cities.

We adopt several empirical strategies to establish further the causal relationship between politician's gender and economic growth. First, in a difference-in-differences specification, we find that when a city switches from having no female mayor or party secretary to having at least one female official, its GDP growth rate decreases by about 0.4% compared to adjacent cities within the same province but not having any female mayor or party secretary in the seven years around the female leader taking office. We see no significant pre-trends. The effect shows up in the year when female officials take office, and we see no reversal or weakening of the gender effect in the next few years when she is in office.

Second, due to the gender quota rule, when a city-level leadership position vacates, the probability for the next appointee to be female highly depends on the fraction of female mayors and party secretaries a province already has. Based on this rule, we use the fraction of a province's female mayors and party secretaries in the year prior to political turnover as an instrument variable. As expected, the instrument is strongly correlated with the gender of the next appointee. The instrument-variable estimate of the gender effect is similar to that of the pooled regression estimate and also the difference-in-differences estimate.

Third, motivated by the corporate board gender quota literature (Ahern and Dittmar, 2012), we conduct a standard event study of stock prices. If a female politician is perceived to be less capable than a male politician, we expect that the stock price of locally headquartered firms may decrease (increase or be flat) when the market learns that a city will have a female (male) leader. Our empirical results confirm this prediction. On average, the stock price decreases by about 1.79% in response to the news of a female politician's appointment, and the stock price increases by 0.08% in response to the news of a male politician's appointment. The difference is 1.87% (t = -2.26).

The evidence is most consistent with the hypothesis that gender quota leads to the suboptimal choice of politicians, and these appointments hurt local economic growth. Further consistent with this hypothesis, we document that, relative to their male counterparts, female mayors and party secretaries are younger, less experienced, and less likely to graduate with a STEM degree or have overseas education experience. After controlling for observed characteristics (including job performance), female mayors and party secretaries are more likely to be promoted than their male counterparts. Further consistent with the gender quota rule, the gender-promotion relationship disappeared after 2012 when the gender quota requirement was largely reached, and the gender-growth relationship also weakened significantly after 2012. We also find that the female politician-economic growth relationship is stronger in areas with stronger gender discrimination, suggesting that, at least partially, the relationship is due to the environment, i.e., female politicians may face discrimination from other politicians or the public, making them less effective ceteris paribus.

The existing literature documents strong evidence that female politicians favor the provision of public goods such as education and healthcare (Thomas 1990, 1994; Duflo, 2003). Compared to other investments, education, and healthcare investments may hurt short-term economic growth but benefit in the long term. We document that, in our setting, women politicians favor education, healthcare, and social security investments, but the relationship is not statistically significant, and the economic magnitude is too small to matter for economic growth.

Relation to literature. Our study contributes to the literature on women as policymakers.[4] The collective research shows important variations across cases but largely suggests that female

[4] See Wängnerud (2009), Pande and Ford (2011), Lawless (2015), Hessami and da Fonseca (2020), and Clayton (2021) for reviews of the literature.

politicians contribute to the better provision of public goods and the strengthening of the position of women's interests (e.g., Chattopadhyay and Duflo, 2004; Wangnerud, 2009; Clayton, 2021).[5] There is evidence that female politicians are less corrupt (Dollar et al., 2001; Swamy et al., 2001; Brollo and Troiano, 2016; Afridi et al., 2017; Decarolis et al., 2023; Baskaran et al., 2024), and female politicians differ from their male counterparts by engaging more fully in consensus-building activities (e.g., Thomas 1994; Volden, Wiseman, Wittmer, 2013). Regarding performance, studies have focused on comparing female and male legislators (Anzia and Berry, 2011; Volden, Wiseman, and Wittmer, 2013; Feng, Hou, and Liu, 2023). For example, Anzia and Berry (2011) document that congresswomen outperform congressmen in the United States (i.e., secure more federal funding and sponsor or cosponsor more bills), and they argue that this is because women are being held to a higher standard. Baltrunaite et al. (2014) find that gender quotas are associated with better-educated politicians, and Besley et al. (2017) report that gender quotas raise the competence of male politicians by increasing the resignation of mediocre male leaders.

Baskaran et al. (2024) is perhaps the most relevant. They find that female legislators in India lead to higher economic growth, which is contrary to our findings. A key difference between Baskaran et al. (2024) and ours is how female politicians are selected. In Baskaran et al. (2024),

There exists a distinct body of work on the effects of women suffrage. For example, Miller (2008) shows that the introduction of women suffrage in the United States was associated with an increase in public health spending and a decline in infant mortality.

[5] Evidence abounds. Female leaders increase investment in healthcare and childcare (Clots-Figueras, 2011; Lippmann, 2022; Baskaran and Hessami, 2023), increase the reporting of crimes against women (Iyer et al., 2012), reduce neonatal mortality (Bhalotra and Clots-Figueras, 2014), and reduce deaths and hospitalizations during COVID (Bruce et al., 2022). Female leadership raises aspirations and educational attainment and especially so for girls (Clots-Figueras, 2011, 2012; Beaman et al., 2012) and encourages women to participate in politics (Beaman et al., 2009; Bhavnani, 2009; De Paola, Scoppa, and Lombardo, 2010; O'Brien and Rickne, 2016; Baskaran and Hessami, 2018; Bagues and Campa, 2021). The classic work of Chattopadhyay and Duflo (2004) studies an Indian policy in which one-third of village council seats and council presidents are reserved for women. They document that women leaders spend more on public goods preferred by women. Brogaard, Gerasimova, and Rohrer (2024) document that female US House Representatives increase the proportion of government procurement contracts allocated to women-owned firms. There is also evidence that female police officers reduce crimes against women (Miller and Segal, 2019; Jassal, 2020) and female representation improves climate change policies (Cook, Grillos, and Andersson, 2019; Mavisakalyan and Tarverdi, 2019).

female legislators are selected through competitive elections. However, in our study, female politicians are selected due to gender quotas. If female politicians face unfair discrimination, conditional on being competitively selected, their ability may be higher than their male counterparts. However, if they are selected due to gender quotas, the opposite may be true.

There is a parallel literature on how the gender of corporate leaders affects corporate policy and performance (Post and Byron, 2015; Miller, 2017). Like in the political leader literature, female and male corporate leaders have different preferences and styles. Female directors tend to undertake fewer workforce reduction (Matsa and Miller, 2013) and reduce the gender pay gap both for regular employees (Tate and Yang, 2015) and executives and directors (Carter, Franco, and Gine, 2017; Naaraayanan and Nielsen, 2022). Female directors are better monitors and female executives are less overconfident (Huang and Kisgen, 2013). Female directors also bring in different skill sets (Kim and Starks, 2016).

Among the corporate studies, most related to ours is the literature on the effects of gender quotas on boards of directors. The findings regarding how the rules affect corporate performance are mixed. Ahern and Dittmar (2012), Greene, Intintoli, and Kahle (2020), Hwang, Shivdasani, and Simintzi (2021), and Gertsberg et al. (2022) document that gender quotas lead to worse corporate performance. Nygaard (2011) and Fernandez-Mendez (2023) document a positive effect, while Eckbo, Nygaard, and Thorburn (2022) document an insignificant effect. The findings are also mixed regarding how gender quotas affect the quality of female directors: Ahern and Dittmar (2012) find that newly appointed female directors are younger and less experienced, Ferrari et al. (2022) document they are younger but better educated, Ferreira et al. (2020) find them more independent, more experienced, more internationally diverse, and no less academically qualified,

and Hwang et al. (2021), and Eckbo and Odegaard (2024) find them as skilled as males.[6] Bertrand et al. (2019) document that the gender quota rule in Norway had little impact on women in business beyond the quota's direct effect on the women who make it into boardrooms.

It is worth emphasizing that our findings do not imply that the gender quota policy is necessarily bad. One possible bright side of such a policy is that it may change people's attitudes toward female leaders (Beaman et al., 2009) and raise females' aspirations (Beaman et al., 2012). In the long run, the policy may pay off. However, anyone considering such a policy should consider the potential short-term costs. It is also worth emphasizing that our findings do not imply that female politicians are worse choices in general. What the findings imply is that any non-merit-based promotion system may have associated costs, regardless of which gender is favored.

We also contribute to the literature on the political economy of China. The political tournament literature documents that economic performance increases a politician's chance of promotion (Li and Zhou, 2005). Our findings suggest that a politician's gender is an important factor that has not been studied. There are two studies on the gender of politicians in the Chinese setting. Decarolis et al. (2023) find that female mayors and city party secretaries are less corrupt than their male counterparts. Feng, Hou, and Liu (2013) find that Chinese congresswomen sponsor more bills than congressmen. Relatedly, Yao and You (2018) find that female membership in the Chinese Communist Party in 1950 reduced the gender gap in education in 1990. However, they do not study economic growth.

[6] Gormley et al. (2023) study the campaigns launched by "The Big Three" institutional investors (Blackrock, State Street, and Vanguard) to increase gender diversity of corporate boards. They find that firms hire directors beyond managers' existing networks and by placing less emphasis on candidates' executive experience.

This paper is organized as follows. Section 2 discusses the institutional background. Section 3 describes the data. Section 4 presents the results. Section 5 discusses potential mechanisms. The last section concludes.

