Women in power: Female city leaders and regional economic development in China

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0 Prologue

The story of Zetian Wu

武则天 (624 - 705)

Zetian Wu

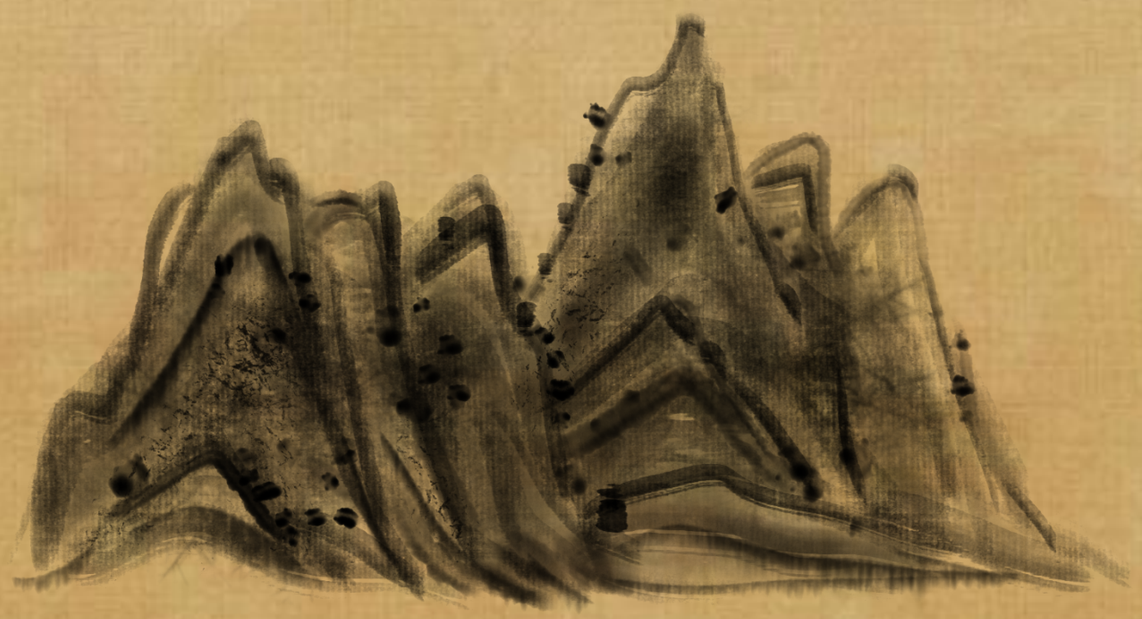
The only officially recognized empress of China.

Contributions:

- Imperial examination
- Reducing corvee and taxes
- Buddhism State Religion Policy

1 Introduction

Motivation & Innovation



Motivation

Leadership is a gendered concept.

- Empirical studies:
  Endogenous problem is hard to settle.

- Experiment studies:
  Reinforcing the gender stereotypes even more sever.

Motivation

We focus our analysis of female government leaders on the municipal party secretary:

1. The average population of 281 prefectural cities is 4.26 million in China.
2. Regional leaders have ultimate authority in China (Xu,2011) .
3. The municipal party secretary is the de facto highest official in a city, female municipal secretaries can suppress male mayors.

Innovation

The behavior and thought analysis of leaders:

By using data mining and machine learning text analysis algorithm, we collect 994 Chinese prefectural city party secretaries' resume data and their 270,202 news reports over 643 newspapers from 2006 to 2016.

We provide the direct evidence of government leaders' agenda, concern, and personality.

Findings:

1. Female municipal secretaries are associated with weaker GDP growth rate, fixed asset, real estate growth and land development.
2. Female leaders undertake significantly less leverage, and lower employment growth in the finance industry.
3. Female leadership promote employment in the culture and education industries, and improve the medical facility, education, and environmental protection.
4. The news text analysis provides direct evidence of female municipal secretary' s personal characteristics of greater compassionate, higher environmental awareness, lower aggressiveness, and higher reliability.

2 Literature Review

Previous Literature & Hypotheses Development

Literature

1. Gender differences in leadership and performance

The female leadership characteristics of higher risk averse, more cautious and better self-discipline, and higher survival rate is obviously accepted as common knowledge in corporate finance.

2. Regional tournament competition and investment-led growth in China

Striking a superior GDP growth and competing against each other for a higher performance ranking is essential for determining the promotion of local government officials.

Hypotheses

Hypothesis 1. Female municipal secretaries are more risk-averse than males, and this risk attitude is also reflected in their political decisions.

Hypothesis 2: Economic performances of the cities governed by female municipal secretaries on average are weaker than cities governed by male municipal secretaries.

Hypothesis 3: Female municipal secretaries are more caring about social issues and negatively associated with the aggressive word in their opinion.

