Women Politicians and Economic Growth[*]

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Abstract

In 2001, China implemented a gender-quota rule for local politicians. We document that, for a period running from 2001 through 2018, Chinese cities under the administration of female political leaders experienced GDP growth rates that were 0.3%–0.5% lower than the rates in male-led cities. This gender–growth relationship holds even after including province*year fixed effects to account for time-varying province-level factors. The relationship also holds after including city fixed effects, which allows us to compare economic growth in a given city between female-led periods and male-led periods. The results are robust in a difference-in-differences test and using an instrumental-variable design. We also find that local stock prices drop when news of female leadership appointments becomes public, while such prices remain flat following news of male appointments. The gender–growth relationship weakens in later years of our sample period, likely reflecting the weakening of the gender-quota rule constraint. The gender–growth relationship is stronger in regions where gender discrimination is more likely to occur. We also document that female leaders' qualifications are poorer but they are more likely to be promoted than their male counterparts.

Keywords: gender; economic growth; gender discrimination; gender quota; China
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1. Introduction

Recent decades have witnessed a notable rise in the share of women in leadership roles across key economic and political arenas.[1] Associated with this trend, a great deal of attention in economics and political science has been paid to understanding the role women play in decision-making. In aggregate, research shows significant variations across cases but suggests broadly that the growth in leadership roles assumed by women does not merely reflect tokenism and makes important differences where they occur (Chattopadhyay and Duflo, 2004; Wängnerud, 2009; Clayton, 2021). Yet, very few studies have examined how female politicians affect economic growth.

We fill this gap in the literature by studying a gender-quota rule in China. In 2001, the Chinese State Council began requiring 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 prefecture-level cities ("cities" hereafter).[2] Specifically, we study how the gender of a mayor or a party secretary affects local economic growth.

We propose and test three hypotheses pertaining to the relationship between gender-quota rules and economic growth. First, if the underrepresentation of women reflects discrimination against women in promotions or informal selection rules that favor members of male-dominated

[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 all mayoral 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 that ranks below a province and above a county. We study cities instead of provinces or counties to balance statistical power against the feasibility of data collection. The number of province-level regions is too small for us to have sufficient statistical power. County-level data are very costly to collect.

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 may result in the appointment of suboptimal candidates while reducing administrative effectiveness in local governments. Candidates can be suboptimal as a result of their poorer personal skills or the local political 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 sources of discrimination. If these sources are important, implementing a gender-quota rule will not necessarily benefit economic growth, even if female appointees have personal skills that are on par with the skills of their male counterparts. Third, female politicians may prefer public goods, which may bring long-term benefits but hurt short-term economic growth.

Our setting is especially suitable for studying the effects of politicians' genders on economic growth. First, city mayors and party secretaries in China are directly responsible for local economic development. Local Chinese 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 gender in politics focuses predominantly on legislators, who typically exert limited influence on local economic growth. Second, a typical Chinese prefecture-level city occupies an area of 15,000 square kilometers (about 5,800 square miles) and a population of 3.5 million, and both measures are comparable in size and population to the state of Connecticut in the United States. Gender-quota rules applied to such high-stakes positions are rare. Third, detailed data on economic activities are available, but many studies examine much smaller areas (often villages and towns) and must rely on much coarser

measures of economic activities. Perhaps for these reasons, most studies do not investigate economic growth, focusing instead on other outcomes (e.g., Chattopadhyay and Duflo, 2004).

In China in 2000, the year before the adoption of the gender-quota rule, only 14 provinces (of 27 provinces or autonomous regions) had installed at least one female mayor or city party secretary.[3] Since 2013, almost all provinces have had at least one female mayor or city party secretary, except the autonomous regions where ethnic minorities represent majorities or significant fractions of the populations, and two provinces (Qinghai and Hainan) that contain very few (less than five) prefecture-level cities. At the city level, the fraction of cities with at least one female leader (either a mayor or party secretary) increased from 7.3% in 2001 to 17.4% in 2013. The ratio has since plateaued.

Using a panel of 238 cities for the period running from 2001 through 2018, we document a robust negative correlation between women officeholders and local GDP growth rates. 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 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 female-led periods and male-led periods in the same city.

One concern with our results is that female politicians may be assigned to cities with lower economic growth. Inconsistent with this conjecture, we find that lagged economic growth is uncorrelated with the genders of newly appointed politicians. The finding that the gender–GDP growth rate correlation is little affected by adding city fixed effects also sheds doubt on the

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

rationale for this concern. Another concern is that male politicians may be more aggressive in their efforts to inflate the GDP growth rates in their cities. We find that female-led cities experience lower growth rates in investments, consumption, and public revenue. Many of these measures are hard to manipulate, suggesting that the results are unlikely to reflect differences in styles of manipulation.

