



Predicting Chinese State-Owned Enterprise Policy Incidence

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Predicting Chinese State-Owned Enterprise Policy Incidence Using a VAR Model

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Abstract

In this exploratory research, we examine the effect of economic and noneconomic indicators on the creation of Chinese state-owned enterprise policies. Using a VAR model, we find indicators that explain state-owned enterprise policy creation variance, which means that we can explain, to some extent, the incidence of state-owned enterprise policies. This reduces economic policy uncertainty, thereby having the potential to increase economic activity and reduce costs.

Keywords

China; state-owned enterprise; regulation; policy

Declarations

The research has not received funding.

There are no conflicts of interest.

Introduction

In this exploratory research, we examine the effect of economic and noneconomic indicators on the creation of Chinese state-owned enterprise policies. Using a VAR model, we find indicators that explain state-owned enterprise policy creation variance, which means that we can explain, to some extent, the incidence of state-owned enterprise policies. This reduces economic policy uncertainty, thereby having the potential to increase economic activity and reduce costs.

This represents a new area of research that identifies policy incidence and can be applied to other countries and industries. Understanding what forces shape policies can help the financial sector and firms increase profits, researchers assess when and how to implement development interventions, and governments understand when (interacting) policies from other departments are likely to be implemented. In addition, knowing which factors influence policy making incidence will bring about a better understanding of how economies develop and function.

In this paper, we discuss the value of predicting policies, then provide a brief literature review. We provide a theoretical basis for Chinese policymaking, then delve into a recent history of Chinese state-owned enterprise reform. We then describe the data, model, and results and discuss the implications of our findings.

Explaining Policy Creation

Why should one use external indicators to explain factors that influence policy creation? The scant literature on explaining policy creation leads us to believe that few scholars have viewed policy explanation as possible and/or worthwhile. However, we believe it is both. First, regarding the plausibility of explaining factors that influence policy creation, we acknowledge that it is exceedingly challenging to find sufficient data and patterns that can do this, looking at the number of policies created within specific time frames. It is an incredibly time-consuming process, and the research in this area remains exploratory at present. It is also the case that, in uncovering explanatory patterns for a certain type of policy, one must

be resigned to the fact that these patterns are unlikely to hold for other types of policies, especially in circumstances in which different policymaking processes are employed.

Second, regarding the value of policy explanation, we assert that it is useful in understanding what the policy climates might look like in the future. This is a boon for firm and industry actors that operate under these policies, as well as for financial firms that invest in related stocks, government actors, and policy analysts. As the study of policy creation develops, policy risk can be reduced, and this understanding can bring about a reduction in costs related to political and economic uncertainty.

Literature Review

There is truly little research that predicts or explains the creation of policies. One vein of research on Chinese policy uses machine learning. The Policy Change Index, created by the Mercatus Center at George Mason University, uses key words in the People's Daily to predict major policy changes in China (Chan and Zhong 2019). The index is analyzed in a journal article, in which policy waves predict the Great Leap Forward and the Cultural Revolution as well as, more recently, supply-side structural reform. The paper uses machine learning techniques, particularly the gated recurrent units (GRU) model developed by Cho et al. (2014), to analyze key phrases. In addition, Lu (2019) uses a neural network and error t-value test to predict monetary policy in China. Six training cases are used to examine the relationship between reserve adjustments and financial markets.

There is also literature on factors that influence public policy. For example, Omer (2004) examines state competition for capital and jobs, finding that state governments compete for capital and jobs and respond to their competitors' tax policy decisions with conforming policy changes. Nay (2017) uses machine learning to understand which bills, out of the tens of thousands that were introduced between 2001 and 2015, were enacted. The author uses a language model that places legislative vocabulary into a semantic-laden vector space.

There is a large literature on the costs imposed by economic policy uncertainty, which makes it more expensive to carry out economic activities. Uncertainty forces economic actors to use precautionary savings or wait and see what policy outcomes will be (Bloom 2009). Monetary policy uncertainty, tax policy uncertainty, and trade policy uncertainty negatively affect the economy (Mumtaz and Zanetti (2013); Fernández-Villaverde et al. (2015); Handley (2014)). Economic policy uncertainty is also applicable to China, and has been found to reduce stock market returns ((Chen et al., 2017) and firm investment (Wang et al., 2014), as well as increase the incidence of mergers and acquisitions (Sha et al 2020).