3 Research Design

Data and Test Analysis Methodology

Test Analysis Methodology

1. Locate the government leader’ s agenda;

2. Tag the government leader’ s opinion;

3. Measure the tone of the government leader’ s opinion.

The process of text analysis on local government leaders' news

Preparation
1. Download the news from CNKI newspaper database and each city's official site.
2. Download the labeled news from Chairman Jinping Xi's speech database.
3. Transfer the PDF file of news into plain text format.

Agenda

Identify the theme of each newspaper report

Center sentences

1. The first sentence of each news;
2. The first sentence including date or time;
3.The first sentence including the municipal secretary's name.

P&O Dictionary

1. Prepare the predicate dictionary to identify the action

2. Prepare the object dictionary to identify the action's target

Conduct the audit study to ensure the accuracy of target activity

Extract the variable of government leaders' activities

Concern

Tokenize the test and tag the Part-of-Speech (POS) of each word by HMMs

Identify the name and action of government leaders in each news by CLM

Use the Chairman Xi' speech database as the training set by CNN

Classify all the government leaders' opinion in each news into 6 categories: party affairs, economy, society, environment, culture, and politics

Divide two student audit teams to evaluate the tag independently

Tag the government leaders' opinion in each news

Personality

Sentiment Dictionary

Scrutinize the 3000 highest frequent words, add them to the aggressive or conservative word dictionary

Accuracy Dictionary

Use the definite and ambiguous words dictionary in You et al. (2018)'s study

Calculate the word frequency of aggressive / conservative / definite / ambiguous

4 Empirical Results

Regional Economy Development and Social Issue

Table.1 Distribution of female municipal secretary in China, 2006-2016

		Male		Female		Sum	
		Num	%	Num	%	Num	%
Age							
	30-39	0	0.00%	0	0.00%	0	0.00%
	40-49	227	23.89%	14	31.82%	241	24.25%
	50-59	720	75.79%	30	68.18%	750	75.45%
	60+	3	0.32%	0	0.00%	3	0.30%
	Sum	950	100.00%	44	100.00%	994	100.00%
Tenure							
	1 year	169	17.79%	8	18.18%	177	17.81%
	2 years	283	29.79%	13	29.55%	296	29.78%
	3 years	134	14.11%	8	18.18%	142	14.29%
	4 years	180	18.95%	9	20.45%	189	19.01%
	5 years and more	184	19.37%	6	13.64%	190	19.11%
	Sum	950	100.00%	44	100.00%	994	100.00%
Education							
	Highschool	2	0.21%	0	0.00%	2	0.20%
	Associate	18	1.89%	0	0.00%	18	1.81%
	Bachelor	200	21.05%	3	6.81%	203	20.42%
	Master	541	56.95%	35	79.55%	576	57.95%
	Ph.D	189	19.89%	6	13.64%	195	19.62%
	Sum	950	100.00%	44	100.00%	994	100.00%

Source: CSMAR Chinese government officials resume database, and the author's calculation.

Table.2 Descriptive statistics on the female municipal secretary, economic development of 278 cities in China, 2006-2016