We adopt several empirical strategies to further establish the causal relationship between a political officeholder'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 leader, its GDP growth rate drops by about 0.4% compared with what occurs in adjacent cities within the same province where there are no female mayors or party secretaries in the seven years around the year a female leader takes 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, as a result of the gender quota rule, when a city-level leadership position is vacated, the probability that the next appointee is female depends heavily on the fraction of female mayors and party secretaries who are already officeholders in that province. Based on this rule, we use the share of a province's female mayors and party secretaries in the year prior to political turnover as an instrumental variable. As expected, the instrument is strongly correlated with the gender of the next appointee. The instrumental-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–related gender-quota literature (Ahern and Dittmar, 2012), we conduct a standard event study of stock prices. If a female officeholder is perceived to be less capable than a male officeholder, we expect the stock prices of locally

headquartered firms to fall (rise or remain flat) when the market learns that a city will have a female (male) leader. Our empirical results confirm this prediction. On average, stock prices fall by about 1.79% in response to the news of a female politician's appointment, while prices rise by 0.08% in response to the news of a male politician's appointment. The difference is 1.87% (t = -2.26).

The evidence pertaining to this question is consistent with the hypothesis that gender quotas lead to suboptimal choices of politicians, and these appointments hurt local economic growth. Also 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 STEM degrees or have overseas educational experience. After controlling for observed characteristics (including job performance), we find that female mayors and party secretaries are more likely to be promoted than their male counterparts. Also consistent with the gender-quota rule, the gender–promotion relationship disappeared after 2012 when the gender-quota requirement was substantially met and the gender–growth relationship also weakened significantly after 2012. We also find that the gender–growth relationship is stronger in areas with more severe gender discrimination, suggesting that, at least partially, the relationship reflects the political environment, i.e., female officeholders 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 with other investments, education and healthcare investments may hurt short-term economic growth but benefit growth in the long term. We document that, in our setting, women

officeholders 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.

Relationship to the literature. Our study contributes to the literature on women as policymakers.[4] The research reveals important variations across cases but largely suggests that female politicians contribute to better provision of public goods and the strengthening of the promotion of women's interests (e.g., Chattopadhyay and Duflo, 2004; Wangnerud, 2009; Clayton, 2021).[5] There is evidence that female politicians are less corrupt than male politicians (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 that 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 higher numbers of bills), and they argue that this is because women are being held to a higher standard. Baltrunaite et al. (2014)

[4] See Wängnerud (2009), Pande and Ford (2011), Lawless (2015), Hessami and da Fonseca (2020), and Clayton (2021) for reviews of the literature. There exists a distinct body of work on the effects of women's suffrage. For example, Miller (2008) shows that the introduction of women's 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 the COVID-19 pandemic (Bruce et al., 2022). Female leadership raises aspirations and educational attainment, especially 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 president positions are reserved for women. They document that women leaders spend more on public goods that women prefer. Brogaard, Gerasimova, and Rohrer (2024) document that female US 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).

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 study that is most relevant to ours. They find that female legislators in India are associated with higher economic growth, which is contrary to our findings. A key difference between Baskaran et al. (2024) and our study regards the process through which female politicians are selected. In Baskaran et al. (2024), female legislators are selected through competitive elections, but in our study female politicians are selected to fill gender quotas. If female politicians face unfair discrimination, conditional on being competitively selected, their leadership capacities may be superior to those of their male counterparts. If they are selected to fill gender quotas, however, the opposite may be true.

There is a parallel stream of literature that studies how a corporate leader's gender affects corporate policy and performance (Post and Byron, 2015; Miller, 2017). As is the case in the political leader literature, here female and male corporate leaders bring different preferences and styles to their positions. Female directors tend to promote fewer workforce-reduction initiatives (Matsa and Miller, 2013) and reduce the gender pay gap for both non-executive employees (Tate and Yang, 2015) and executives and directors (Carter, Franco, and Gine, 2017; Naaraayanan and Nielsen, 2022). Female directors have also been found to function more effectively as monitors while female executives are less overconfident than their male counterparts (Huang and Kisgen, 2013). Female directors also bring different skillsets to the workplace (Kim and Starks, 2016).

Among the corporate studies, those most closely related to ours focus on the effects of gender quotas on boards of directors. The findings regarding how such 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 are associated with 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 to be 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 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. Anyone considering such a policy should however 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 chances of being promoted (Li and Zhou, 2005). Our findings suggest that a politician's gender is an important

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

factor that has not been studied. There are two studies on politician gender 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, but they do not study economic growth.

The remainder of this paper is organized as follows. In Section 2, we discuss the institutional background. In Section 3, we describe the data. Section 4 presents the results. In Section 5, we discuss mechanisms that might drive our results. The last section concludes the paper.