Theoretical basis

There are several ways in which Chinese policy may be explained by financial, economic, and other indicators. These include indicators that reflect agenda setting, consensus building, and policy experts' studies. This is visible in the work of Ma and Lin (2012), who construct a review of Chinese scholarship on policy making. They divide the Chinese policy-making literature into three strains: one exploring agenda-setting, one on consensus building, and another looking at policy actors.

First, Chinese scholars have noted that agenda setting is an essential component of policy making. Wang (2006) asserts that agenda setting in China can be classified by the identity of agenda proposers and the extent to which citizens participate. Wang shows that there has been additional influence on policy making since the 1990s, including experts, the media, stakeholders, and the public. This visible agenda setting framework provides a direction for future policy creation, and that is its purpose. Using a formally or less formally established agenda helps both economic leaders and actors to carry out the agenda.

Second, consensus building has arisen in China as a way to gather support for policy creation. Chen (2006) stated that policy is conducted formally, through the bureaucratic system, and informally, through the negotiation network. In the bureaucratic system, policy is made through consensus, while in the negotiation network, policy is made based on the influence of policy advocates. The process of consensus

building may be less visible to outsiders, but there may be indications of consensus building within the media or other outlets.

Third, policy making can also be understood through the study of key policy experts, particularly of state related think tanks. Zhu (2006) empirically examined the influence of think tank experts and their role on policy making in China. He found that policy making has changed from a process led by political elites to one led by social elites. He finds three major patterns in policy making, including pretransition, in which policy making is dominated by political elites, preliminary transition, in which social elites begin to influence policymaking, and policymaking diversification, in which there is more interaction between policy advisory and civil society. Indeed, the research carried out at the highest levels of government is often indicative of policy movements that will shape future government rules and regulations.

Combining these forces is another theory, which states that policies are created through a feedback loop that shapes how policies are applied and revised. For China, the policy feedback loop continues when state-owned enterprises and local governments respond to central reform directives (Leutert 2021).

Successful cases may serve as models or participate in pilot programs for a larger rollout. This is something that is frequently seen in China. In this case, government organization may share these successful cases with enterprises, other government bodies, or the public. The central government reviews the advancement of the initial reforms and determines whether additional policies can push forward the initial reforms, or whether the initial reforms should be abandoned.

Specific to state-owned enterprises, the theory of such firms and policies governing them must necessarily change over time. While there is no general theory of state-owned enterprises, Jefferson (1998) puts forward a theory stating that state-owned enterprises can be classified as a type of impure public good with externality and public-policy implications. Jefferson views firms owned by the people with serious agency problems as public goods. Fiscal and financial subsidies are used to replenish ongoing losses due to state-owned enterprise inefficiencies.

During the time in which Jefferson was writing, this theory could easily be applied, but due to years of state-owned enterprise reform, firms have faced harder financial constraints and have been forced to improve management. While firms continue to cope with an agency issue, this problem has been further constrained.

Today, even though state-owned enterprises are no longer public goods per se, they remain agents of the state; otherwise, why has the state gone to such lengths to keep state-owned enterprises in their control? Even though the managerial distance between the state and state-owned enterprises has increased, the policy distance has not.

We can judge the distance between the state and state-owned enterprises using the framework proposed by Norris. Norris (2016) puts forward five factors that determine if a state can use economic powers to accomplish its strategic goals: the extent to which the state is unified, compatibility between goals of the state and commercial actor, commercial market structure, the reporting relationship between the firm and the state, and the distribution of resources between the state and firm.

In answer to the first factor, we can indeed assert that the Chinese state is unified, especially under Xi Jinping, in which Xi has called for the party to unify around the “party core” (Gan 2018). Xi has worked toward purging the government of corrupt officials in order to cleanse and consolidate the Communist party. With regard to the distribution of resources between state and firm, in the case of state-owned enterprises, funds in the form of bank loans are made available to the firms to carry out policy directives.

Even if there is low direct compatibility between the goals of the state and the state-owned enterprise, the unified nature of the Chinese state and the power of the Communist party ensure that state-owned firms line up their economic activities with state mandates, which increases indirect compatibility between the goals of both parties. In addition, state-owned enterprises have a strong incentive to carry out government directives due to the political advantages such a relationship provides them.

The state therefore can use its economic powers to carry out strategic goals, and has a vested interest in inducing state-owned enterprises to carry out its policies. For example, in the wake of the global financial crisis, the Chinese government issued a stimulus package, which initiated large-scale investment in infrastructure. The organizations to carry out infrastructure construction were largely central and local state-owned enterprises. Many were required to find external funding, but it was understood that state firms would assist the implementation of the stimulus package. Hence state firms have been deemed vital to the legitimization of the Communist party through economic and social stability.