2. Institutional background

In 1995, China hosted the Fourth World Conference on Women, convened by the United Nations in Beijing. At this conference, governments worldwide agreed on the Beijing Declaration and Platform for Action, a comprehensive set of principles to achieve greater equality and opportunity for women. The Declaration flagged 12 areas where urgent action was needed, one of which was women in power and decision-making. Since then, the issue of women's political representation has gained increasing attention worldwide (Tripp and Kang, 2008). In the same year, the Chinese State Council distributed The Program for the Development of Chinese Women (1995 – 2000), which states, "Actively ensure that there are women in leadership positions at all levels of government and that the proportion of women among heads of government departments is significantly increased." The Outline has been updated in 2001, 2011, and 2021. Since 2001, the updated Outline has changed the above encouragement to a requirement. It also required a significant increase in the number of women in head positions.[7]

The local governments of China consist of four branches: a People's Government headed by a governor/mayor who acts as the executive, a People's Congress with legislative powers, a People's Political Consultative Conference as an advisory body, and a parallel local branch of the Chinese Communist Party (CCP) that elects a party secretary and a Standing Committee. We do not study the People's Congress and the People's Political Consultative Conference, as the other

[7] For more background bout gender equality in China, see, for example, Qian (2008), Wei and Zhang (2011), Qian (2024), and Xue (2024).

two branches are far more powerful and important for local economic growth. The mayor is the head of the People's Government, and the party secretary is the head of the local CCP branch. The party secretaries are appointed by the provincial party committee, and the mayors are elected by the city-level People's Congress. However, for simplicity, we often refer to their appointments and elections as appointments in this paper.

The gender quota rule requires each branch to have at least one female official. In a People's Government, the female official can be the mayor or a vice mayor. In the CCP branch, the female official can be the party secretary or a regular member of the Standing Committee. Although female officials do not have to hold the head positions – which we study – to meet the requirement, the additional requirement of women in head positions plays a role at the province level. Across all the cities in a province, the provincial government needs to have female mayors or party secretaries.

Panel A of Table 1 reports the distribution of the number of provinces (including autonomous regions) by the number of female mayors and city party secretaries for each year between 2001 and 2018. Table 1 includes 22 provinces and 5 autonomous regions.[8] We count mayors and city party secretaries at the end of each year. Table 1 clearly shows a downward trend in the number of provinces with zero female leaders, and overall, the number of provinces with either two or three female leaders has increased over time. Toward the end of the sample period, several provinces still lack a female leader. Most are autonomous regions or provinces with too few prefecture-level cities, such as Hainan. The autonomous regions may not need to follow the gender quota rule as closely as other provinces. Hainan province and Qinghai province have four

[8] We do not include the directly administrated municipalities because they do not have prefecture-level cities. We exclude autonomous regions as the evidence suggests that the quota rule is not strictly applied to them. Qinghai and Hainan have two and four prefecture-level cities, respectively. The quota rule is not strictly applied to them either.

and two prefecture-level cities, respectively. The small number may have made it challenging to satisfy the quota rule, and they may have been made exceptions.

Panel B reports the distribution after excluding the 5 autonomous regions, Qinghai, and Hainan. Although in the post-2012 period, there are still provinces without any female leaders at the end of a year, none of them have shown zero females more than one year after 2012, meaning that these provinces, even if they do not meet the gender quota requirement, their deviations are temporary.

3. Data and summary statistics

We obtain city-level economic indicators from the CEIC Database and information about mayors and party secretaries from the CSMAR Database. The demographic information of mayors and city party secretaries in the dataset is incomplete. We manually fill in missing personal information (i.e., gender, age, and tenure) for mayors and party secretaries, primarily based on information on various government websites. We obtain information on stock return, market capitalization, and firm locations from CSMAR. Our sample period is from 2001 to 2018. We begin our sample in 2001 because it was the first year when the gender quota rule became a requirement. We end our sample in 2018 because that was the latest year with complete city-level GDP data when we started this project. For the reasons we discussed in Section 2, we do not include the four directly administrated municipalities or the five autonomous regions. We also exclude Hainan and Qinghai, although our main results are generally similar if we include Hainan, Qinghai, and the five autonomous regions.[9]

We start with 4,283 city-years during our sample period.[10] We first drop city-years with a too-small economy, defined as city-years when its last year's GDP (based on the price level of 2000) is below ¥10 billion (about $1.4 billion). We also drop city-years if any of the following is

[9] We report the baseline regression results after including them in the Internet Appendix.
[10] We exclude other types of prefecture-level divisions (prefectures, autonomous prefectures, and leagues) from our analysis. Prefecture-level cities are the predominant type, accounting for 88% of total prefecture-level divisions. Other types tend to be very different from prefecture-level cities. See Chien (2009) for a detailed discussion of these divisions.

missing: lagged GDP, annual GDP growth rate, the percentage of the primary/secondary/tertiary sectors in the overall economy, lagged population, and politician characteristics (i.e., gender, age, and tenure). We end up with 4,039 city-year observations.

Figure 1 displays the percentage of female politicians in our sample. We report the percentage of cities with at least one female politician, whether as a mayor or a party secretary and separately for the percentages of female mayors and female party secretaries. A city is considered to have a female mayor (party secretary) if the mayor (party secretary) is female at any time of the year. Consistent with the policy push of the Chinese government, the percentage of female politicians (both mayors and city party secretaries) increased significantly from 2001. In 2001, 7.9% of the cities had a female leader, and the percentage increased to 16.4% in 2013. Interestingly, it then decreased to 11.7% in 2018, and the decrease in female mayors largely drove the decrease.

Table 2 reports the summary statistics of the sample. Panel A reports the mean, median, standard deviation (STD), the minimum, and the maximum of each variable. Panel B reports their pairwise correlations. *GDP Growth* is the GDP growth rate of a city in year *t*. *Female* is a dummy variable that equals one if a city has a female leader (either a mayor or a party secretary) and zero otherwise. *Secondary Ratio* and *Tertiary Ratio* represent the shares of the GDP in the secondary sector and the tertiary sector, respectively. *GDP* and *population* are local total GDP and population, respectively. We include the age and tenure of both mayors and party secretaries. All the economic variables are measured at the end of year *t* -1. All the continuous variables are winsorized at the 1% level for both tails.

The average GDP growth rate is 11.20%. The standard deviation is 3.67%, the minimum is 0.4%, and the maximum is 20.1%, indicating a large cross-sectional variation. On average, 12.2% of the city-years have a female leader. On average, mayors are 51.0 (exp(3.932)) years old and party secretaries are 53.1 (exp(3.973)) years old. Their tenures are 2.15 years and 2.36 years for mayors and party secretaries, respectively. The average tenure implies that the tenure upon departure is about 4.3 and 4.7 years, respectively, slightly shorter than the typical five-year term for mayors and city party secretaries.

The correlation between *Female* and *GDP Growth* is -0.060 ($p < 0.01$), providing univariate evidence that female politicians are negatively associated with local GDP growth. *Female* is also correlated with a higher secondary sector ratio and a smaller population.

4. Results

This section presents the main results. In Section 4.1, we conduct the pooled panel regressions. In Section 4.2, we examine whether the relationship is causal using three identification strategies. We summarize and discuss the results in Section 4.3.

4.1. Pooled panel regressions

We first compare cities with a female leader and cities without a female leader in a simple panel regression framework. Specifically, we regress a city's GDP growth rate in year *t* ($Growth_{c,t}$) onto a $Female_{c,t}$ dummy, controlling city and politician characteristics ($X_{c,t-1}$) and various fixed effects (FEs). The $Female_{c,t}$ dummy equals one if city *c* has a female leader at any time of year *t*, either the mayor or the party secretary, and zero otherwise. We cluster the standard errors by city.[11]

$$Growth_{c,t} = \beta_1 Female_{c,t} + \gamma' X_{c,t-1} + FEs + \varepsilon_{c,t}. \quad (1)$$

Table 3 reports the results. In column (1), we include *Female*, a set of control variables. The coefficient of *Female* is -0.347 (t = -3.03), indicating that cities led by female leaders experience a GDP growth rate that is 0.347% lower compared to those governed by male leaders. In column (2), we add the city fixed effects, and the year fixed effects. The city fixed effects control for city-level time-invariant factor, and the year fixed effects control for macroeconomic factors. In column (3), we add the province*year fixed effects to control for any provincial level time-varying factors. The province*year fixed effects can control any time-varying province level factors. After including them, essentially, our regressions enable us to compare cities from the same province and in the same year. In column (4), we add the fixed effects from both columns

[11] The results are robust if we use other ways of clustering. For example, if we cluster the standard errors by province, in the specification of column (4), the *t* value of the *Female* coefficient will become -3.59.

(2) and (3). Note that there is no need to include the year fixed effects as the province*year fixed effects absorb the year fixed effects. The additions of the fixed effects decrease the coefficient of *Female* only slightly. For example, relative to that in column (1), adding both the city and the province*year fixed effects decreases the coefficient of *Female* from -0.347 to -0.274 (t = -2.84).