	$Female_{c,t}$=1					$Female_{c,t}$=0					t-test
	Obs	Mean	Std.Dev	Min	Max	Obs	Mean	Std.Dev	Min	Max	Difference
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(2)-(7)
Panel A. Dependent Variable: Economy Development											
$LnGDP_{c,t}$	126	6.51	0.84	4.93	8.85	2,884	6.65	0.90	4.69	8.85	-0.132
$GDPrate_{c,t}$	126	10.10	3.93	-0.40	17.00	2,884	11.78	3.82	-0.40	21.30	-1.678***
$LnConsume_{c,t}$	126	14.65	0.90	13.01	17.13	2,884	14.76	1.03	12.37	17.13	-0.109
$LnFixInv_{c,t}$	126	15.36	0.90	13.17	17.46	2,884	15.42	0.95	13.17	17.47	-0.062
$LnPatent_{c,t}$	126	6.30	1.70	2.40	10.48	2,884	6.02	1.99	0.00	10.48	0.284
$LnRealestate_{c,t}$	126	12.82	1.15	10.17	15.90	2,884	13.00	1.25	9.98	15.90	-0.184
Panel B. Dependent Variable: Land Auction											
$LnPlanland_{c,t}$	107	16.10	1.21	12.61	18.24	2,147	16.43	1.12	9.96	19.23	-0.335***
$LnPlanarea_{c,t}$	107	16.57	1.28	12.96	18.70	2,147	16.88	1.43	0.00	19.70	-0.308**
$LnSolddeal_{c,t}$	107	4.89	1.25	1.10	7.07	2,147	5.06	1.17	1.10	7.94	-0.173
$LnSoldland_{c,t}$	107	15.11	1.48	8.71	17.47	2,147	15.47	1.26	6.56	18.44	-0.352***
$LnSoldarea_{c,t}$	107	15.56	1.54	9.31	17.88	2,147	15.90	1.63	0.00	18.85	-0.338**
Panel C. Dependent Variable: Financial Sector Development											
$LnLoan_{c,t}$	126	15.38	0.95	13.80	18.54	2,884	15.50	1.12	13.37	18.54	-0.115
$LnDeposit_{c,t}$	126	15.91	0.88	14.37	18.80	2,884	15.99	1.03	13.95	18.80	-0.081
$LnFinemp_{c,t}$	126	0.65	0.31	0.15	1.69	2,884	0.79	0.42	0.15	2.14	-0.137***
$Loanratio_{c,t}$	126	0.61	0.15	0.29	1.09	2,884	0.63	0.17	0.29	1.09	-0.023
Panel C. Dependent Variable: Chengtou Bond											
$Issue_{c,t}$	126	0.43	0.50	0.00	1.00	2,076	0.38	0.49	0.00	1.00	0.052
$LnBondsize_{c,t}$	126	1.25	1.61	0.00	5.62	2,076	1.15	1.63	0.00	5.62	0.097
$Length_{c,t}$	126	2.75	3.27	0.00	8.39	2,076	2.35	3.12	0.00	8.39	0.403
$Coupon_{c,t}$(%)	126	2.61	3.18	0.00	10.00	2,076	2.19	3.03	0.00	10.00	0.419
$Yieldxpd_{c,t}$(%)	126	1.80	9.81	0.00	83.61	2,076	1.03	7.98	-1.00	148.90	0.768
Panel D. Control Variable											
$Highedu_{c,t}$(%)	126	0.01	0.02	0.00	0.11	2,884	0.02	0.02	0.00	0.11	-0.003
$LnPublic_{c,t}$	126	13.86	0.72	12.15	15.90	2,884	13.97	0.78	12.14	15.98	-0.111
$LnRoad_{c,t}$	126	2.31	0.59	0.91	3.61	2,884	2.23	0.58	0.61	3.61	0.075
$LnGDPPA_{c,t-1}$	126	10.08	0.61	8.54	11.42	2,884	9.92	0.67	8.40	11.43	0.162***
$(n+g+\delta)_{c,t}$(%)	126	0.60	0.52	-0.32	2.26	2,884	0.68	0.49	-0.32	2.26	-0.085*
$Unemprt_{c,t}$(%)	126	0.65	0.41	0.12	1.87	2,884	0.60	0.40	0.11	2.20	0.049

Data Resources: CSMAR Chinese government officials resume database, the annual China City Statistical Yearbook (2007-2017), and the author's calculation.

Table.3 The impact of female municipal secretary on local economic development

	(1)	(2)	(3)	(4)
	$LnGDP_{i,t}$	$GDPrate_{i,t}$	$LnGDP_{i,t}$	$GDPrate_{i,t}$
$Female_{i,t}$	-0.027	-0.747**	-0.020	-0.647*
	(-1.24)	(-2.08)	(-0.98)	(-1.94)
$LnGDPPA_{i,t-1}$				-2.432***
				(-3.16)
$LnPublic_{i,t}$			0.382***	5.197***
			(8.23)	(5.74)
$LnRoad_{i,t}$			0.031	-0.416
			(1.61)	(-1.65)
$(n+g+\delta)_{i,t}$			0.019**	0.568***
			(2.19)	(3.14)
$Highedu_{i,t}$			0.532	9.271
			(0.64)	(0.54)
$Unemprt_{i,t}$			-0.018	-0.096
			(-1.17)	(-0.36)
Constant	5.361***	0.746	0.558	-41.126***
	(9.11)	(0.06)	(0.73)	(-2.63)
Personal Effects	*Yes*	*Yes*	*Yes*	*Yes*
Year Effects	*Yes*	*Yes*	*Yes*	*Yes*
City Effects	*Yes*	*Yes*	*Yes*	*Yes*
N	3010	3010	3010	3010
Adj. R^2	0.871	0.588	0.895	0.622

Table.4 The impact of female municipal secretary on local economic development

	(1)	(2)	(3)	(4)	(5)
	$LnConsume_{i,t}$	$LnFiximv_{i,t}$	$LnPatent_{i,t}$	$LnFiximv_{i,t}$	$LnRealestate_{i,t}$
$Female_{i,t}$	0.007	-0.091**	0.004	-0.069	-0.130**
	(0.50)	(-1.98)	(0.05)	(-1.58)	(-2.27)
$LnGDPPA_{i,t-1}$				0.452***	0.234*
				(5.36)	(1.84)
$LnPublic_{i,t}$				0.590***	0.431***
				(7.51)	(4.65)
$LnRoad_{i,t}$				-0.005	0.027
				(-0.16)	(0.56)
$(n+g+\delta)_{i,t}$				-0.001	0.052*
				(-0.05)	(1.77)
$Highedu_{i,t}$				-0.913	0.546
				(-0.59)	(0.23)
$Unemprt_{i,t}$				-0.054*	-0.119*
				(-1.88)	(-1.88)
Constant	13.608***	12.816***	5.913**	1.468	4.212*
	(19.88)	(10.50)	(2.48)	(0.90)	(1.76)
Personal Effects	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Year Effects	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
City Effects	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
N	3010	3010	3010	3010	3010
Adj. R^2	0.905	0.833	0.811	0.869	0.728