Due to the core incompatibility between the policy goals of the state and the profit-oriented goals of state-owned enterprises, future reform policies can be expected to ensure that state firms remain sufficiently capitalized and productive despite the existence of highly challenging state-imposed requirements. This may require restructuring of firms and their financial resources within policy-executing industries, such as mining, construction, raw materials processing, and technology.

Chinese state-owned enterprise policies

Now, we turn to the changing nature of state-owned enterprise policies. Chinese state-owned enterprise reform and associated policies were important topics for many years after reform and opening-up. This is because state firms were at the core of the Communist system under Mao, the only firms allowed to formally participate in economic activity for several decades, and at the heart of the industrialization drive. As China began to reform and open up to both the outside world and private enterprise, state-owned enterprises required massive changes while maintaining ties to the state.

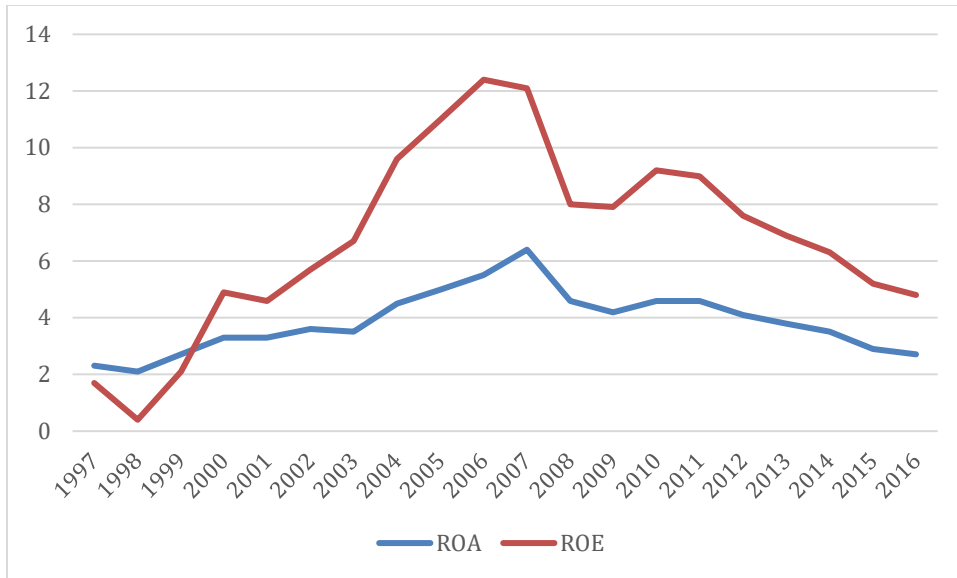
Since their creation, state owned enterprises have played an important role in the Chinese economy in order to fulfill government policy objectives and maintain strategic operations. However, they were extremely inefficient in many cases, since employment had been guaranteed under the centrally planned economy and SOEs merely had to fulfill government production targets under soft budget constraints. While SOEs played an important role in guaranteeing the livelihoods of workers and providing social

welfare services, the separation between owners and managers within SOEs gave rise to the classic principal-agent problem (Song 2018). This is because some state firm managers have been able to abuse their power for their own gain. State-owned enterprise owners faced both difficulties in monitoring the activities of managers as well as low incentives for supervisory agency officials.

Major reforms have attempted to address some of these issues. In the late 1990s, state-owned enterprises experienced a massive shock as the number of such firms was dramatically reduced in order to reduce the role of the state in the economy. The aim was to maintain large SOEs but remove government ownership of small SOEs. By the early 2000s, state-owned enterprise reform was oriented toward restructuring; privatization was carried out through means of employee shareholding, public offerings, enterprise sales, bankruptcy, leasing, and joint ventures. This process greatly improved SOE efficiency but did not bring SOEs up to the performance levels of private firms.

Corporatization and globalization of SOEs occurred between 2003 and 2013. In order to accomplish this, the State-owned Assets Supervision and Administration Commission (SASAC) was created in 2003. Between 2003 and 2006, the number of central SOEs had declined, but state firms that remained were very large corporations due to mergers and acquisitions. Such corporations were concentrated in strategic sectors, such as public utilities, nonrenewable natural resources, and national security. SOEs were provided with preferential loans, and some were permitted to globalize in order to secure critical resources abroad.