As shown in the summary statistics, female-led cities and male-led cities have different industry structures. Specifically, the secondary sector tends to be more important for female-led cities than male-led ones. As we can see from Table 3, controlling for the importance of industry structure has minimal effect on the *Female* coefficient. One weakness of controlling for *Secondary Ratio* and *Tertiary Ratio* is that their effects may be time-varying. In other words, the secondary sector may do relatively better than other sectors than in other years. *Secondary Ratio* and *Tertiary Ratio* only control for the average effects. In column (5), we construct a *Synthetic Growth* variable to control for the time-varying effect of industry structure. Specifically,

$$Synthetic\ Growth_{c,t} = \sum_{sector=1}^{2} Ratio_{sector,t-1} Growth_{sector,t}. \quad (2)$$

The *Synthetic Growth* variable can be considered the counterfactual economic growth rate a city would have if its three sectors all grew at the same rate as the whole economy.[12] As expected, its coefficient is 0.825 (t = 5.76), which is highly statistically positive. Even with this control, the coefficient of *Female* continues to be similar to that in the other three models.[13]

In column (6), we break up the *Female* dummy into a *Female Mayor* dummy and a *Female Party Secretary* dummy. They have coefficients of -0.235 (t = -2.17) and -0.220 (t = -1.54), respectively. Relative to the *Female* dummy in other columns, these two coefficients have lower statistical significance, likely due to a relatively small sample of female politicians once we break

[12] The idea of the *Synthetic Growth* variable is similar to that of the Bartik instrument (Bartik, 1991; Blanchard and Katz, 1992). However, we do not use *Synthetic Growth* as an instrument for an explanatory variable. Instead, we use it as a control (column (5) of Table 3) or to define an abnormal growth variable (Internet Appendix Table A1).

[13] In an alternative specification, instead of including *Synthetic Growth* as a control, we use it to adjust the outcome variable. In other words, we use $Growth_{c,t} - Synthetic\ Growth_{c,t}$ as our outcome variable. The new variable can be explained as an abnormal GDP growth rate. Internet Appendix Table A1 reports the results, and we continue to find results similar to those in Table 3.

all female politicians by mayors and party secretaries. However, the coefficients have similar magnitudes, indicating the effect is similar for both positions.

We report several robustness tests in Internet Appendix Table A2. First, we include the autonomous regions, Qinghai, and Hainan. Second, we exclude cities with a population of less than 1 million. Third, we exclude sub-provincial-level cities. Officials of the sub-provincial level cities are ranked at the sub-provincial level instead of at the prefecture level. There are 15 such cities. Fourth, in Table 3, *Female* equals one if the mayor (party secretary) is female at any time of the year and zero otherwise. In a few years, politicians were appointed in the second half of the year or may leave their posts in the first half of the year. Their influence on the local economy in that year may be relatively limited. Hence, we also redefine the politician's gender after excluding such politicians. In all three robustness tests, the coefficient of *Female* continues to be similar to that in the main specification.

Overall, the results in Table 3 show that Female-led cities tend to have lower economic growth than male-led cities, and the politician gender-GDP growth rate correlation is robust to various alternative specifications.

4.2.Other economic outcomes

In Table 4, we examine whether female-led cities differ from male-led cities in other economic outcomes. Specifically, we investigate these outcomes: investment growth; government revenue growth; average wage growth; consumption per capita growth; science, education, and healthcare spending/GDP, and social security spending/GDP. The results show that female-led cities have a lower growth rate in all four growth variables than male-led cities, although we only observe statistical significance for investment growth. This finding shows that the gender-growth relationship applies to many components of economic activities, and it has a direct impact on resident income.

The existing literature documents strong evidence that female politicians favor the provision of public goods such as education and healthcare (Thomas 1990, 1994; Duflo, 2003). The results in the last two columns of Table 4 show that female-led cities spend more on science,

education, and healthcare, as well as social security as a fraction of their GDP than male-led cities. The coefficients are 0.052 for science, education, and healthcare/GDP and 0.033 for social security/GDP. Neither is statistically significant. The economic magnitude is also small. Female-led cities spend 0.052% more on science, education, and healthcare and 0.033% more than social security. Relative to female politicians' impact on GDP growth (about 0.3%), their effects on these public goods items are much smaller.

4.3.Three identification tests

The pooled panel regressions in Section 4.1 present a robust, striking finding that female-led cities have lower GDP growth rates. However, such correlations do not necessarily mean that politician gender has a causal effect on local economic growth. In our view, the most plausible alternative story is that female politicians are more likely to be assigned to cities that are expected to grow slower. We do not see an apparent reason top-level politicians want to do this, and we are unaware of any such evidence.

In Internet Appendix Table A3, we examine whether a city's past GDP growth rate predicts the gender of its future politicians. Specifically, we focus on the city-years when a new mayor or a city party secretary is appointed. The dependent variable is a dummy that equals one if the newly appointed official is female and zero otherwise. In the three models, we vary the set of fixed effects. The coefficient of the GDP growth in year t - 1 is positive, although mostly statistically insignificant. In untabulated results, we also find that GDP growth in year $t - 2$ and in year $t - 3$ have no significant predictive power for the gender of the following appointed officials.

The evidence shows no significant correlation between a politician's gender and a city's lagged growth rate. In addition, it is unclear why the government would have such an incentive. Nevertheless, in this section, we conduct three identification tests to establish further the causal relationship between a politician's gender and economic growth.

4.3.1. A difference-in-differences approach

The first test we adopt is a stacked difference-in-differences (DID) test. We implement a stacked DID design instead of a staggered DID to mitigate the problem of negative weights (De Chaisemartin and D'Haultfoeuille, 2020; Callaway and Sant'Anna, 2021; Goodman-Bacon, 2021; Sun and Abraham, 2021). In the test, we use the appointment of a female politician as the shock. Cities switching from having no female leader to having at least one female leader (i.e., when *Female* = 0 to *Female* = 1) are the treatment group. We denote the year of the appointment as year 0, and we include [-4, +4] in our analysis. We require that the treated cities do not have female leaders in the four years leading up to the appointment of female leaders (i.e., years -4 to -1), and the female official has to stay at least until year 2. If the female official leaves office in year 3 (or year 4), we keep this event but end the sample in year 2 (3). We use the neighboring cities from the same province as the controls for a treated city. We also require that the control cities never have a female politician in the period around the female politician's appointment. Specifically, we estimate the following model.

$$Growth_{e,c,t} = \beta_1 Treat_{e,c} * Post_{e,t} + \beta_2 Treat_{e,c} + \beta_3 Post_{e,t} + \gamma' X_{c,t-1} + FEs + \varepsilon_{e,c,t}, (3)$$

where *e* indexes events. In event *e*, a female leader is appointed for city *c* in year *s*. $Treat_{e,c}$ equals one for city *c* and zero otherwise. $Post_{e,t}$ equals one from year *s* to year *s* + 4 and zero from *s* – 4 to *s* – 1. $X_{c,t-1}$ is a set of control variables. FEs stands for fixed effects, which vary from model to model. The main coefficient of interest is the β_1, which measures the treatment effect. If the appointment of a female leader decreases a city's GDP growth rate, we expect $\beta_1 < 0$.

Table 5 reports the results. The only difference across the three columns is the different choices of the fixed effects. In column (1), we include the province*year fixed effects. In column (2), we include the city and the province*year fixed effects. In column (3), we include the event*city and the province*year fixed effects. In column (3), the coefficient of *Treat*Post* is -0.473 (*t* = -2.62). The different choices of the fixed effects have minimal impact on the coefficient of *Treat*Post*. The negative coefficient of *Treat*Post* is consistent with the pooled panel

regression results in Table 3. The DID estimate suggests an effect of about -0.45%, slightly higher than that from the pooled panel regressions.

In Figure 2, we report the dynamic effects. Specifically, we estimate the following model.

$$Growth_{e,c,t} = \sum_{y=-4\ \&\ y\neq -1}^{y=3} \beta_y Treat_{e,c} * Post_{e,s-y} + \beta_2 Treat_{e,c} + \sum_{y=-4\ \&\ y\neq -1}^{y=3} \delta_{3,y} Post_{e,s-y} + \gamma' X_{c,t-1} + FEs + \varepsilon_{e,c,t}, \quad (4)$$

where *s* is the year of the event, and *y* is the event year, ranging from year -4 to year +3. Following the convention, year -1 is used as the base year. $Post_{e,s-y}$ equals one for event year *y* and zero otherwise. The coefficients of β_y capture the treatment effect relative to the base year -1.

Figure 2 displays the coefficients of β_y and their 95% confidence intervals. To generate these coefficients, we include the event*city and the province*year fixed effects. It is evident that the coefficients of β_y drop significantly from year -1 to year 0. Prior to the event, β_y is close to zero and never statistically significant. From year 0, its magnitude increases significantly and is statistically significant at the 5% level for years 0 and 1. For year +2, the coefficient is -0.585, with a t-value of -1.82, significant at the 10% level. Figure 2 also confirms the key identification assumption of the DID strategy – there is no pre-trend.

4.3.2. An instrumental variable approach

Based on the gender quota rule, we propose two instrumental variables. The gender quota rule requires at least one female politician at each level of the Chinese government. Based on this gender quota rule, we have two predictions about the politician's gender in the year when a vacant position becomes available. Accordingly, we propose two instrumental variables.