Table.5 The impact of female municipal secretary on regional land auction

	(1)	(2)	(3)	(4)	(5)
	$LnPlanland_{i,t}$	$LnPlanarea_{i,t}$	$LnSolddeal_{i,t}$	$LnSoldland_{i,t}$	$LnSoldarea_{i,t}$
$Female_{i,t}$	-0.178*	-0.238**	-0.107	-0.259*	-0.324**
	(-1.76)	(-2.36)	(-1.22)	(-1.92)	(-2.39)
$LnGDPPA_{i,t-1}$	0.994***	1.046***	0.872***	1.037***	1.281***
	(4.11)	(3.30)	(3.54)	(3.86)	(2.94)
$LnPublic_{i,t}$	0.671***	0.741***	0.583***	0.746***	0.920***
	(3.76)	(3.10)	(3.06)	(3.62)	(3.15)
$LnRoad_{i,t}$	-0.075	-0.052	-0.001	-0.026	-0.042
	(-0.73)	(-0.34)	(-0.01)	(-0.24)	(-0.26)
$(n+g+\delta)_{i,t}$	-0.118**	-0.128*	-0.165***	-0.168***	-0.148*
	(-2.51)	(-1.68)	(-3.20)	(-3.00)	(-1.79)
$Highedu_{i,t}$	-7.201	-10.065	-12.043**	-10.412	-4.070
	(-0.96)	(-1.33)	(-2.12)	(-1.43)	(-0.34)
$Unemprt_{i,t}$	0.003	0.108	-0.015	0.038	0.225
	(0.04)	(0.81)	(-0.20)	(0.42)	(1.52)
Constant	-4.033	-5.465	-13.457***	-10.097*	-18.239*
	(-0.93)	(-0.82)	(-3.03)	(-1.83)	(-1.90)
Personal Effects	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Year Effects	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
City Effects	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
N	2254	2254	2254	2254	2254
Adj. R^2	0.580	0.418	0.653	0.528	0.386

Table.6 The impact of female municipal secretary on finance sector development

	(1)	(2)	(3)	(4)
	$LnLoan_{i,t}$	$LnDeposit_{i,t}$	$LnFinemp_{i,t}$	$Loanratio_{i,t}$
$Female_{i,t}$	-0.046*	-0.002	-0.019*	-0.022*
	(-1.74)	(-0.13)	(-1.83)	(-1.67)
$LnGDPPA_{i,t-1}$	0.108*	0.198***	-0.061**	-0.048**
	(1.83)	(5.19)	(-2.18)	(-2.10)
$LnPublic_{i,t}$	0.256***	0.259***	0.040**	0.020
	(5.87)	(7.80)	(2.15)	(1.24)
$LnRoad_{i,t}$	0.047**	0.022*	0.000	0.016*
	(2.41)	(1.78)	(0.02)	(1.70)
$(n+g+\delta)_{i,t}$	0.003	0.022***	0.020***	-0.008
	(0.23)	(2.76)	(2.81)	(-0.90)
$Highedu_{i,t}$	2.079	0.413	3.093***	1.333**
	(1.22)	(0.36)	(4.59)	(2.40)
$Unemprt_{i,t}$	0.025	-0.002	0.008	0.015
	(1.10)	(-0.09)	(0.59)	(1.11)
Constant	11.118***	10.414***	0.449	1.095**
	(10.67)	(15.69)	(0.81)	(2.18)
Personal Effects	*Yes*	*Yes*	*Yes*	*Yes*
Year Effects	*Yes*	*Yes*	*Yes*	*Yes*
City Effects	*Yes*	*Yes*	*Yes*	*Yes*
N	3010	3010	3010	3010
Adj. R^2	0.865	0.964	0.493	0.135

Table.8 The impact of female municipal secretary on regional section employment

	(1)	(2)	(3)	(4)	(5)
	$Agrgrt_{i,t}$	$Mingrt_{i,t}$	$Fingrt_{i,t}$	$Culgrt_{i,t}$	$Edugrt_{i,t}$
$Female_{i,t}$	-0.115**	-0.114***	-0.019**	0.036*	0.027*
	(-2.49)	(-2.87)	(-2.38)	(1.85)	(1.90)
$LnGDPPA_{i,0}$	0.016	0.043	0.012**	0.009	0.003
	(0.50)	(1.39)	(2.10)	(0.91)	(0.54)
$LnPublic_{i,0}$	-0.036	0.019	-0.006	-0.009	0.004
	(-1.32)	(0.61)	(-0.94)	(-1.07)	(0.80)
$LnRoad_{i,0}$	0.014	-0.015	-0.002	0.008	0.008
	(0.38)	(-0.45)	(-0.38)	(0.78)	(1.34)
$(n+g+\delta)_{i,0}$	-0.015	0.016	0.005	0.000	0.009
	(-0.59)	(0.56)	(0.91)	(0.03)	(1.44)
$Highedu_{i,0}$	-0.235	-1.047	0.557***	0.057	-0.041
	(-0.35)	(-1.34)	(2.94)	(0.24)	(-0.34)
$Unemprt_{i,0}$	-0.030	-0.019	-0.008	-0.022	0.004
	(-0.62)	(-0.54)	(-1.09)	(-1.63)	(0.53)
Constant	-1.087	-2.555	0.261	-0.078	-0.589
	(-0.59)	(-1.10)	(0.46)	(-0.08)	(-1.18)
Personal Effects	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Year Effects	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
City Effects	*No*	*No*	*No*	*No*	*No*
N	782	580	911	911	911
Adj. R^2	-0.003	0.020	0.038	-0.000	0.011