Figure 1. ROA and ROE of State-Owned Enterprises



Source: Ministry of Finance

Between 1997 and 2016, the number of SOEs decreased and then increased after 2008, although total assets rose by eleven times over the entire period (Lin et al 2020). SOE total factor productivity and return on assets rose through 2007. However, after 2007, SOE financial performance declined through 2013 because of the disruption and economic slowdown caused by the global financial crisis. During this time, renewed calls for SOE reform policies rose.

One of the major issues that presented itself was overinvestment. After the global financial crisis, government stimulus was used to increase investment in infrastructure. This led to the construction, in some cases, of “ghost towns,” in which no one lived, an example of investment solely for the sake of adding to annual GDP numbers. SOEs and local governments played major roles in this construction. As a result, many SOEs faced high levels of indebtedness, since their projects were insufficiently revenue-generating.

By 2015, SOE reform had become a core goal, particularly with the publication of the “Guiding Opinions on Deepening the Reform of State-owned Enterprises,” which put forth the “1 + N” policy system reform based on SOE classification (Lin et al 2020). Under this system, SOEs were classified as commercial

SOEs and public service SOEs in order to keep track of their respective performances. Market competition was a main means of judging commercial SOE performance, while political importance was the method of judging public service SOEs. Commercial SOEs were then additionally classified as perfectly competitive sectors and strategic sectors. The main idea of the “1 + N” policy was to strengthen the role of the Communist Party in SOEs and also to reorganize central SOEs. One of the central goals of the reform overall was to promote mixed ownership, in order to attract private capital into SOEs.

Mergers were used to reduce the number of unprofitable SOEs without having to cut jobs, and they had the added benefit of ending price wars among firms. However, the result was the dominance of behemoth firms, creating monopolies with far greater pricing power (Song 2018).

Reforms to corporate governance also took place. A State Council document laid out, in 2017, a means to modernize SOEs by enhancing the role of the Communist Party in corporate governance and requiring that SOEs’ boards of directors maintain a slate of mainly external directors. Anticorruption measures were simultaneously applied in order to ensure clean corporate governance.

SOEs continue to play an important role in infrastructure construction as a focus of policy fulfillment. However, Holz (2018) notes that additional SOE reform is necessary to improve good governance that makes profitability an explicit objective. Holz also points out that SOEs carry out functions that are not necessarily part of their official requirements, including maintaining employment for the sake of social stability, creating jobs for party leaders, fulfilling policy needs, and acting as “national champions.” These have created conflicting objectives for SOEs. This has been complicated by the fact that the SASAC organization falls short, as it has little authority over appointment of key SOEs and insufficient ability to regulate SOEs.

As noted above, because of the necessary relationship between SOEs and the government, it is likely that inefficiencies and unofficial requirements will continue to plague the sector. China retains SOE for the purposes of carrying out policy objectives and maintaining influence of the Communist party. As SOEs

encounter problems associated with excessive debt or insurmountable governance issues, additional policy reforms will likely be implemented. We therefore expect SOE policies to continue to be made, although likely at a slowing rate.

Having discussed the state of SOE reform, we now turn to our model explanation of SOE policy incidence.

Data

First, we describe our data set. We use monthly data taken from January 2010-June 2019 (when the data results for the dependent variable end). The dependent variable, monthly number of state-owned enterprise regulations, is taken from the Wanfang China Laws and Regulations Database. We find regulations with the key phrase “state-owned enterprise” in the title. Regulations were issued from different departments, including the Central Government Procurement Center, Central Committee of the Communist Party of China, Ministry of Finance, National Development and Reform Commission, and the State-owned Assets Supervision and Administration Commission.

Other data used for independent variables includes: Ministry of Finance policy collated to a monthly level in the Wanfang Database and People’s Daily mention of small enterprises.

The Ministry of Finance is a cabinet-level department of the State Council, and is responsible for administration of macroeconomic policies as well as the government budget. The body carries out fiscal policies as well as tax and revenue regulations. The People’s Daily is the official newspaper of the Communist Party of China. We seek newspaper articles on small enterprises, which are, like state owned enterprises, the backbone of China’s socialist market economy. Policies on small and medium sized enterprises have often been adjusted in order to increase economic growth and inclusion.

The number of independent variables is restricted in order to increase the robustness of the results. Other data was excluded due to its insignificant effect in explaining policy variance. Of particular note is the

fact that state-owned enterprise financial data, including the industrial value-added of state owned enterprises and number of loss-making firms, had no effect on policy incidence.