First, for a focal city *c* when a vacant position is available, if its province has a relatively higher female ratio, the focal city will have a lower probability of having a female to fill the vacation. Therefore, we define the first instrument, *IV1*, as the fraction of female politicians (including both mayors and party secretaries) in the same province as the focal city but not including the focal city *c*. *IV1* is measured with a one-year lag. If provinces maintain a certain

female politician ratio, we expect *IV1* to be a strong negative predictor of the likelihood that city *c* will get its opening position filled by a female.

Second, for a focal city *c* when a vacant position is available, if the province typically maintains a female ratio higher than it currently has, the province has a higher probability of appointing a female to fill the position. Therefore, we define the second instrumental variable, *IV2*, as the province's female ratio four years ago minus the female ratio right before the appointment of the vacant position. We exclude city *c* when calculating both ratios. We choose four years because it is roughly the median tenure upon departure for city leaders. The results are similar if we choose five years. We expect *IV2* to be a strong positive predictor of the likelihood that city *c* will get its opening position filled by a female. We assign the values of *IV2* to the corresponding cities from the year of the turnover until the next turnover.

Table 6 presents the results. The odd columns present the results for the first-stage regressions, and the even columns present the second-stage results. In the first two columns, we use *IV1* as the instrument; in the next two columns, we use *IV2* as the instrument; and in the last two columns, we use both *IV1* and *IV2* as the instruments. As expected, both instruments are strongly predictors of the gender of the next appointment. As column (5) shows, both are highly statistically significant even when both were included in the same regression.

In the second stage, the coefficient of *Female* is negative, ranging from -0.324 to -1.457 and is statistically significant in all three columns. When we use only *IV1* or use both instruments, the coefficients of *Female* are similar to that from the DID test. When we use only *IV2*, the coefficient is -1.3457, significantly larger than that from the DID test. We also note that this estimate has a large standard error, and its confidence interval contains the point estimate from the DID test.

Overall, the instrument variable approach yields evidence consistent with the pooled regression analysis and the DID analysis.

4.3.3. An event study on stock price reaction

If the gender effect is causal and investors understand this, we expect the stock market to react in a predictable pattern. Specifically, when the market learns a female will be appointed as the next leader of a city, on average, the stock price of firms located in that city may decrease. In contrast, when the market learns a male will be appointed, the price of local stocks may slightly increase or be flat. We expect the latter to increase slightly or be flat because the fraction of female leaders is low (see Table 2), and the appointment of a male leader may not be considered a big surprise.

We define the "announcement date" as the first day that the appointment news shows up on newspapers or government websites. We manually collect these announcement dates. In almost all cases, these are the days when an official's appointment is officially announced, either by the provincial government (for party secretaries) or the People's Congress (for mayors). For mayors, they often start with the title of interim mayor, and almost all interim mayors are elected to be the mayor within the next year. Hence, we define the date when an official is elected to be an interim mayor as the announcement date. We want to emphasize that although the appointment dates are the first day the news was reported, it is likely that the appointments were partially expected. Typically, there is a discussion process before the official announcements. Hence, we expect the stock market to react before the official announcement dates.

We follow the standard methodology to conduct the event study analysis (Fama, Fisher, Jensen, and Roll, 1969; Campbell, Lo, and MacKinlay, 1998). We first construct a city-level stock portfolio. The city-level portfolio is a market capitalization-weighted portfolio of all the stocks located in city *c*. For an event of city *c* on day *t*, we calculate the daily abnormal return of the city-level portfolio as the raw portfolio return minus the contemporaneous stock market return, defined as the market capitalization-weighted portfolio of all the domestically listed stocks. Cumulative abnormal returns (CARs) are calculated as the sum of daily abnormal returns over a period. Data on individual stock return and market capitalization and data on the stock market return are from CSMAR. Our results are similar if we construct the city-level portfolio by equally weighting local

stocks or calculating abnormal returns using other models, such as the market model. We can obtain the announcement dates and calculate the abnormal returns for 1,232 appointments, 63 of which are female leader appointments.

Figure 3 displays the average CARs for the [-12, 5] period. It is evident that the male leader appointment news has little impact on the stock returns, but the female leader appointment news is associated with market declines. Figure 3 also suggests that the market reaction starts before the official news reaches the market, consistent with earlier discussions. Over the [-10, 1] period, the average CARs are -1.791% (t = -2.23) for female leader appointments and 0.076% (t = 0.39) for male leader appointments. The difference is -1.867% (t = -2.26). The results confirm that news of female appointments is associated with lower stock returns.

One potential concern of any longer-window event study is that there may be confounding events, although we do not find any systematic events over the [-10, 1] window. Hence, we also examine the shorter [-5, 1] window. The female-male CAR difference is -1.034% (t = -1.72) over the [-5, 1] period. Although the female-male CAR differences are smaller, they are still economically large and statistically significant, although weaker than the long window. Overall, the results from the shorter windows are comforting, as confounding events are much less likely to happen during such short periods.

4.4.Summary

The striking finding that female-led cities have lower economic growth than male-led cities continues in the three identification tests. The identification of the DID test requires that the assignment of leaders is exogenous. Although ruling this possibility completely out is hard, the finding of no significant pre trend suggests that at least female leaders are not assigned to cities whose GDP growth rate has been relatively trending down. The treatment effect appears exactly in the year when a leader takes office, which also points to a causal interpretation. The identification of the instrumental variable approach requires the instruments to be exogenous. We believe they are plausibly so, especially *IV2*, which is calculated based on the data before a leader

was appointed and is carried out during his/her tenure. In our view, in terms of empirical identification, the event study is the most convincing.

The following section examines the mechanisms behind the politician's gender-economic growth relationship.

5. Mechanisms

The results so far are inconsistent with the hypothesis that the gender quota rule will improve administrative effectiveness by reducing the influence of gender discrimination and promoting better candidates. As shown in Table 4, female officials indeed have higher spending on public goods such as education, healthcare, and social security, but the economic magnitude is too small to explain our findings on GDP growth, and the relationship is statistically insignificant.

In this section, we investigate the third alternative hypothesis: Restricting the free choice of politicians may result in the appointment of suboptimal candidates. Candidates can be suboptimal due to their lower personal skills or the environment. We also examine which factor is likely to play a role.

5.1.Female leaders have lower "qualifications"

First, we compare the "qualifications" between female and male leaders. Qualification is multi-dimensional, and we can measure only some observable characteristics. Specifically, we examine these characteristics: age, party tenure (i.e., the number of years since one became a party member), work experience (i.e., the number of years since one started working), whether one has a bachelor's degree or above, whether one has a STEM background, whether one graduated from a top tier college where top tier is defined if it is a Project 211 college, and whether one had any overseas education experience. Table 7 reports the results. When taking office, females are younger, have lower party tenure, and have less working experience. They are also less likely to have overseas education experience or a STEM background. Females are slightly more likely to hold a bachelor's degree or above, although both females and males have quite a high probability

of having such degrees (94.0% vs. 91.5%). Both males and females have a similar probability of graduating from a Project 211 college (42.9% vs. 44.0%). Overall, female politicians seem to have lower qualifications than their male counterparts.

5.2.Female leaders have a higher chance of promotion

Another prediction is that, everything else the same, female leaders should have a higher chance of being promoted than their male counterparts. We test this prediction by examining whether female mayors and city party secretaries are more likely to be promoted than their male counterparts.[14] The Chinese government has clearly defined ranks for different government positions. If an official switches to a higher-ranked position, we consider it a promotion.[15] As mayors are typically considered the number two position within a city government, we also consider mayor to city party secretary (or head of same-ranked departments in higher-level governments) as a promotion. On average, the annual promotion probability is 23.78%.

Table 8 reports that females are more likely to be promoted after controlling for other factors. Based on the OLS regression, the margin effect of being a female is associated with a 5.2 percentage points increase in receiving promotion every year. Relative to the annual promotion probability of 23.78%, such an increase is economically large.

Recall that the fraction of female leaders reached the peak in 2012. One possible reason for the lack of continuing increase in the female ratio is that the gender quota requirement has been satisfied. We examine the gender-promotion relationship in two subsamples: before and after 2012.

[14] Ideally, we should test whether female officials at the sub-city level have a higher chance to be promoted than males one. Unfortunately, such a test is difficult to do for several reasons. First, there is no existing data base with all the vice-city level officials, perhaps because many positions are at that level, including vice mayors, members of the city level party standing committee, many officials at the departments of provincial governments, and some vice-city level county governors and party secretaries. All of them have a chance to get promotion and data on their biographic characteristics and job performance do not exist or are hard to collect.

[15] A mayor or a city party secretary may sit on the provincial-level party standing committee. For these cases, he/she is considered at the sub-provincial level instead of at the prefecture level.

The results in Table 8 confirm that the gender-promotion relationship is stronger in the earlier sample and becomes weaker and statistically insignificant later.[16]

5.3.The gender-growth relationship is stronger when gender quota constraint is binding

There is a natural implication of the subperiod results. Suppose the gender quota rule leads to the appointments of female leaders who are less qualified than their male counterparts and hurts economic performance. In that case, we expect the gender-growth relationship to exist only when the gender quota is binding, namely the period before 2012. Table 9 reports the baseline results by the two subperiods. Consistently, we find that the effect of the gender-economic growth relationship is stronger in the first half of the sample than in the second half. In fact, it is only marginally significant in the first subperiod.