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 designed to enable women to achieve greater equality and opportunity. The Declaration flagged 12 areas where urgent action was needed, one of which involved women in power and decision-making positions. Since then, women's political representation has gained increasing attention globally (Tripp and Kang, 2008). In the same year, the Chinese State Council distributed The Program for the Development of Chinese Women (1995–2000), one provision of which calls on China to "[a]ctively 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 was updated in 2001,

2011, and 2021. Since 2001, the updated Outline has changed the above encouragement to a requirement. It also mandated a significant increase in the number of women in head positions.[7]

Local governments in China consist of four branches: a People's Government headed by a governor/mayor who acts as the chief executive, a People's Congress with legislative powers, a People's Political Consultative Conference that acts 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 either People's Congresses or People's Political Consultative Conferences, as the other two branches are far more powerful and important for local economic growth. The mayor is the head of a People's Government, while a party secretary is the head of a local CCP branch. City party secretaries are appointed by provincial party committees, while mayors are elected by city-level People's Congresses. For simplicity, however, we often refer in this paper to both appointments and elections as "appointments."

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 head positions—which we study—to meet the requirement, the additional requirement to seat women in head positions plays a role at the province level. Across all cities in a given province, the provincial government must include female mayors or party secretaries.

In Panel A of Table 1, we report the distribution of the number of provinces (including autonomous regions) with female mayors and city party secretaries for each year between 2001

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

and 2018. Table 1 includes 22 provinces and five 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 any female leader. Most are autonomous regions or provinces, such as Hainan, with few prefecture-level cities. The autonomous regions may not need to follow the gender-quota rule as closely as other provinces. Hainan province and Qinghai province include four and two prefecture-level cities, respectively. That small number may have made it challenging to satisfy the quota rule and exceptions may have been made for these provinces.

In Panel B we report the distribution after excluding the five autonomous regions, Qinghai, and Hainan. Although in the post-2012 period there remain provinces that lack female leaders at the end of a given year, none of them has shown zero females in more than one year after 2012, which means that, even if these provinces do not meet the gender-quota requirement in a given year, their deviations from the quota 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 pertaining to mayors and city party secretaries in the dataset is incomplete. We fill in missing personal information (i.e., gender, age, and tenure) for mayors and party secretaries manually, based primarily on information that is available on various government websites. We obtain information on stock returns, market capitalization, and the firm's headquarters locations from CSMAR. Our sample period runs from 2001 through 2018. We begin our sample period in 2001 because it was the first year of the gender-quota rule's implementation. We end our sample period in 2018 because

[8] We do not include directly administrated municipalities because there are no prefecture-level cities in them.

that was the latest year with complete city-level GDP data available when we started this project. For reasons 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 associated with an economy that is too small, defined as city-years when a city's previous year's GDP (based on 2000 price levels) is below ¥10 billion (about $1.4 billion). We also drop city-years if any of the following is missing: lagged GDP, annual GDP growth rate, the shares of the primary/secondary/tertiary sectors in the overall economy, lagged population, and politician characteristics (i.e., gender, age, and tenure). Ultimately, we base our analysis on 4,039 city-year observations.

Figure 1 displays the percentages of female politicians in our sample. We report the percentages of cities with at least one female politician, whether as mayor or 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 during a given year. Consistent with the policy push of the Chinese government, percentages of female officeholders (both mayors and city party secretaries) increased significantly after 2001. In 2001, 7.9% of the cities had at least one female leader, with the percentage increasing to 16.4% in 2013. Interestingly, it then declined to 11.7% in 2018, with a decline in female mayors largely driving the overall decline.

In Table 2 we report summary statistics for the sample. In Panel A we report the mean, median, standard deviation (STD), minimum value, and maximum value of each variable. In Panel B we report their pairwise correlations. *GDP Growth* is a city's GDP growth rate 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 captured

[9] In the Internet Appendix, we report the baseline regression results after including them.
[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 differ markedly from prefecture-level cities. See Chien (2009) for a detailed discussion of these divisions.

by 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 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 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 share and a smaller population.

4. Results

This section presents our study's main results. In Section 4.1, we present the pooled panel regression results. In Section 4.2, using three identification strategies, we examine whether the relationship is causal. We summarize and discuss the results in Section 4.3.

4.1. Pooled panel regressions

We first compare cities with at least one female leader and cities that lack any female leader in a simple panel regression framework. Specifically, we regress a city's GDP growth rate in year *t* ($Growth_{c,t}$) on a $Female_{c,t}$ dummy, controlling for 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 during year *t*, either the mayor or the party secretary, and zero otherwise. We cluster standard errors by city.[11] We estimate the following model:

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

We report the results in Table 3. For column (1), we include *Female* and a set of control variables. The coefficient on *Female* is -0.347 (t = -3.03), indicating that cities led by female leaders experience a GDP growth rate that is 0.347% lower than in those governed by male leaders. For column (2), we add city fixed effects and year fixed effects. We use city fixed effects to control for city-level time-invariant factors, while year fixed effects control for macroeconomic factors. For column (3), we add province*year fixed effects to control for any province-level time-varying factors. Province*year fixed effects can control for time-varying province-level factors. After including thse controls, our regressions essentially enable us to compare cities from the same province and in the same year. For column (4), we add fixed effects associated with both columns (2) and (3). Note that there is no need to include year fixed effects as province*year fixed effects absorb year fixed effects. The additions of these fixed effects reduce the coefficient on *Female* only slightly. For example, relative to the coefficient reported in column (1), the coefficient on *Female* after adding both city and province*year fixed effects drops from -0.347 to -0.274 (t = -2.84).