Model

In this paper, we use the basic Vector Autoregressive (VAR) model to capture the dynamic relationship between SOE policy incidence, Ministry of Finance policy and People's Daily mention of small enterprises. To be more specific, we use the VAR model to explore whether the Ministry of Finance policy and People's Daily mention of small enterprises can predict the incidence of SOE policies and to what extent can the incidence of SOE policies be explained by these variables

We can apply a VAR model, as it is possible that all the variables in the VAR equation may be a function of their past lags and other variables' past lags. The VAR model we use with two lags can be expressed as:

$$\vec{Y}_t = \vec{a} + A_1 \vec{Y}_{t-1} + A_2 \vec{Y}_{t-2} + \vec{\varepsilon}_t$$

Where \vec{Y}_t is a vector of variables the SOE policy incidence, Ministry of Finance policy and People's Daily mention of small enterprises, \vec{Y}_{t-1} and \vec{Y}_{t-2} are vectors of the lags of the above variables; \vec{a} is a vector of intercepts; A_1 and A_2 represent coefficient matrices; and $\vec{\varepsilon}_t$ is the vector of zero mean error terms. In practice, the lag period of VAR model should be chosen by a combination of different information criteria.

Empirical Results

In order to estimate the VAR model and to forecast the SOE policy incidence, we first divide the whole sample period into two different parts. The in-sample period is 2010m1-2018m12 and the out-of-sample period is 2019m1-2019m6. We use the former to estimate the VAR model and the later to forecast.

Before estimating the VAR model, we first conduct the Augmented Dickey-Fuller (ADF) test to make

sure all the time series are stationary, and the results reject the hypothesis of having a unit root, which means these series can be used to construct the VAR model.

As shown in **Figure 1**, all the series are stationary and show mean reversion characteristics. The mean of Ministry of Finance policy is much larger than the other two variables. And we can also see from Figure 1 that all the three variables are becoming smaller, which means the economic policy uncertainty in China decreases in recent years.

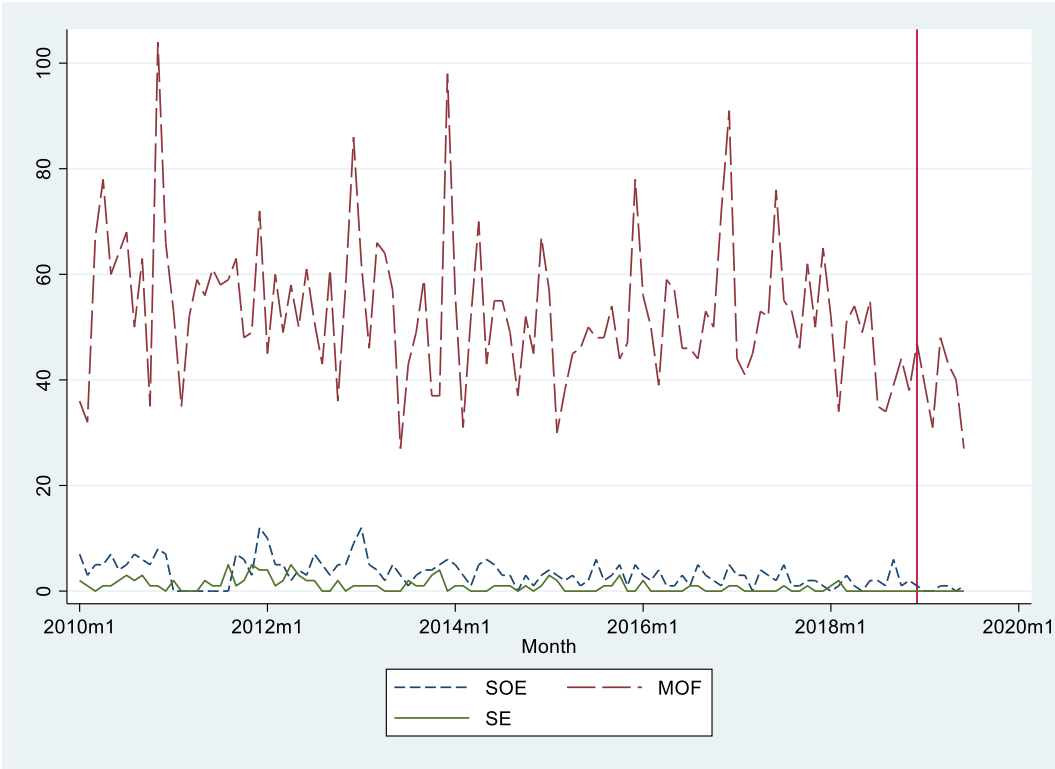


Figure1 Time series of different variables

In Figure1 SOE represents the SOE policy incidence, MOF represents the Ministry of Finance policy and SE represents the People’s Daily mention of small enterprises. The vertical red line represents the division of in-sample and out-of-sample period. And the marks are the same in the following tables and figures.