Table.9 The impact of female municipal secretary on FDI, medical facility, education and environment protection

	(1)	(2)	(3)	(4)	(5)
	$FDIgrt_{i,t}$	$Hospitalgrt_{i,t}$	$Bookgrt_{i,t}$	$Pschoolgrt_{i,t}$	$Greenlandgrt_{i,t}$
$Female_{i,t}$	0.124*	0.117**	0.063**	0.033**	0.078*
	(1.89)	(2.15)	(1.99)	(2.16)	(1.73)
$LnGDPPA_{i,0}$	-0.141	-0.292	-0.466	-0.076	-0.187
	(-0.24)	(-0.89)	(-1.14)	(-0.53)	(-0.59)
$LnPublic_{i,0}$	-0.007	0.000	0.012	0.017***	0.008
	(-0.27)	(0.01)	(1.28)	(3.29)	(1.10)
$LnRoad_{i,0}$	-0.004	0.036*	0.001	0.029***	-0.023*
	(-0.13)	(1.73)	(0.13)	(5.07)	(-1.73)
$(n+g+\delta)_{i,0}$	-0.028	-0.010	0.025**	-0.004	0.004
	(-1.04)	(-0.48)	(2.25)	(-0.75)	(0.29)
$Highedu_{i,0}$	0.041*	0.018	0.009	0.035***	0.017*
	(1.72)	(1.12)	(0.81)	(5.19)	(1.65)
$Unemprt_{i,0}$	0.018	-0.010	-0.015	-0.001	-0.017
	(0.37)	(-0.49)	(-0.90)	(-0.09)	(-0.96)
Constant	0.132	-1.711	-0.017	0.144	-0.405
	(0.07)	(-1.65)	(-0.01)	(0.30)	(-0.33)
Personal Effects	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Year Effects	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
City Effects	*No*	*No*	*No*	*No*	*No*
N	816	897	897	910	897
Adj. R^2	0.176	0.035	0.028	0.184	0.040

5 Text Analysis

Municipal secretaries' agenda, concern, and personality

Table.10 Descriptive statistics on the municipal secretary's news report of 281 cities in China, 2006-2016

	$Female_{i,t}$=1						$Female_{i,t}$=0						t-test
	N	Mean	P10	P25	P75	P90	N	Mean	P10	P25	P75	P90	Difference
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(2)-(8)
Panel A: The sum news number													
$ReportNum_{i,t}$	70	123.21	49	86	153	199	1739	143.63	66	94	183	233	-20.417**
$OpinionNum_{i,t}$	70	102.44	42.5	66	133	160	1739	118.69	53	77	151	195	-16.244**
Panel B: The share of different activities to the sum news number													
$AgdSchool_{i,t}$(%)	70	9.59	2.24	3.92	11.11	24.97	1739	7.62	2.09	3.49	8.77	15.82	1.967**
$AgdHospt_{i,t}$(%)	70	2.96	0.90	1.59	3.92	5.59	1739	3.14	0.72	1.52	4.35	6.19	-0.177
$AgdCultr_{i,t}$(%)	70	0.42	0.00	0.00	0.75	1.24	1739	0.28	0.00	0.00	0.37	0.97	0.144*
$AgdComf_{i,t}$(%)	70	2.18	0.00	0.84	2.91	4.59	1739	1.50	0.00	0.53	2.17	3.17	0.675***
Panel C: The share of different opinion tags to the sum news number													
$TagParty_{i,t}$(%)	70	2.35	0.00	0.00	3.66	5.22	1739	2.28	0.00	0.85	3.27	5.00	0.074
$TagEcon_{i,t}$(%)	70	50.41	33.01	41.03	59.87	63.65	1739	54.51	37.88	46.64	62.96	68.93	-4.100***
$TagSociety_{i,t}$(%)	70	16.13	6.46	9.05	20.37	30.66	1739	13.49	6.39	9.09	16.48	21.28	2.645***
$TagEvir_{i,t}$(%)	70	1.88	0.00	0.00	2.86	4.51	1739	1.22	0.00	0.00	1.49	3.08	0.657**
$TagCultr_{i,t}$(%)	70	13.47	6.39	9.17	16.33	20.07	1739	12.10	5.61	8.00	14.94	19.27	1.374*
$TagPolitic_{i,t}$(%)	70	18.63	9.76	12.80	22.95	30.16	1739	18.69	9.09	12.77	23.73	29.79	-0.058
Panel D: The frequency of different sentimental word to the sum news with opinion													
$AggressFreq_{i,t}$	70	4.47	2.74	3.15	5.00	6.80	1739	5.19	3.00	3.73	6.18	7.90	-0.727***
$ConservFreq_{i,t}$	70	0.40	0.18	0.24	0.54	0.71	1739	0.35	0.16	0.21	0.44	0.57	0.059**
$DefiniteFreq_{i,t}$	70	10.55	6.90	7.98	11.89	15.92	1739	9.88	6.32	7.60	11.46	14.03	0.667
$AmbigFreq_{i,t}$	70	2.04	1.17	1.39	2.44	3.14	1739	2.31	1.20	1.58	2.79	3.65	-0.268**