As shown in the summary statistics, female-led cities and male-led cities typically have differing industry structures. Specifically, the secondary sector tends to be more important for female-led cities than for male-led ones. As we can see from Table 3, controlling for the importance of industry structure has only a minimal effect on the *Female* coefficient. One weakness involved in controlling for *Secondary Share* and *Tertiary Share* is that their effects may be time-varying. In other words, the secondary sector may perform relatively better than other sectors in other years. *Secondary Share* and *Tertiary Share* control only for average effects. For

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

column (5), we construct a *Synthetic Growth* variable to control for the time-varying effects of industry structure. Specifically,

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

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

For column (6), we break up the *Female* dummy into a *Female Mayor* dummy and a *Female Party Secretary* dummy, which results in coefficients of -0.235 (t = -2.17) and -0.220 (t = -1.54), respectively. Relative to the *Female* dummy coefficients reported in other columns, these two coefficients have lower statistical significance, likely reflecting a relatively small sample of female politicians once we break down all female politicians into mayors and party secretaries. The coefficients are similar in magnitude, indicating that the effect is similar for both positions.

In Internet Appendix Table A2, we report the results of several robustness tests. First, we include the autonomous regions, Qinghai, and Hainan. Second, we exclude cities with populations of less than 1 million. Third, we exclude sub-provincial-level cities. Officials in 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 a city's mayor (party secretary) is female at any time of the year and zero otherwise. In several of the sample years, politicians were appointed to their offices in the second half of the year or may have left their posts in the first half of the year. Their influence on the local economy in that year may have been relatively limited. Hence, we

[12] The idea of the *Synthetic Growth* variable is similar to that of the Bartik instrument (Bartik, 1991; Blanchard and Katz, 1992), but 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 abnormal GDP growth rate. In Internet Appendix Table A1 we report the results, which again are similar to those reported in Table 3.

also redefine an officeholder's gender after excluding such officeholders. In all three robustness tests, the coefficient on *Female* continues to be similar to that in the main specification.

Overall, the results reported in Table 3 show that female-led cities tend to experience 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 with respect to other economic outcomes. Specifically, we investigate the following 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 experience lower growth rates than male-led cities for all four growth variables, although we observe statistical significance only for investment growth. This finding shows that the gender–growth relationship applies to many components of economic activities and 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 reported in the last two columns of Table 4 show that female-led cities spend more than male-led cities on science, education, and healthcare as well as social security as a share of GDP. 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 on 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 specified in Section 4.1 generate the robust, striking finding that female-led cities experience lower GDP growth rates than male-led cities. Such correlations

do not necessarily mean, however, that officeholder 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 where growth is expected to be slower. We see no apparent reason that 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 officeholders. Specifically, we focus on city-years during which a new mayor or a city party secretary is appointed. The dependent variable is a dummy that equals one if a newly appointed officeholder is female and zero otherwise. Across the three models, we vary the sets of fixed effects. The coefficient on 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 year t – 3 provide no significant predictive power for the genders of appointed officials in year t.

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 describe three identification tests we conducted to further establish the causal relationship between an officeholder'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 shifting from *Female* = 0 to *Female* = 1) constitute 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 a female official must remain in her position 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 neighboring cities in the same province as controls for a treated city. We also require that

control cities have no female officeholders in the period around the focal female politician's appointment. Specifically, we estimate the following model,

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

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 β_1, which measures the treatment effect. If the appointment of a female leader reduces a city's GDP growth rate, we expect $\beta_1 < 0$.

We report the results in Table 5. The only difference across the three columns is in the choices of fixed effects. For column (1), we include province*year fixed effects. For column (2), we include city and province*year fixed effects. In column (3) we include event*city and province*year fixed effects. In column (3), the coefficient on *Treat*Post* is -0.473 (*t* = -2.62). The differing choices of fixed effects have minimal impacts on the coefficient on *Treat*Post*. The negative coefficient on *Treat*Post* is consistent with the pooled panel regression results reported in Table 3. The DID estimate suggests an effect of about -0.45%, slightly higher than that derived 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 on β_y capture the treatment effect relative to the base year -1.

Figure 2 displays the coefficients on β_y and their 95% confidence intervals. To generate these coefficients, we include event*city and province*year fixed effects. It is evident that the coefficients β_y drop significantly from year -1 to year 0. Prior to the event, β_y is close to zero and never statistically significant. Following 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, and is 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. Instrumental-variable approach

The gender-quota rule requires there to be at least one female officeholder at each level of the Chinese government. Based on this rule, we generate two predictions about an officeholder'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 share, the focal city will be less likely to have a female fill the vacancy. Therefore, we define the first instrument, *IV1*, as the share of female politicians (including both mayors and party secretaries) in the same province as the focal city *c* but not including the focal city. *IV1* is measured with a one-year lag. If provinces maintain a certain female officeholder share, we expect *IV1* to be a strong negative predictor of the likelihood that city *c* will fill its open position with a female.