Next, we choose the optimal lags of the VAR model based on different information criteria. As shown in **Table 1**, the different information criteria show that the optimal lag period should be 1 or 2. In the

following analysis, to consider longer effects of different variables, we use VAR (2) as the baseline model and VAR (1) as the robustness test, and results are similar.

Table1 The optimal lags of the VAR model

lag	LL	LR	df	p	FPE	AIC	HQIC	SBIC
0	-774.005				1546.29	15.8572	15.8892	15.9364
1	-746.959	54.092	9	0.000	1070.05	15.489	15.617*	15.8055*
2	-736.921	20.075	9	0.017	1048.26*	15.4678*	15.6918	16.0217
3	-730.098	13.647	9	0.135	1097.42	15.5122	15.8323	16.3035
4	-725.288	9.6199	9	0.382	1198.48	15.5977	16.0138	16.6264
5	-721.333	7.9097	9	0.543	1333.95	15.7007	16.2128	16.9668
6	-716.914	8.8395	9	0.452	1473.56	15.7942	16.4023	17.2977
7	-709.761	14.305	9	0.112	1543.12	15.8319	16.536	17.5728
8	-707.654	4.2141	9	0.897	1796.26	15.9725	16.7727	17.9508
9	-704.886	5.5362	9	0.785	2069.69	16.0997	16.9959	18.3154
10	-692.371	25.029*	9	0.003	1962.07	16.028	17.0202	18.4811

Basic VAR model. The estimation results are shown in Table2, we can see that the joint significance level of all the three equations is significant, with the R-squared 0.40, 0.11 and 0.24, which means the model can explain the variance of dependent variables from 10% to 40%. The VAR model can capture the dynamic relationship between those three variables. When we explore the regression results in Table 3, we find that the coefficient of the lags of MOF are all significant at the 1% level, which means that the Ministry of Finance policy can strongly predict the incidence of SOE policies. However, the 2-period lag of MOF negatively predicts the SOE policies, which means their relationship may change as the period becomes longer. As for People's Daily mention of small enterprises (SE), the one-period lag of SE can predict the incidence SOE policies, while the 2-period lag of SE cannot predict the incidence SOE policies. The results reveal that in the short run, the policy making is more pronounced by the agenda-setting process rather than the consensus building process.

Table2 The estimation results of VAR model

Equation	Parameters	RMSE	R-sq	chi2	P>chi2
SOE	7	2.00581	0.4043	71.94722	0.0000
MOF	7	13.1326	0.1054	12.48299	0.0520
SE	7	1.11421	0.2449	34.37621	0.0000

Table3 The regression results of VAR model

	Coef.	Std. Err.	z	P>z	[95% Conf. Interval]	
SOE						
SOE						
L1.	.2828351	.0969924	2.92	0.004	.0927335	.4729366
L2.	.1363296	.0868771	1.57	0.117	-.0339464	.3066057
MOF						
L1.	.0437479	.0148408	2.95	0.003	.0146605	.0728353
L2.	-.0462077	.0151856	-3.04	0.002	-.0759709	-.0164444
SE						
L1.	.560704	.1735556	3.23	0.001	.2205413	.9008667
L2.	.2220233	.1826002	1.22	0.224	-.1358665	.5799132
_cons	1.314543	1.068908	1.23	0.219	-.7804779	3.409564
MOF						
SOE						
L1.	-.4987299	.6350347	-0.79	0.432	-1.743375	.7459153
L2.	.9372061	.5688075	1.65	0.099	-.1776362	2.052048
MOF						
L1.	.1067994	.0971666	1.10	0.272	-.0836436	.2972425
L2.	-.1908259	.0994241	-1.92	0.055	-.3856936	.0040418
SE						
L1.	-.329588	1.136315	-0.29	0.772	-2.556724	1.897548
L2.	2.302339	1.195532	1.93	0.054	-.0408604	4.645539
_cons	54.36577	6.998424	7.77	0.000	40.64911	68.08243
SE						
SOE						
L1.	.0049374	.0538786	0.09	0.927	-.1006627	.1105374
L2.	.0044627	.0482596	0.09	0.926	-.0901244	.0990499
MOF						
L1.	.0161102	.008244	1.95	0.051	-.0000477	.032268
L2.	.0101349	.0084355	1.20	0.230	-.0063983	.0266682
SE						
L1.	.3722612	.0964089	3.86	0.000	.1833033	.5612192
L2.	.0882012	.1014331	0.87	0.385	-.110604	.2870065
_cons	-.9207084	.5937707	-1.55	0.121	-2.084478	.2430607

Tests for VAR model. Several tests are carried out to confirm the validity of the VAR model above. These tests include joint significance of the coefficients, the white noise process of the residuals and stability of the VAR model. First, Wald test is used to check the significance of coefficients of different lags, results are shown in [Table 4](#). The results show that all the lags are significant, which means that the lag period is set appropriately. Second, under the assumption that the VAR model is correctly set, the residuals should follow a white noise process, which means that the residuals should follow the normal distribution and there is no self-correlation in the residuals.