Table.11 The share of female municipal secretary's agenda

	(1)	(2)	(3)	(4)
	$AdgSchool_{i,t}$	$AgdHospt_{i,t}$	$AgdCultr_{i,t}$	$AgdComf_{i,t}$
$Female_{i,t}$	0.570	0.031	0.097	0.682**
	(1.37)	(0.09)	(1.12)	(2.59)
$LnGDPPA_{i,t-1}$	1.886*	-0.785	0.412***	0.857**
	(1.81)	(-1.18)	(2.67)	(2.19)
$LnPublic_{i,t}$	-1.669**	0.615	-0.153	-0.512*
	(-2.02)	(1.23)	(-1.49)	(-1.74)
$LnRoad_{i,t}$	0.963*	-0.057	-0.005	0.115
	(1.90)	(-0.23)	(-0.08)	(0.70)
$(n+g+\delta)_{i,t}$	-0.036	-0.182	0.045	-0.172
	(-0.11)	(-1.06)	(0.77)	(-1.21)
$Highedu_{i,t}$	-10.522	35.772**	8.755	-15.142**
	(-0.49)	(2.51)	(1.61)	(-2.13)
$Unemprt_{i,t}$	0.408	0.092	0.029	-0.420***
	(0.77)	(0.29)	(0.37)	(-2.81)
Constant	-9.803	9.284	-1.469	5.455
	(-0.45)	(0.67)	(-0.46)	(0.62)
Personal Effects	*Yes*	*Yes*	*Yes*	*Yes*
Year Effects	*Yes*	*Yes*	*Yes*	*Yes*
City Effects	*Yes*	*Yes*	*Yes*	*Yes*
N	1809	1809	1809	1809
Adj. R^2	0.756	0.084	0.015	0.103

Table.12 The sentiment word frequency of female municipal secretary

	(1)	(2)	(3)	(4)	(5)	(6)
	$TagParty_{i,t}$	$TagEcon_{i,t}$	$TagSociety_{i,t}$	$TagEnvir_{i,t}$	$TagCultr_{i,t}$	$TagPolitic_{i,t}$
$Female_{i,t}$	-0.148	-3.425**	1.055	0.652**	2.145*	-0.367
	(-0.55)	(-2.33)	(0.90)	(2.32)	(1.75)	(-0.36)
$LnGDPPA_{i,t-1}$	0.018	-1.652	2.454	-1.730**	-0.897	2.692
	(0.03)	(-0.53)	(1.05)	(-2.36)	(-0.45)	(1.16)
$LnPublic_{i,t}$	-0.962**	-0.129	0.398	1.360*	0.918	-1.165
	(-2.29)	(-0.06)	(0.25)	(1.91)	(0.68)	(-0.79)
$LnRoad_{i,t}$	-0.146	-3.308***	1.611**	-0.390	0.993	1.065
	(-0.58)	(-2.72)	(2.13)	(-1.36)	(1.07)	(1.02)
$(n+g+\delta)_{i,t}$	0.099	0.400	0.144	0.113	0.660	-0.811
	(0.56)	(0.49)	(0.28)	(0.67)	(0.91)	(-1.35)
$Highedu_{i,t}$	-22.721**	38.561	-72.372	36.838	-8.363	44.284
	(-2.44)	(0.62)	(-1.14)	(1.32)	(-0.25)	(1.32)
$Unemprt_{i,t}$	0.287	1.140	-1.400**	-0.075	-0.318	-0.187
	(1.33)	(0.92)	(-2.17)	(-0.30)	(-0.50)	(-0.22)
Constant	12.392	152.610***	-21.368	-1.850	-31.023	-28.754
	(1.13)	(2.77)	(-0.62)	(-0.16)	(-0.80)	(-0.73)
Personal Effects	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Year Effects	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
City Effects	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
N	1809	1809	1809	1809	1809	1809
Adj. R^2	0.179	0.382	0.179	0.111	0.005	0.252