Second, for focal city *c* when a vacant position is available, if its province typically maintains a female share that is higher than the current share, the province is more likely to appoint a female to fill the position. Therefore, we define the second instrumental variable, *IV2*, as a province's female share four years previously minus the female ratio immediately before the appointment that fills 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 fill its open position with 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 while the even columns present the second-stage results. For the first two columns, we use *IV1* as the instrument; for the next two columns, we use *IV2* as the instrument; for the last two

columns, we use both *IV1* and *IV2* as instruments. As expected, both instruments are strong predictors of the gender of the next appointment. As the results reported in column (5) show, both instruments are highly statistically significant even when both are included in the same regression.

In the second stage, the coefficient on *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 on *Female* are similar to those from the DID test. When we use only *IV2*, the coefficient is -1.3457, which is 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 instrumental-variable approach yields evidence consistent with the pooled regression analysis and the DID analysis.

4.3.3. An event study on stock-price reactions

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 that a female will be appointed as the next leader of a given city, the stock prices of firms located in that city may on average drop. In contrast, when the market learns that a male will be appointed, the prices of local stocks may rise slightly or remain flat. We expect stock prices in the latter cities to rise slightly or remain flat because the share of female leaders is small (see Table 2) and the appointment of a male leader may not come as a big surprise.

We define an "announcement date" as the first day that appointment news is reported in newspapers or on government websites. We collect these announcement dates manually. 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). Mayors often start with the title "interim mayor," and almost all interim mayors are elected mayor within the next year. Hence, we define the date when an official is elected as an interim mayor as the announcement date. We want to emphasize that although an appointment date is the first day the news is reported, it is likely that the appointments were partially expected. Typically, there is a

discussion process before official announcements. Hence, we expect the stock market to react before 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 stocks located in city *c*. For an event in city *c* on day *t*, we calculate the daily abnormal return on the city-level portfolio as the raw portfolio return minus the contemporaneous stock market return, defined as the market capitalization–weighted portfolio of all domestically listed stocks. Cumulative abnormal returns (CARs) are calculated as the sum of daily abnormal returns over a given period. Data on individual stock returns and market capitalization and data on stock market returns are obtained from CSMAR. Our results are similar if we construct city-level portfolios 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 male-leader appointment news has little impact on stock returns, but female-leader appointment news is associated with market declines. Figure 3 also suggests that market reactions start before 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 the relationship between news of female appointments and lower stock returns.

One concern associated with 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 a 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. Overall, the results derived using the shorter windows are comforting, as confounding events are much less likely to occur during such short periods.

4.4.Summary

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

5. Mechanisms

The results reported so far are inconsistent with the hypothesis that the gender-quota rule improves administrative effectiveness by reducing the influence of gender discrimination and promoting better candidates. As shown in Table 4, female officials indeed engage in higher spending on public goods such as education, healthcare, and social security, but the economic magnitude is too small to explain our findings regarding 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 as a result of poorer personal skills or the political environment. We also examine which factor is likely to play a role.

5.1. Female leaders' poorer "qualifications"

First, we compare the "qualifications" of female and male leaders. Qualification is a multi-dimensional construct and we can measure only some observable characteristics. Specifically, we examine the following characteristics: age, party tenure (i.e., the number of years since becoming a party member), work experience (i.e., the number of years since starting to work), whether one has earned 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 as a Project 211 college, and whether one had any overseas educational experience. Table 7 reports the results. When taking office, females are younger, have shorter party tenures, and have less working experience. They are also less likely to have overseas educational experience or STEM backgrounds. Females are slightly more likely to have earned bachelor's degrees or above, although for both females and males it is highly probable that they have earned such degrees (94.0% vs. 91.5%). Both males and females are similarly likely to have graduated from Project 211 colleges (42.9% vs. 44.0%). Overall, female officeholders seem to have qualifications that are inferior to those of their male counterparts.

5.2. Female leaders are more likely than males to be promoted

Another prediction is that, holding all else equal, female leaders should be more likely to be 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 applies clearly defined ranks for government positions. If an official

[14] Ideally, we should test whether female officials at the sub-city level are more likely to be promoted than their male counterparts. Unfortunately, such a test is difficult to conduct for several reasons. First, there is no existing database that includes data pertaining to all sub-city level officials, perhaps because there are many positions at that level, including vice mayors, members of city-level party standing committees, and many officials at departments in provincial governments. All are eligible for promotions but data on their biographical characteristics and job performance do not exist or are hard to collect.

switches to a higher-ranked position, we consider it a promotion.[15] As the office of mayor is typically considered the number two position within a city government, we also regard a shift from 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%.

The results reported in Table 8 indicate that, after controlling for other factors, females are more likely than males to be promoted. Based on the OLS regression, the marginal effect of being a female is associated with a 5.2 percentage point increase in the chances of receiving a promotion every year. Relative to the annual promotion probability of 23.78%, such an increase is economically large.