The results of LM test are shown in [Table 5](#); the null hypothesis that there is no self-correlation cannot be rejected. [Table 6](#) reports the results of different normal distribution tests, including the Jarque-Bera test, the Skewness test, and the Kurtosis test. All the tests shows that the residuals do not follow a normal

distribution. Lastly, we must confirm the stability of the VAR model and eigenvalues are used to conduct this test. Figure 2 reports the results of eigenvalues of the VAR model. All the eigenvalues are smaller than 1, indicating that the VAR model is stable. In general, most tests show that the VAR model is set appropriately, although the residuals do not follow a normal distribution.

Table4 Wald test for the joint significance of all coefficients in VAR model

Equation	lag	chi2	df	Prob > chi2	lag	chi2	df	Prob > chi2
SOE	1	37.18365	3	0.000	2	14.32555	3	0.002
MOF	1	1.520269	3	0.678	2	11.70239	3	0.008
SE	1	19.17108	3	0.000	2	1.971505	3	0.578
All	1	57.54067	9	0.000	2	23.36973	9	0.005

Table5 LM test for self-correlation of the residuals

lag	chi2	df	Prob > chi2
1	10.5126	9	0.31060
2	8.2088	9	0.51325

Table6 Test for normal distribution of residuals

Jarque-Bera test				
Equation		chi2	df	Prob > chi2
SOE		10.264	2	0.00591
MOF		12.003	2	0.00247
SE		69.795	2	0.00000
ALL		92.062	6	0.00000
Skewness test				
Equation	Skewness	chi2	df	Prob > chi2
SOE	.74549	9.818	1	0.00173
MOF	.64025	7.242	1	0.00712
SE	1.4144	35.342	1	0.00000
ALL		52.402	3	0.00000
Kurtosis test				
Equation	Kurtosis	chi2	df	Prob > chi2
SOE	3.3175	0.445	1	0.50455
MOF	4.0383	4.761	1	0.02911
SE	5.793	34.453	1	0.00000
ALL		39.659	3	0.00000