5.4.The gender-growth relationship is stronger in areas with stronger discrimination

So far, the results in the previous three subsections (Subsections 5.1 – 5.3) are mostly consistent with the first hypothesis that the gender quota rule leads to the appointment of less qualified female candidates, and their appointments hurt local economic growth. If the environment plays a role, we expect stronger effects in areas with stronger gender discrimination.

We use three proxies for region-level gender discrimination: GDP per capita, the ratio of the primary sector, and the proportion of females aged 15 and above with a college or higher degree. We measure the first two proxies at the city level and the last at the province level because the

[16] Besides of promotions and staying unchanged, officials may retire or be "demoted" to lower ranks. Besides cases involving a direction demotion to a lower rank, we also include resigning due to personal reasons, corruption, or retirements as well as switching to be the chair of city-level People's Congress or the chair of the People's Political Consultative Conference as demotions. Although both the chair of city-level People's Congress and the chair of the People's Political Consultative Conference are ranked at the prefecture level, these positions are typically considered less powerful than mayors or party secretaries. Out of all the official-year observations, 8.5% cases are involved retirements or demotions. In Internet Appendix Table A4, we use an ordered logistic model to consider promotion, unchanged, and retirements/demotions. The results re similar to that in Table 8.

city-level data are unavailable. It has been widely documented that economic development drives down gender inequality (e.g., Duflo, 2012), and in economies heavily reliant on agriculture or other primary sectors, traditional gender roles tend to persist, often resulting in higher levels of gender discrimination (Boserup, 1970).

Table 10 reports the results. For each discrimination proxy, we split the sample into two subsamples based on its median value. The results show that the gender-growth relationship is negative in all the subsamples. However, it is much stronger and statistically significant only when the GDP per capita is lower, the local primary sector ratio is higher, or females are less educated.

These results show that the gender quota rule leads to the appointments of female leaders with lower qualifications than male ones. The gender-growth relationship is stronger in areas with stronger gender discrimination. Overall, it suggests that the selection and the environment may contribute to the gender-growth relationship.

6. Conclusions

In this paper, we study how a politician's gender affects economic growth using a gender quota rule in China. We document a robust finding that Chinese cities under the administration of female political leaders have a GDP growth rate of 0.3-0.5% lower than male-led cities. The results are robust in a difference-in-differences test and in an instrumental variable design. When the news that a city will have a female leader, the stock price of firms located in that city decreases by about 2%, while the stock price reaction to male leader appointment news is flat. The gender-growth relationship is weaker in the later years when the quota requirement is likely not as binding as in the earlier years. The gender-growth relationship is stronger in regions where gender discrimination is stronger. Female leaders also have lower qualifications than their male counterparts. Overall, the results show that selection (appointment of less qualified candidates)

and the environment (e.g., gender discrimination of the public) likely contribute to the gender-growth relationship.

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Table 1. The distribution of provinces by the number of female leaders

This table presents the distribution of provinces by the number of female mayors and city party secretaries for each year between 2001 and 2018. We count both mayors and city party secretaries at the end of each year.

Panel A. Including autonomous regions, Qinghai, and Hainan

Year	#Female=0	#Female=1	#Female=2	#Female=3
2001	16	8	2	1
2002	15	7	4	1
2003	12	14	0	1
2004	10	12	4	1
2005	10	11	5	1
2006	8	9	10	0
2007	10	8	9	0
2008	9	14	3	1
2009	8	14	3	2
2010	6	16	2	3
2011	5	7	11	4
2012	5	9	10	3
2013	4	7	10	6
2014	4	9	9	5
2015	3	8	11	5
2016	4	9	12	2
2017	5	10	12	0
2018	7	12	6	2

Panel B. Excluding autonomous regions, Qinghai, and Hainan

Year	#Female=0	#Female=1	#Female=2	#Female=3
2001	11	6	2	1
2002	11	4	4	1
2003	8	11	0	1
2004	7	8	4	1
2005	6	8	5	1
2006	3	7	10	0
2007	4	7	9	0
2008	4	12	3	1
2009	3	12	3	2
2010	3	12	2	3
2011	2	4	10	4
2012	2	6	9	3
2013	0	5	9	6
2014	0	6	9	5
2015	0	6	9	5
2016	1	6	12	1
2017	1	8	11	0
2018	4	9	5	2

Table 2. Summary statistics

This table presents the summary statistics for the sample. Panel A reports the mean, median, standard deviation (STD), the minimum and the maximum of each variable. Panel B reports their pairwise correlations. *Growth* is the GDP growth rate (in percentage) of a city in year *t*. *Female* is a dummy variable that equals one if a city has a female leader (either a mayor or a party secretary) and zero otherwise. *Secondary Ratio* and *Tertiary Ratio* represent the shares of the GDP in the secondary sector and the tertiary sector, respectively. *GDP* and *Population* are local total GDP and population, respectively. All the economic variables are measured at the end of year *t* -1. All the continuous variables are winsorized at the 1% level for both tails.

Panel A. Summary statistics

	Mean	Median	STD	Min	Max
Growth	11.196	11.4	3.671	0.4	20.1
Female	0.122	0	0.327	0	1
Log (Population)	15.157	15.182	0.585	13.624	16.241
Log (GDP)	24.941	24.901	0.933	23.145	27.277
Secondary Ratio	58.576	58.432	14.558	25.301	94.396
Tertiary Ratio	46.068	43.465	13.124	21.307	85.315
Log (Mayor Age)	3.932	3.932	0.076	3.714	4.078
Log (1+Mayor Tenure)	1.146	1.099	0.411	0	2.079
Log (Secretary Age)	3.973	3.989	0.068	3.784	4.094
Log (1+Secretary Tenure)	1.213	1.099	0.441	0	2.197

Panel B. Correlations

	Growth	Female	Log (Population)	Log (GDP)	Secondary Ratio	Tertiary Ratio	Log (Mayor Age)	Log (1+ Mayor Tenure)	Log (Secretary Age)	Log (1+ Secretary Tenure)
Growth	1									
Female	-0.060***	1								
Log (Population)	-0.011	-0.151***	1							
Log (GDP)	-0.222***	-0.031**	0.498***	1						
Secondary Ratio	-0.220***	0.097***	-0.195***	0.440***	1					
Tertiary Ratio	-0.458***	-0.01	0.113***	0.511***	0.015	1				
Log (Mayor Age)	-0.140***	-0.024	0.115***	0.277***	0.072***	0.286***	1			
Log (1+Mayor Tenure)	0.064***	0.002	0.041***	0.082***	0.021	0.006	0.279***	1		
Log (Secretary Age)	-0.168***	-0.02	0.055***	0.210***	0.170***	0.161***	0.152***	0.125***	1	
Log (1+Secretary Tenure)	0.084***	0.01	0.007	-0.01	-0.027*	-0.068***	0.106***	0.341***	0.273***	1

Table 3. Pooled panel regressions

This table reports the pooled panel regression results. The dependent variable is *GDP Growth*, which is the GDP growth rate of a city in year *t*. *Female* is a dummy variable that equals one if a city has a female leader (either a mayor or a party secretary) and zero otherwise. *Synthetic Growth* is defined based on Equation (1). See Table 2 for the definitions of other variables. All the continuous variables are winsorized at the 1% level for both tails. Standard errors are clustered at the city level, and *t*-statistics are reported in parentheses. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
Dept. Var. =			Growth (%)			
Female	-0.347***	-0.311**	-0.249***	-0.274***	-0.272***	
	(-3.03)	(-2.50)	(-3.20)	(-2.84)	(-2.89)	
Female mayor						-0.235**
						(-2.17)
Female party secretary						-0.220
						(-1.54)
Log (Population)	-0.413***	1.339	-0.112	-2.186***	-1.601**	-1.586**
	(-3.54)	(1.12)	(-1.23)	(-3.25)	(-2.20)	(-2.21)
Log (GDP)	0.349***	-2.186***	-0.035	-3.754***	-3.888***	-3.888***
	(4.33)	(-5.53)	(-0.39)	(-8.28)	(-8.57)	(-8.56)
Secondary ratio	-0.058***	-0.001	0.003	0.013	-0.046***	-0.046***
	(-12.22)	(-0.05)	(0.58)	(0.76)	(-2.61)	(-2.61)
Tertiary ratio	-0.059***	-0.006	0.015**	0.010	-0.054***	-0.054***
	(-12.91)	(-0.42)	(2.22)	(0.57)	(-2.65)	(-2.65)
Lagged Growth	0.682***	0.535***	0.480***	0.376***	0.365***	0.365***
	(38.62)	(18.97)	(14.13)	(10.35)	(9.88)	(9.87)
Log (Mayor Age)	-0.404	-0.783	0.213	0.331	0.213	0.216
	(-0.84)	(-1.51)	(0.56)	(0.67)	(0.44)	(0.44)
Log (1+Mayor Tenure)	0.129	0.122	-0.082	-0.039	-0.033	-0.031
	(1.45)	(1.42)	(-1.22)	(-0.56)	(-0.47)	(-0.45)
Log (Secretary Age)	-2.143***	-0.699	-0.784*	-0.392	-0.419	-0.410
	(-3.93)	(-1.07)	(-1.72)	(-0.69)	(-0.76)	(-0.74)
Log (1+Secretary Tenure)	-0.138	-0.253***	-0.052	-0.061	-0.049	-0.046
	(-1.47)	(-2.78)	(-0.71)	(-0.78)	(-0.63)	(-0.60)
Synthetic Growth					0.825***	0.826***
					(5.76)	(5.76)
City FE	NO	YES	NO	YES	YES	YES
Year FE	NO	YES	NO	NO	NO	NO
Province x Year FE	NO	NO	YES	YES	YES	YES
Observations	4,023	4,023	4,020	4,020	4,020	4,020
R^2	0.662	0.751	0.833	0.853	0.856	0.856