Recall that the share of female leaders peaked in 2012. This might reflect satisfaction or the gender-quota requirement. We examine the gender–promotion relationship in two subsamples: observations of data before and after 2012. The results reported in Table 8 confirm that the gender–promotion relationship is stronger in the earlier sample period and weakens and becomes statistically insignificant in the later period.[16]

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

[16] In addition to being promoted and remaining in a position, officials may retire or be "demoted" to lower ranks. Thus, in addition to cases involving a direct demotion to a lower rank, we also regard as demotions resignations for personal reasons, in response to findings of corruption, or retirements as well as position switches to the chair of a city-level People's Congress or the chair of a People's Political Consultative Conference. Although both the chair of a city-level People's Congress and the chair of a People's Political Consultative Conference are ranked at the prefecture level, these positions are typically considered less powerful than those of mayors or party secretaries. Among all the official-year observations, 8.5% of cases involve retirements or demotions. In Internet Appendix Table A4, we use an ordered logistic model to consider promotions, unchanged status, and retirements/demotions. The results are similar to those reported in Table 8.

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

There is a natural implication of the subperiod results. Suppose the gender-quota rule leads to 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 for the two subperiods. Consistently, we find that the effect of the gender–growth relationship is stronger in the first half of the sample period 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 that experience more severe discrimination

The results reported in Subsections 5.1–5.3 are mostly consistent with the first hypothesis, namely that the gender-quota rule leads to the appointment of less-qualified female candidates and their appointments hurt local economic growth. If the political environment plays a role, we expect stronger effects in areas where gender discrimination is more severe.

We use three proxies for region-level gender discrimination: GDP per capita, the share of the primary sector, and the proportion of females aged 15 and above who have earned college or higher degrees. We measure the first two proxies at the city level and the last at the province level because city-level data on college degrees are unavailable. It has been widely documented that economic development reduces gender inequality (e.g., Duflo, 2012) and, in economies that rely heavily on agriculture or other primary sectors, traditional gender roles tend to persist, often resulting in higher levels of gender discrimination (Boserup, 1970).

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

These results show that the gender-quota rule leads to the appointments of female leaders with poorer qualifications than their male counterparts. The gender–growth relationship is stronger in areas where gender discrimination is more severe. Overall, these findings suggest that selection and the political environment may contribute to the gender–growth relationship.

6. Conclusion

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 indicating that Chinese cities under the administration of female political leaders experience a GDP growth rate that is 0.3%–0.5% lower than that in male-led cities. The results are shown to be robust in a difference-in-differences test and using an instrumental variable design. When the news that a city will have a female leader is released, the stock prices of firms located in that city fall by about 2%, while the stock-price reaction to male leader appointment news is flat. The gender–growth relationship is weaker in later sample 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 more severe. Female leaders also are not as well-qualified as their male counterparts. Overall, the results of our study indicate that selection (appointment of less qualified candidates) and the political environment (e.g., gender discrimination among the public) likely both 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 with 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 summary statistics for the sample. In Panel A we report the mean, median, standard deviation (STD), and the minimum and maximum values of each variable. In Panel B we report 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 Share* and *Tertiary Share* represent the shares of GDP captured by the secondary sector and the tertiary sector, respectively. *GDP* and *Population* are local total GDP and population, respectively. All economic variables are measured at the end of year *t* -1. All 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 Share	58.576	58.432	14.558	25.301	94.396
Tertiary Share	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 Share	Tertiary Share	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 Share	-0.220***	0.097***	-0.195***	0.440***	1					
Tertiary Share	-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 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 share	-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 share	-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

In this table we report panel regression results for several 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 percentages) are measured in year *t*. *Female* is a dummy variable that equals one if a city has a female leader (either a mayor or party secretary) and zero otherwise. See Table 3 for the list of control variables. All 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. Difference-in-differences strategy

In adopting our difference-in-differences strategy, we designated female political appointments as the treatment group. When a city appoints a female politician in year *t*, we use neighboring cities as the control. We also require the neighboring cities to be located in the same province as the treatment city, and a control city never has a female politician in office in the [-4, 3] period around the female politician's appointment. See Table 3 for the list of control variables. All 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. Instrumental variable strategy

We use two instrumental variables. For columns (1) and (2) we define the first instrument, *IV1*, as the share of female politicians (including both mayors and party secretaries) based in the same province as the focal city but not including the focal city *c*. *IV1* is measured with a one-year lag. For columns (3) and (4), we define the second instrumental variable, *IV2*, as a province's female share of mayors/party secretaries during the preceding four years minus the female share immediately before the appointment of the vacant position. See Table 3 for the list of control variables. All 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 variables are calculated using the data for the year before an appointment year unless otherwise indicated. Top tier college is defined as a Project 211 college.

	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
Top tier 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

In this table we report results pertaining to the association between a politician's gender and the likelihood that he/she will be promoted. 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 an official is the mayor and zero if the official is a 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

In this table we report pooled panel regression results for two subperiods. The dependent variable is *GDP Growth*, which is the GDP growth rate (as a 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 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.