Table.13 The sentiment word frequency of female municipal secretary

	(1)	(2)	(3)	(4)
	$AggressFreq_{i,t}$	$ConservFreq_{i,t}$	$DefiniteFreq_{i,t}$	$AmbigFreq_{i,t}$
$Female_{i,t}$	-0.777*	0.024	-0.255	-0.504**
	(-1.78)	(0.58)	(-0.40)	(-2.38)
$LnGDPPA_{i,t-1}$	0.141	0.009	0.430	-0.019
	(0.23)	(0.14)	(0.41)	(-0.05)
$LnPublic_{i,t}$	-0.104	-0.011	0.254	-0.196
	(-0.24)	(-0.27)	(0.35)	(-0.86)
$LnRoad_{i,t}$	-0.017	0.015	0.285	0.065
	(-0.08)	(0.71)	(0.70)	(0.57)
$(n+g+\delta)_{i,t}$	0.248	0.021	0.135	0.100
	(1.62)	(1.36)	(0.49)	(1.25)
$Highedu_{i,t}$	16.349	0.174	15.607	1.178
	(1.29)	(0.16)	(0.82)	(0.16)
$Unemprt_{i,t}$	-0.119	-0.020	-0.413	-0.018
	(-0.44)	(-0.69)	(-0.99)	(-0.11)
Constant	4.348	0.971	-5.591	8.772*
	(0.40)	(0.91)	(-0.31)	(1.67)
Year Effects	*Yes*	*Yes*	*Yes*	*Yes*
City Effects	*Yes*	*Yes*	*Yes*	*Yes*
N	1809	1809	1809	1809
Adj. R^2	0.337	0.042	0.180	0.206

6 Robustness Check

Identification and alternative hypotheses

Table.14 The Difference-in-Difference (DID) study of female municipal secretary's inauguration and departure

	(1) $GDPrate_{i,t}$	(2) $LnPlanarea_{i,t}$	(3) $LnSoldarea_{i,t}$	(4) $Loanratio_{i,t}$
$Female_{i,t-2} \times FMStart_{i,t-2}$	0.478	-0.018	-0.043	-0.002
	(1.08)	(-0.12)	(-0.26)	(-0.11)
$Female_{i,t-1} \times FMStart_{i,t-1}$	-0.582	-0.159	-0.229	-0.005
	(-1.27)	(-1.16)	(-1.39)	(-0.31)
$Female_{i,t}$	-0.668*	-0.257**	-0.354**	-0.026*
	(-1.70)	(-2.14)	(-2.21)	(-1.80)
$Female_{i,t+1} \times FMEnd_{i,t+1}$	-0.199	-0.134	-0.138	-0.021
	(-0.28)	(-1.21)	(-1.06)	(-0.98)
$Female_{i,t+2} \times FMEnd_{i,t+2}$	0.201	-0.082	-0.109	0.022
	(0.36)	(-0.68)	(-0.92)	(0.64)
City Economy Control	*Yes*	*Yes*	*Yes*	*Yes*
Personal Effects	*Yes*	*Yes*	*Yes*	*Yes*
Year Effects	*Yes*	*Yes*	*Yes*	*Yes*
City Effects	*Yes*	*Yes*	*Yes*	*Yes*
N	2690	2156	2156	2690
Adj. R^2	0.621	0.451	0.405	0.146

“Exogenous” turnovers:

“The bribe and sudden departure” secretary

1. The dismission of the bribe officer is prompt and unexpected;
2. The sudden departure of predecessor officials leaves the delegation of a successor to become cursory and quickly;
3. We consider the sub-sample of the sudden departure municipal secretary’s successors as an exogenous group.

Table.16 The sample of the sudden departure municipal secretary's successors

	(1)	(2)	(3)	(4)	(5)
	$GDPrate_{i,t}$	$GDPrate_{i,t}$	$LnRealestate_{i,t}$	$LnLoan_{i,t}$	$Loanratio_{i,t}$
$Female_{i,t}$	-1.941**	-1.637	-0.181	-0.157	-0.080*
	(-2.07)	(-1.60)	(-1.12)	(-1.25)	(-1.80)
$LnGDPPA_{i,t-1}$		0.135	6.286***	9.167***	1.222*
		(0.01)	(3.07)	(5.50)	(1.83)
$LnPublic_{i,t}$		2.020***	1.442***	1.154***	0.032
		(4.57)	(14.18)	(18.24)	(0.92)
$LnRoad_{i,t}$		-2.038***	0.275**	0.171**	0.026
		(-3.94)	(2.06)	(2.22)	(0.55)
$(n+g+\delta)_{i,t}$		-0.484	0.122	0.292***	0.030
		(-0.76)	(0.96)	(3.59)	(0.62)
$Highedu_{i,t}$		0.679	0.184	0.048	-0.009
		(1.24)	(1.60)	(0.63)	(-0.30)
$Unemprt_{i,t}$		-0.040	-0.055	0.066	-0.058
		(-0.06)	(-0.41)	(0.68)	(-1.53)
Constant	-64.285**	-113.621***	-16.197*	-21.579***	-8.945***
	(-2.11)	(-2.86)	(-1.96)	(-3.67)	(-3.14)
Personal Effects	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Year Effects	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
City Effects	*No*	*No*	*No*	*No*	*No*
N	115	115	115	115	115
Adj. R^2	0.582	0.697	0.836	0.904	0.192