Table 4. Other economic outcomes

This table reports the panel regression results on these economic outcomes: investment growth; government revenue growth; average wage growth; consumption per capita growth; science, education, and healthcare spending/GDP, and social security spending/GDP. These growth rates (in percentage) are measured in year *t*. *Female* is a dummy variable that equals one if a city has a female leader (either a mayor or a party secretary) and zero otherwise. See Table 3 for the list of control variables. All the continuous variables are winsorized at the 1% level for both tails. Standard errors are clustered at the city level, and *t*-statistics are reported in parentheses. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
Dept. Var. =	Investment Growth	Government Revenue Growth	Average Wage Growth	Consumption per capita Growth	Science, Education, and Healthcare /GDP	Social Security /GDP
Female	-2.011**	-0.695	-0.414	-0.062	0.052	0.033
	(-2.58)	(-1.03)	(-1.42)	(-0.18)	(0.92)	(0.70)
City controls	YES	YES	YES	YES	YES	YES
Politician controls	YES	YES	YES	YES	YES	YES
City FE	YES	YES	YES	YES	YES	YES
Province x Year FE	YES	YES	YES	YES	YES	YES
Observations	3,838	3,505	3,997	3,471	2,641	3,113
R^2	0.663	0.697	0.460	0.397	0.955	0.916

Table 5. A difference-in-difference strategy

Female politician appointments are the treatment group. When a city appoints a female politician in year *t*, we use the neighboring cities as the control. We also require the neighboring cities to belong to the same province as the treatment city, and a control city never has a female politician in the [-4, 3] period around the female politician's appointment. See Table 3 for the list of control variables. All the continuous variables are winsorized at the 1% level for both tails. Standard errors are clustered at the city level, and *t*-statistics are reported in parentheses. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)
Dept. Var. =		Growth (%)	
Post x Treat	-0.423**	-0.452**	-0.473***
	(-2.60)	(-2.61)	(-2.62)
Post	-0.040	0.012	0.118
	(-0.33)	(0.08)	(0.51)
Treat	0.125		
	(0.87)		
City controls	YES	YES	YES
Politician controls	YES	YES	YES
City FE	NO	YES	NO
Province x Year FE	YES	YES	YES
Event x City FE	NO	NO	YES
Observations	1,444	1,444	1,444
R^2	0.879	0.902	0.908

Table 6. An instrumental variable strategy

We use two instrumental variables. In columns (1) and (2), we define the first instrument, *IV1*, as the fraction of female politicians (including both mayors and party secretaries) in the same province as the focal city but not including the focal city *c*. *IV1* is measured with a one-year lag. In columns (3) and (4), we define the second instrumental variable, *IV2*, as the province's female ratio four years ago minus the female ratio right before the appointment of the vacant position. See Table 3 for the list of control variables. All the continuous variables are winsorized at the 1% level for both tails. Standard errors are clustered at the city level, and *t*-statistics are reported in parentheses. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
	1st	2nd	1st	2nd	1st	2nd
Dept. Var. =	Female	Growth (%)	Female	Growth (%)	Female	Growth (%)
IV1	-6.251***				-5.918***	
	(-12.86)				(-12.12)	
IV2			0.144***		0.091***	
			(5.59)		(5.29)	
Female		-0.324*		-1.457**		-0.445***
		(-1.87)		(-2.40)		(-2.90)
City controls	YES	YES	YES	YES	YES	YES
Politician controls	YES	YES	YES	YES	YES	YES
City FE	YES	YES	YES	YES	YES	YES
Province x Year FE	YES	YES	YES	YES	YES	YES
Observations	4,020	4,020	3,613	3,613	3,613	3,613
R^2	0.610	0.853	0.420	0.863	0.629	0.869

Table 7. Comparing the characteristics of female and male politicians

All the variables are calculated using the data the year before the appointment year unless otherwise indicated.

	Female			Male			Difference	
	N	Mean	Median	N	Mean	Median	Mean	*t*-stats
Age	133	48.594	49	2323	50.248	51	-1.654	-5.469***
Party tenure	122	26.230	27	2153	27.033	27	-0.803	-1.907*
Work experience	123	27.528	28	2099	28.665	30	-1.137	-2.317**
Bachelor or above	133	0.940	1	2327	0.915	1	0.025	1.141
Good college	133	0.429	0	2327	0.440	0	-0.011	-0.259
Overseas college	133	0	0	2327	0.035	0	-0.035	-9.217***
STEM	133	0.105	0	2327	0.183	0	-0.078	-2.790***

Table 8. Gender and promotions

This table reports the results on how the gender of a politician is associated with the likelihood of promotions. The dependent variable is promotion, which equals one if an official is promoted to a higher-ranked position and zero otherwise. *Mayor* is a dummy that equals one if the official is the mayor and zero if the official is the party secretary. See Table 3 for the list of control variables. Standard errors are clustered at the city level, and *t*-statistics are reported in parentheses. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Dept. Var. =	(1)	(2)	(3)	(4)	(5)	(6)
	Promotion					
	Full sample		<=2012		>2012	
	Logit	OLS	Logit	OLS	Logit	OLS
Female	0.317**	0.052**	0.482***	0.075**	0.186	0.034
	(2.12)	(2.02)	(2.88)	(2.58)	(0.71)	(0.77)
Growth	0.701	0.136	3.451	0.542*	1.770	0.385
	(0.43)	(0.54)	(1.64)	(1.76)	(0.39)	(0.55)
Log (Population)	0.256**	0.037**	0.456***	0.062**	-0.081	-0.010
	(2.20)	(2.08)	(2.74)	(2.56)	(-0.47)	(-0.36)
Log (GDP)	-0.087	-0.011	-0.160	-0.020	0.056	0.008
	(-0.86)	(-0.73)	(-1.14)	(-0.97)	(0.33)	(0.30)
Secondary ratio	0.008	0.001	0.009	0.001	0.015	0.002
	(1.18)	(1.05)	(0.94)	(0.76)	(1.46)	(1.47)
Tertiary ratio	-0.003	-0.001	-0.007	-0.001	0.003	0.001
	(-0.34)	(-0.42)	(-0.65)	(-0.81)	(0.20)	(0.35)
Log (Age)	-1.089**	-0.169**	-2.444***	-0.359***	2.456**	0.401**
	(-2.26)	(-2.23)	(-4.18)	(-3.95)	(2.35)	(2.37)
Log (1+Tenure)	1.385***	0.225***	1.527***	0.236***	1.196***	0.201***
	(13.84)	(14.37)	(12.16)	(12.38)	(6.01)	(5.94)
Mayor	0.971***	0.152***	0.950***	0.143***	1.109***	0.182***
	(13.63)	(14.51)	(10.96)	(11.58)	(7.72)	(8.36)
Province FE	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES
Observations	5,345	5,345	3,810	3,810	1,535	1,535
Pseudo R^2/R^2	0.1205	0.123	0.1386	0.139	0.1114	0.114

Table 9. Subperiod analysis

This table reports the pooled panel regression results for two subperiods. The dependent variable is *GDP Growth*, which is the GDP growth rate (in percentage) of a city in year *t*. *Female* is a dummy variable that equals one if a city has a female leader (either a mayor or a party secretary) and zero otherwise. *Synthetic Growth* is defined based on Equation (1). See Table 3 for the list of control variables. All the continuous variables are winsorized at the 1% level for both tails. Standard errors are clustered at the city level, and *t*-statistics are reported in parentheses. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

	(1)		(2)
Dept. Var. =		Growth (%)	
	year<=2012		year>2012
Female	-0.386***		-0.284*
	(-2.78)		(-1.87)
City controls	YES		YES
Politician controls	YES		YES
City FE	YES		YES
Province x Year FE	YES		YES
Observations	2,606		1,414
R^2	0.756		0.826

Table 10. Cross-sectional heterogeneity

This table reports the pooled panel regression results for subsamples. For each of the three characteristics (GDP per capita, primary ratio, and female higher education ratio), we split the sample into two subsamples by the median. The dependent variable is *GDP Growth*, which is the GDP growth rate of a city in year *t*. *Female* is a dummy variable that equals one if a city has a female leader (either a mayor or a party secretary) and zero otherwise. See Table 3 for the list of control variables. All the continuous variables are winsorized at the 1% level for both tails. Standard errors are clustered at the city level, and *t*-statistics are reported in parentheses. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
	GDP per capita		Primary ratio		Female higher education ratio	
	Low	High	Low	High	Low	High
Dept. Var. =	Growth (%)					
Female	-0.553***	-0.100	-0.171	-0.464***	-0.160	-0.383***
	(-3.65)	(-0.87)	(-1.28)	(-3.68)	(-0.99)	(-3.34)
City controls	YES	YES	YES	YES	YES	YES
Politician controls	YES	YES	YES	YES	YES	YES
City FE	YES	YES	YES	YES	YES	YES
Year FE	NO	NO	NO	NO	NO	NO
Province x Year FE	YES	YES	YES	YES	YES	YES
Observations	1,983	1,976	1,993	1,977	2,168	1,852
R^2	0.845	0.908	0.891	0.866	0.850	0.862

Figure 1. Time trend of the percentage of female politicians

This figure displays the percentage of female politicians in our sample from 2001 to 2018. The solid line shows the percentage of cities with at least one female politician, whether as a mayor or a party secretary. The dotted line indicates the percentage of cities with a female mayor, while the dashed line represents the percentage of cities with a female party secretary.