Dept. Var. =	(1)	Growth (%)	(2)
	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

In this table we report pooled panel regression results for subsamples. For each of the three characteristics (GDP per capita, primary share, and female higher education share), we split the sample into two subsamples at the median. The dependent variable is *GDP Growth*, which is a city's GDP growth rate 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 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 shares of female politicians

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

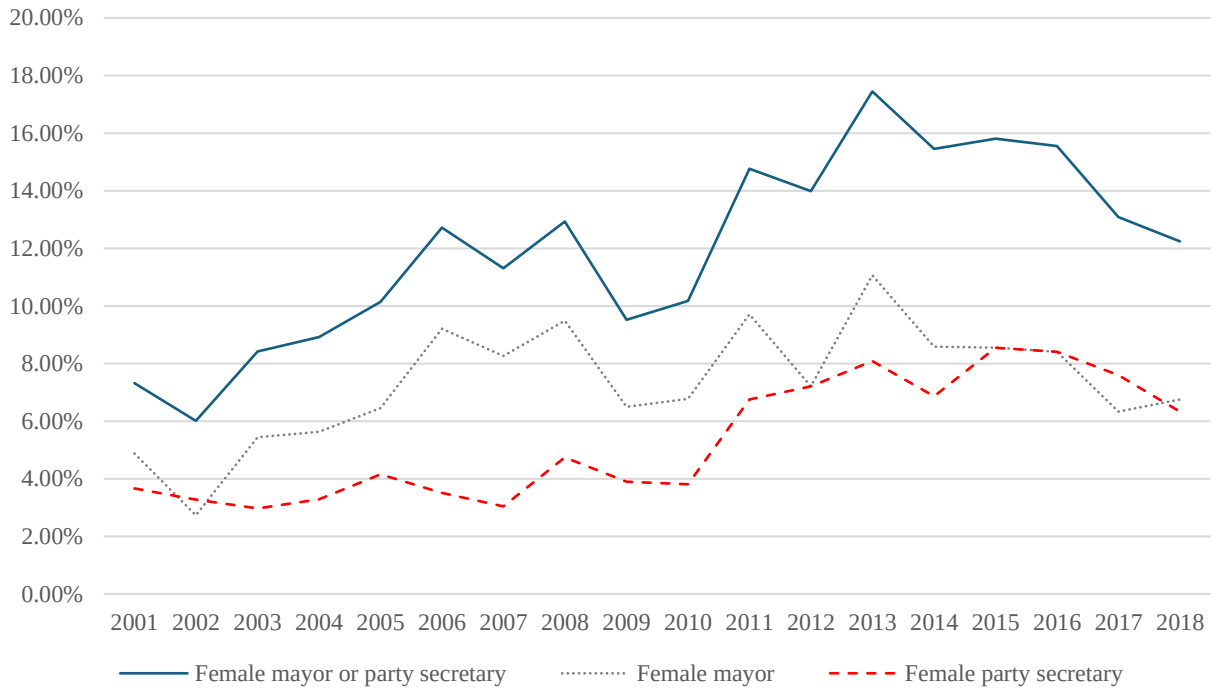


Figure 2. Parallel trends test or dynamic coefficients

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 a focal event and y is the event year, ranging from 4 years before an event occurs to 3 years after the event occurs. 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 event*city and province*year fixed effects. Standard errors are clustered at the city level.