Table.17 The future career of female municipal secretary

	(1)	(2)	(3)	(4)
	$Promotion_{i,t}$	$Promotion_{i,t}$	$Bribe_{i,t}$	$Bribe_{i,t}$
$Female_{i,t}$	-0.471*	-0.500**	-0.261	-0.269
	(-1.90)	(-1.98)	(-0.52)	(-0.52)
$AnnGDPrate_{i,t}$		0.537		-2.639
		(0.55)		(-1.60)
$LnGDPPA_{i,0}$		0.259**		-0.242
		(2.37)		(-1.44)
$LnPublic_{i,0}$		0.089		-0.050
		(0.90)		(-0.35)
$LnRoad_{i,0}$		-0.108		0.181
		(-0.97)		(1.03)
$(n+g+\delta)_{i,0}$		-0.092		-0.012
		(-0.78)		(-0.06)
$Highedu_{i,0}$		1.201		12.317***
		(0.36)		(3.04)
$Unemprt_{i,0}$		-0.079		-0.177
		(-0.51)		(-0.73)
Constant	-22.377***	-34.445***	6.352	11.291
	(-2.66)	(-3.26)	(0.54)	(0.79)
Personal Effects	*Yes*	*Yes*	*Yes*	*Yes*
Year Effects	*Yes*	*Yes*	*Yes*	*Yes*
City Effects	*No*	*No*	*No*	*No*
N	951	872	949	872
Adj. R^2	0.035	0.028	0.176	0.184

Table.18 The additional test of female mayor impact on regional economic development

	(1)	(2)	(3)	(4)	(5)
	$GDPrate_{i,t}$	$LnSolddeal_{i,t}$	$LnFinemp_{i,t}$	$LnBondsize_{i,t}$	$Length_{i,t}$
$FemaleMayor_{i,t}$	-0.291	-0.096	-0.005	-0.050	-0.176
	(-0.99)	(-1.22)	(-0.55)	(-0.48)	(-0.68)
$LnGDPPA_{i,t-1}$	-2.425***	0.856***	-0.060**	0.252	1.656**
	(-3.17)	(3.54)	(-2.10)	(0.80)	(2.25)
$LnPublic_{i,t}$	5.199***	0.543***	0.040**	0.488**	1.176**
	(5.67)	(2.80)	(2.14)	(2.22)	(2.43)
$LnRoad_{i,t}$	-0.451*	-0.001	0.002	0.024	0.326
	(-1.79)	(-0.01)	(0.19)	(0.16)	(0.95)
$(n+g+\delta)_{i,t}$	0.573***	-0.162***	0.021***	0.195**	0.218
	(3.18)	(-3.11)	(2.86)	(2.58)	(1.11)
$Highedu_{i,t}$	9.285	-12.605**	3.172***	16.039*	-17.353
	(0.53)	(-2.23)	(4.57)	(1.94)	(-0.90)
$Unemprt_{i,t}$	-0.085	-0.008	0.007	-0.006	0.154
	(-0.31)	(-0.10)	(0.53)	(-0.05)	(0.47)
Constant	-40.667***	-14.736***	0.317	-14.494***	-51.370***
	(-3.28)	(-3.62)	(0.66)	(-2.68)	(-4.13)
Personal Effects	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Year Effects	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
City Effects	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
N	3010	2254	3010	2181	2181
Adj. R^2	0.620	0.654	0.492	0.309	0.124

7 Conclusion

And further discussion

Findings:

1. Female municipal secretaries are associated with weaker GDP growth rate, fixed asset, real estate growth and land development.
2. Female leaders undertake significantly less leverage, and lower employment growth in the finance industry.
3. Female leadership promote employment in the culture and education industries, and improve the medical facility, education, and environmental protection.
4. The news text analysis provides direct evidence of female municipal secretary' s personal characteristics of greater compassionate, higher environmental awareness, lower aggressiveness, and higher reliability.

Contribution:

1. We extend the applicability of female leadership theory from behavioral finance into regional economics.

2. This paper sheds a light in identifying the direct evidence of people' s actions and wills by machine learning text analysis algorithm.

3. Our study also provides valuable counterfactual empirical evidence for the China economic growth theory, that promoting land development and locating financial resource are decisive factors in the development of regional economy in China.

Discussion:

1. The lower expectation of career promotion for female secretaries may lead them declining the competitive impulse and developing the sector they care, such as: medication, education and environment protection.

2. The female municipal secretaries, therefore, seem to be more compassionate, reliable and humane compared with the male counterparts.

3. The female government leaders' developing preference of lower leverage, more compassionate, and more environment-friendly, in addition of their incorruptness, makes a perfect match for the new politic trend of Chairman Xi in China.

Thank You !!

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