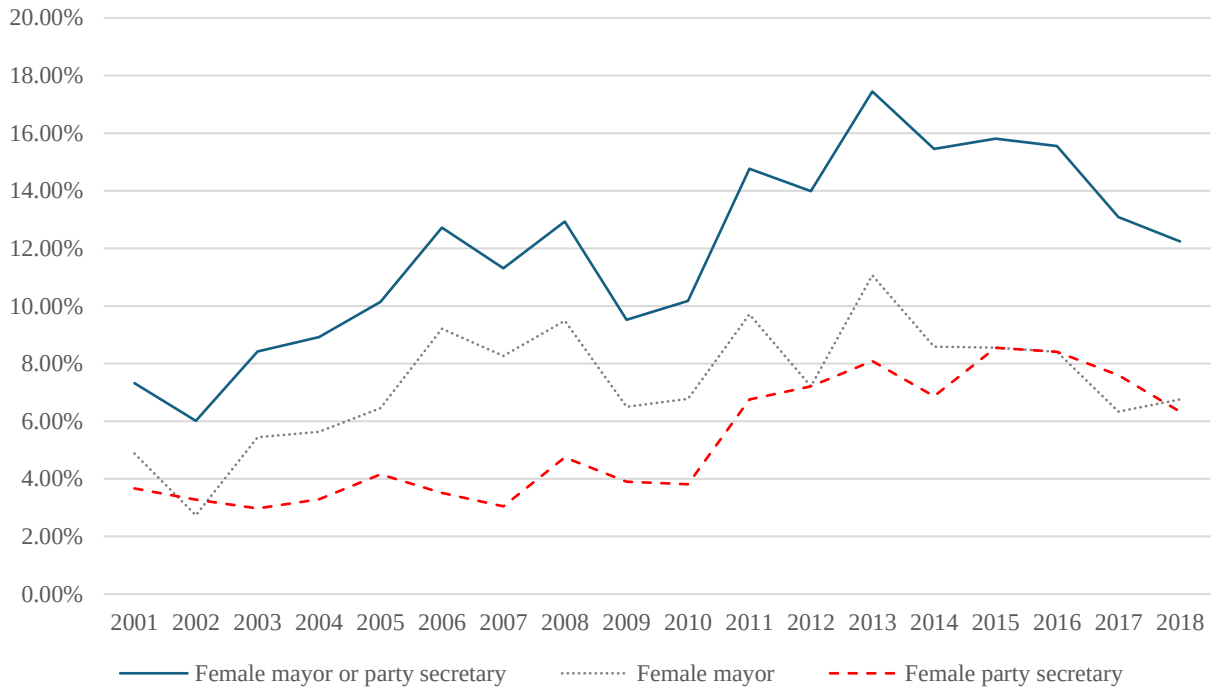


Figure 2. Parallel trends test or dynamic coefficients

This figure displays the β_y coefficients and their 95% confidence intervals estimated based on Equation (4).

$$Growth_{e,c,t} = \sum_{y=-4\ \&\ y\neq -1}^{3} \beta_y Treat_{e,c} * Post_{e,s-y} + \beta_2 Treat_{e,c} + \sum_{y=-4\ \&\ y\neq -1}^{3} \delta_{3,y} Post_{e,s-y} + \gamma' X_{c,t-1} + FEs + \varepsilon_{e,c,t}, \quad (4)$$

where *s* is the year of the event, and *y* is the event year, ranging from 4 years before the event to 3 years after the event. Following the convention, year -1 is used as the base year. $Post_{e,s-y}$ equals one for event year *y* and zero otherwise. The coefficients of β_y capture the treatment effect relative to the base year -1. We include the event*city and the province*year fixed effects. Standard errors are clustered at the city level.

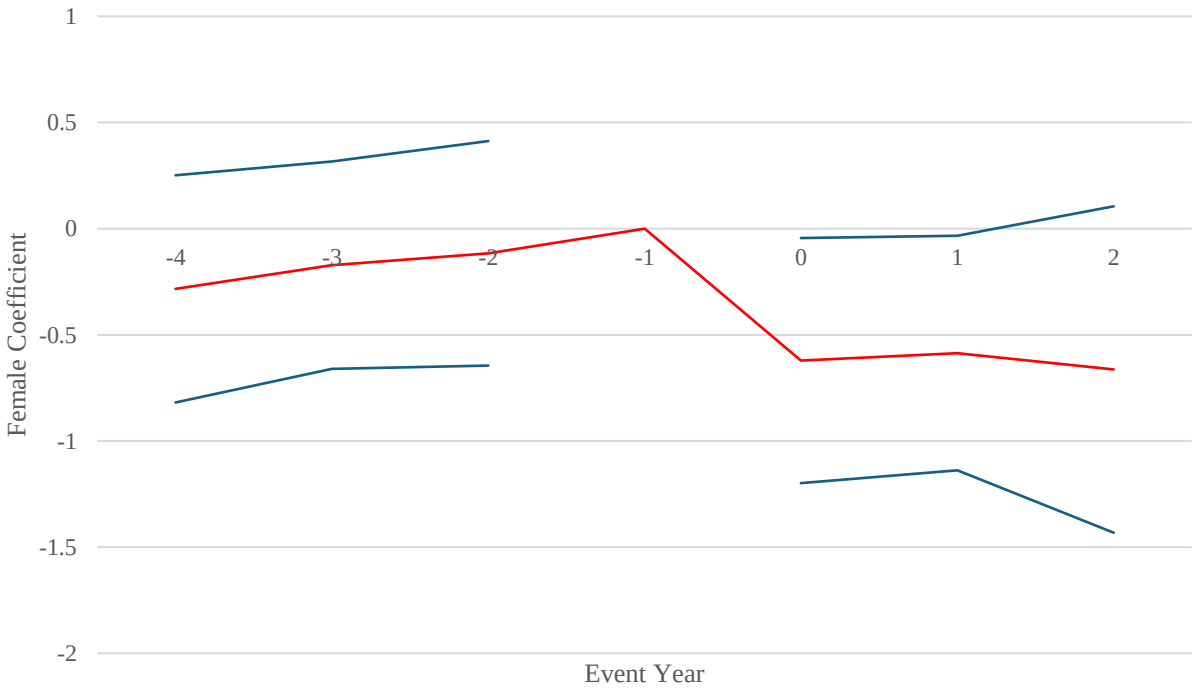
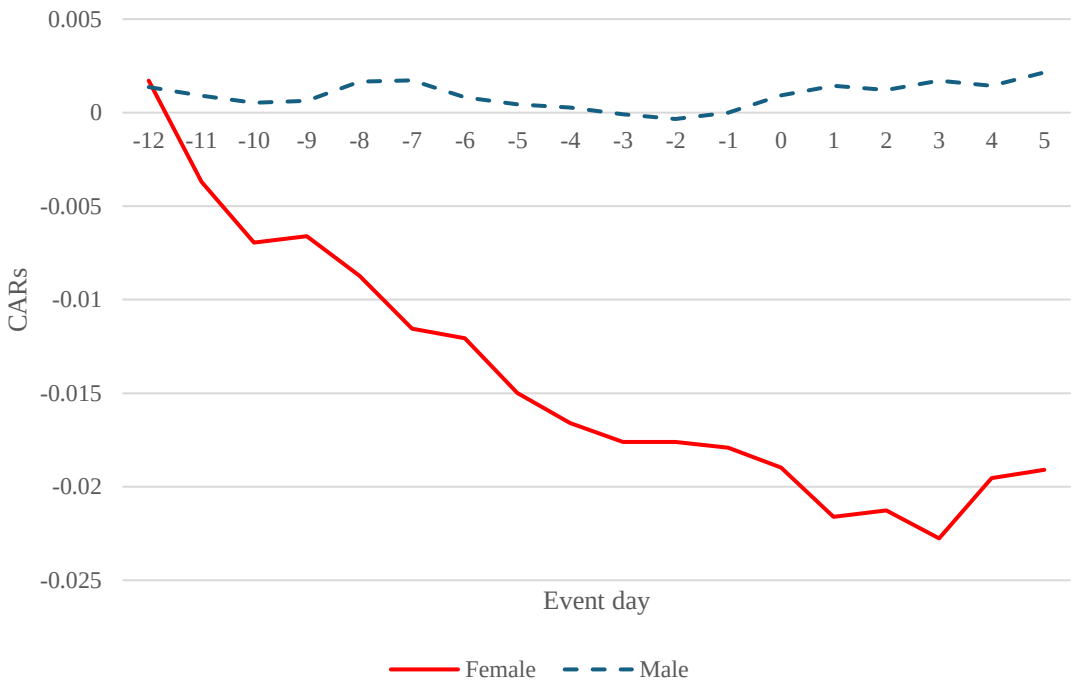


Figure 3. An event study on stock price reaction

This figure displays the cumulative abnormal returns (CARs) around the news of city leader appointments. The solid red line represents the cases in which a female leader is appointed. The dashed blue line represents the cases in which a male leader is appointed. Abnormal returns are calculated as the city-level portfolio returns minus the contemporaneous stock market return.