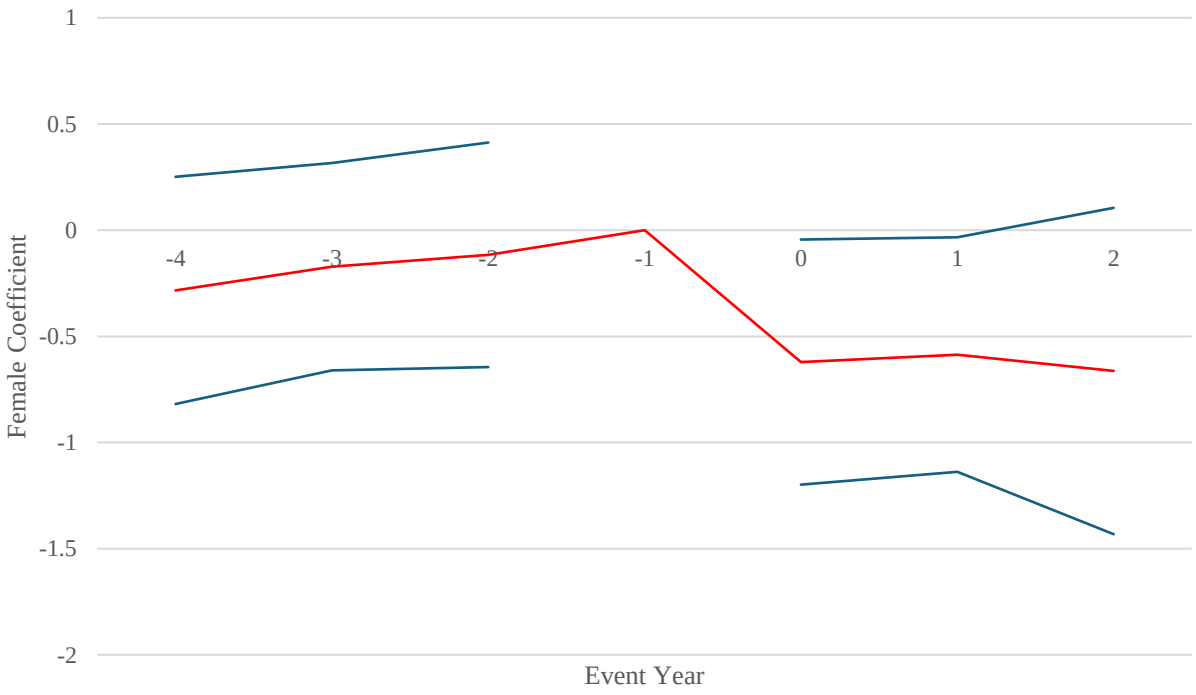
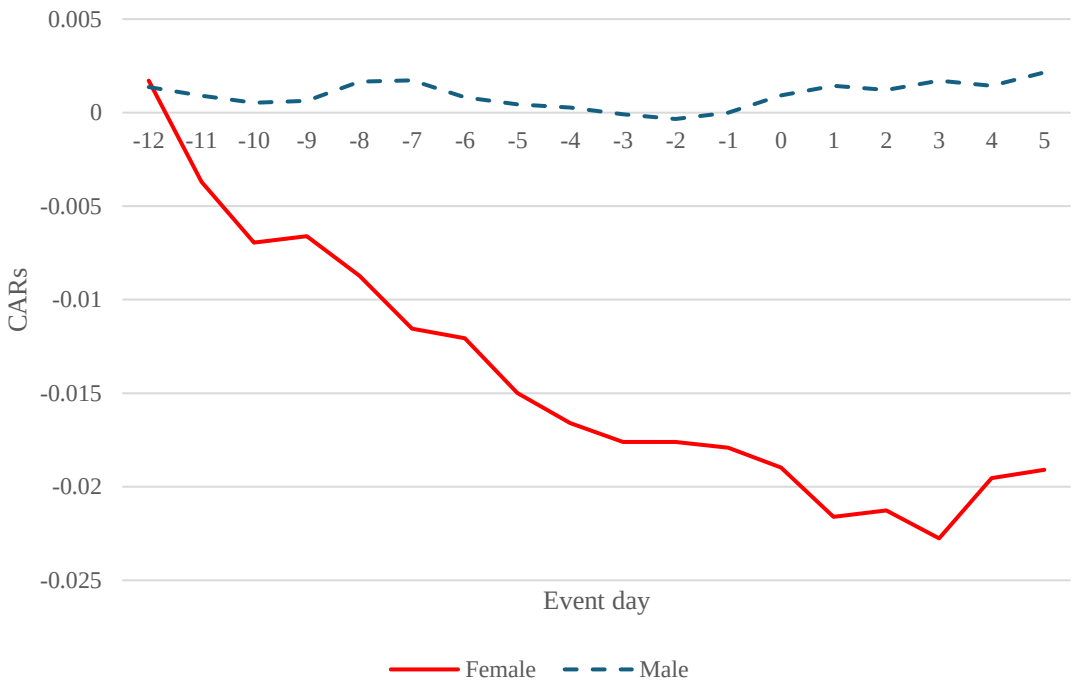


Figure 3. Event study on stock-price reactions

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



Internet Appendix

Women Politicians and Economic Growth

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

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

Table A3 presents results of tests designed to indicate how past GDP growth and other city-level characteristics affect the genders of newly appointed officials.

Table A4 presents results of ordered logistic regressions pertaining to the relationship between gender and promotions/demotions of officials.

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

In this table we report pooled panel regression results. The dependent variable is *Abnormal Growth*, defined as the 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 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

In this table we report the results of three robustness tests of the pooled panel regression results reported in Table 3. For column (1) we include cities from the five autonomous regions, Qinghai, and Hainan. For column (2) we exclude a city if its population is less than 1 million. For column (3), we exclude sub-provincial-level cities. For column (4), we consider only politicians who work in city government for at least six months within a given sample year. The dependent variable is *GDP Growth*, which is a city's GDP growth rate 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 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 results of OLS regressions in which we use a city's economic characteristics to predict the gender of its newly appointed leader in the succeeding year. The dependent variable equals one if the newly appointed leader is female and zero otherwise. We include only city-years in which 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

In this table we report results pertaining to the association between an officeholder's gender and the likelihood the officeholder is promoted or retires/is demoted. The dependent variable can take any of three values: promotion, unchanged, or retirement/demotion. Please see the main text of the paper for detailed definitions. *Mayor* is a dummy variable that equals one if an official is mayor and zero if the official is party secretary. See Table 2 for 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.

	(1)	(2)	(3)
Dept. Var. =		Turnover	
	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