Internet Appendix

Women Politicians and Economic Growth

Table A1 presents the pooled panel regressions with adjusted GDP growth rate as the dependent variable.

Table A2 presents several robustness tests for the pooled panel regressions.

Table A3 tests how past GDP growth and other city characteristics affect the gender of the newly appointed official.

Table A4 reports the ordered logistic regressions about the relationship between gender and the promotion/demotions of officials.

Table A1. Pooled panel regressions with adjusted GDP growth rate as the dependent variable

This table reports the pooled panel regression results. The dependent variable is *Abnormal Growth*, defined as growth rate minus *Synthetic Growth*. *Synthetic Growth* is defined based on Equation (1). *Female* is a dummy variable that equals one if a city has a female leader (either a mayor or a party secretary) and zero otherwise. See Table 2 for the definitions of other variables. All the continuous variables are winsorized at the 1% level for both tails. Standard errors are clustered at the city level, and *t*-statistics are reported in parentheses. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)	(4)	(5)
	Dependent Var. = Abnormal Growth (%)				
Female	-0.324**	-0.305**	-0.261***	-0.272***	
	(-2.59)	(-2.42)	(-3.39)	(-2.87)	
Female mayor					-0.232**
					(-2.13)
Female party secretary					-0.224
					(-1.57)
Log (Population)	0.147	2.240*	-0.136	-1.478**	-1.465**
	(1.25)	(1.74)	(-1.42)	(-1.97)	(-1.99)
Log (GDP)	-0.076	-1.970***	0.001	-3.916***	-3.916***
	(-0.78)	(-4.68)	(0.01)	(-8.62)	(-8.61)
Secondary ratio	-0.055***	-0.072***	-0.057***	-0.059***	-0.058***
	(-11.65)	(-4.47)	(-9.54)	(-3.73)	(-3.72)
Tertiary ratio	-0.053***	-0.075***	-0.050***	-0.068***	-0.068***
	(-8.99)	(-4.81)	(-7.36)	(-4.04)	(-4.05)
Lagged Growth	0.458***	0.528***	0.470***	0.363***	0.362***
	(23.84)	(18.58)	(13.76)	(9.97)	(9.96)
Log (Mayor Age)	-0.677	-1.007*	0.093	0.188	0.192
	(-1.24)	(-1.89)	(0.25)	(0.38)	(0.39)
Log (1+MayorTenure)	0.031	0.134	-0.075	-0.031	-0.030
	(0.32)	(1.54)	(-1.12)	(-0.45)	(-0.44)
Log (Secretary Age)	-1.696***	-0.875	-0.838*	-0.424	-0.417
	(-2.68)	(-1.34)	(-1.84)	(-0.77)	(-0.76)
Log (1+Secretary Tenure)	-0.184**	-0.234**	-0.037	-0.046	-0.043
	(-2.00)	(-2.57)	(-0.50)	(-0.60)	(-0.56)
City FE	NO	YES	NO	YES	YES
Yes FE	NO	YES	NO	NO	NO
Province x Year FE	NO	NO	YES	YES	YES
Observations	4,023	4,023	4,020	4,020	4,020
R^2	0.533	0.665	0.775	0.805	0.805

Table A2. Pooled panel regressions – Robustness tests

This table reports three robustness tests of the pooled panel regression results in Table 3. In column (1), we include cities from the five autonomous regions, Qinghai, and Hainan. In column (2), we exclude a city if its population is less than 1 million. In column (3), we exclude sub-provincial-level cities. In column (4), we only consider politicians who work for a city for at least six months within the year. The dependent variable is *GDP Growth*, which is the GDP growth rate of a city in year *t*. *Female* is a dummy variable that equals one if a city has a female leader (either a mayor or a party secretary) and zero otherwise. *Synthetic Growth* is defined based on Equation (1). See Table 2 for the definitions of other variables. All the continuous variables are winsorized at the 1% level for both tails. Standard errors are clustered at the city level, and *t*-statistics are reported in parentheses. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)	(4)
Dependent Var. =	Including autonomous regions, Qinghai, and Hainan	Population>1 million	Exclude sub-provincial level cities	At least 6 months
	Dependent Var. = Abnormal Growth (%)			
Female	-0.270***	-0.274***	-0.292***	-0.261***
	(-2.75)	(-2.84)	(-2.88)	(-2.61)
Log (Population)	-1.551**	-2.292***	-1.378*	-2.159***
	(-2.29)	(-3.11)	(-1.95)	(-3.27)
Log (GDP)	-3.897***	-3.805***	-3.965***	-3.747***
	(-8.97)	(-8.20)	(-8.04)	(-8.24)
Secondary ratio	0.017	0.011	0.011	0.013
	(1.05)	(0.67)	(0.66)	(0.77)
Tertiary ratio	0.009	0.014	0.013	0.010
	(0.52)	(0.73)	(0.66)	(0.56)
Lagged Growth	0.368***	0.382***	0.363***	0.376***
	(10.60)	(10.26)	(9.30)	(10.37)
Log (Mayor Age)	0.107	0.301	0.406	0.338
	(0.23)	(0.61)	(0.79)	(0.69)
Log (1+MayorTenure)	-0.075	-0.035	-0.059	-0.049
	(-1.10)	(-0.50)	(-0.74)	(-0.71)
Log (Secretary Age)	-0.344	-0.254	-0.446	-0.403
	(-0.62)	(-0.45)	(-0.76)	(-0.71)
Log (1+Secretary Tenure)	-0.060	-0.060	-0.025	-0.057
	(-0.79)	(-0.78)	(-0.31)	(-0.74)
City FE	YES	YES	YES	YES
Province x Year FE	YES	YES	YES	YES
Observations	4,395	3,941	3,752	4,019
R^2	0.855	0.857	0.853	0.853

Table A3. Past GDP growth and the gender of newly appointed politicians

In this table, we report the OLS regressions in which we use a city's economic characteristics to predict the gender of its next year's newly appointed leader. The dependent variable is equal to one if the newly appointed leader is female and zero otherwise. We only include the city-years whereas a politician will be appointed in the next year. Standard errors are clustered at the city level, and *t*-statistics are reported in parentheses. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

	(1)	(2)	(3)
Dept. Var. =	Female	Female	Female
GDP growth	0.002	0.004*	0.001
	(0.94)	(1.83)	(0.37)
Log (Population)	-0.035***	-0.147	-0.142
	(-2.69)	(-1.42)	(-1.19)
Log (GDP)	0.002	0.003	0.007
	(0.19)	(0.09)	(0.13)
Secondary ratio	-0.000	0.000	0.001
	(-0.32)	(0.10)	(0.63)
Tertiary ratio	-0.001	0.000	0.000
	(-0.98)	(0.06)	(0.08)
City FE	NO	YES	YES
Year FE	YES	YES	NO
Province x Year FE	NO	NO	YES
Observations	2,455	2,455	2,424
R^2	0.018	0.138	0.239

Table A4. Gender and promotion – ordered logistic

This table reports the results on how the gender of a politician is associated with the likelihood of promotions and retirements/demotions. The dependent variable can take on three values: promotion, unchanged, or retirements/demotions. Please see the paper for the detailed definitions. *Mayor* is a dummy that equals one if the official is the mayor and zero if the official is the party secretary. See Table 2 for the definitions of other variables. Standard errors are clustered at the city level, and *t*-statistics are reported in parentheses. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Dept. Var. =	(1)	(2) Turnover	(3)
	Ordered Logit	Ordered Logit	Ordered Logit
Female	0.219*	0.325**	0.152
	(1.76)	(2.31)	(0.75)
Growth	1.303	3.379**	3.718
	(1.01)	(2.25)	(0.99)
Log (Population)	0.187**	0.330***	-0.046
	(2.06)	(2.61)	(-0.32)
Log (GDP)	-0.033	-0.094	0.082
	(-0.40)	(-0.85)	(0.55)
Secondary ratio	0.004	0.007	0.005
	(0.76)	(0.85)	(0.45)
Tertiary ratio	-0.002	-0.005	0.002
	(-0.35)	(-0.57)	(0.15)
Log (Age)	-3.356***	-4.396***	-0.923
	(-7.62)	(-8.12)	(-1.05)
Log (1+Tenure)	0.718***	0.802***	0.528***
	(8.24)	(7.35)	(2.98)
Mayor	0.614***	0.565***	0.755***
	(10.24)	(7.57)	(6.48)
Province FE	5,345	3,810	1,535
Year FE	0.053	0.066	0.042
Observations	YES	YES	YES
Pseudo R^2	YES	YES	YES