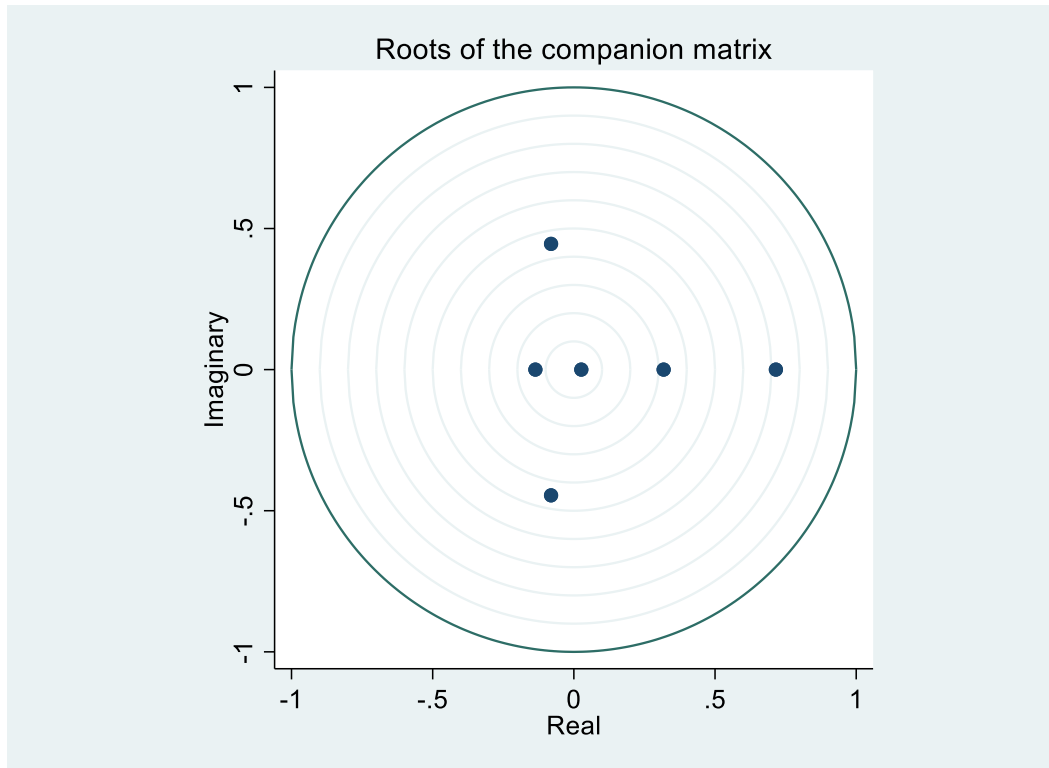


Figure2 Unit root test for the VAR model

Forecasting. We have previously divided the sample period into two parts, the in-sample period of 2010m1-2018m12, and the out-of-sample period of 2019m1-2019m6. We have used the in-sample period to construct the VAR model above, now we are going to use the out-of-sample period to predict. Figure 3 reports the forecasting results of the VAR model, which reports the forecasting results of SOE policy incidence. As shown in the subfigure, the forecasted value of (the change of) SOE policy incidence is close to the true value. Meanwhile, the 95% confidential interval covers all the true values. The results reveals that the predictability of the VAR model is robust. We can use Ministry of Finance policy and People’s Daily mention of small enterprises to predict the incidence of SOE policy.

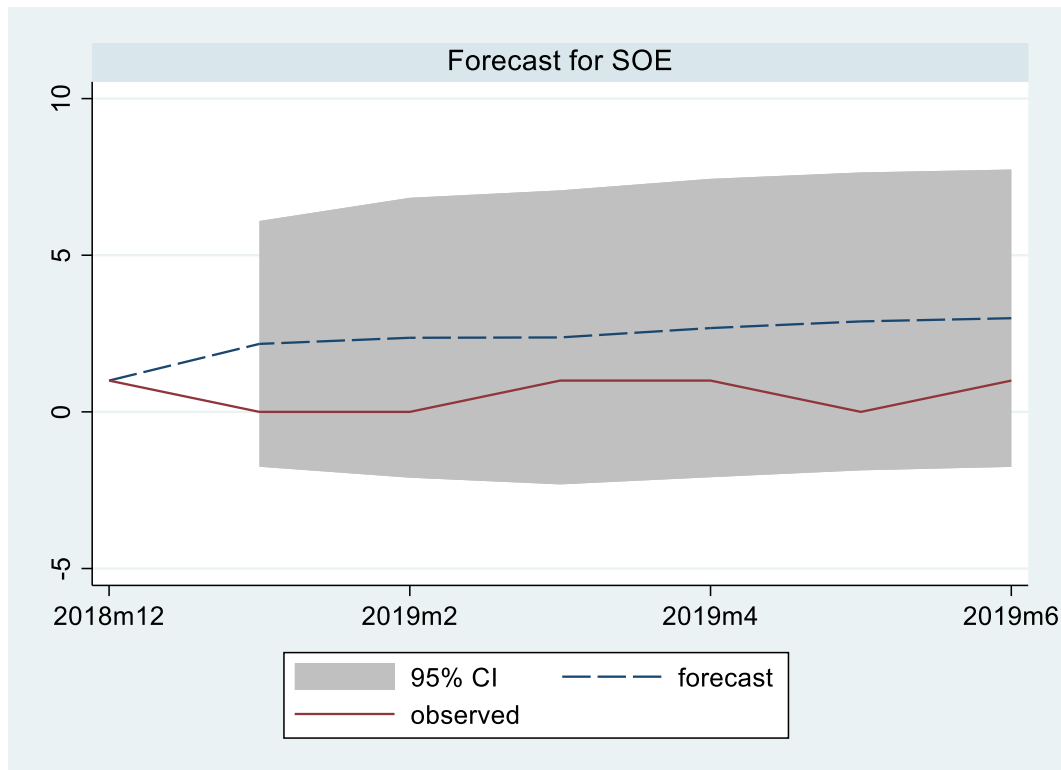


Figure3 Forecasting with the VAR model

Granger causality test. Then we apply Granger causality test to explore whether there are causal relationships between the variables in the VAR model¹. Table 7 reports the results of the Granger causality test, and we can see that the coefficients of the SOE policy incidence (the first panel), which means that Ministry of Finance policy and People’s Daily mention of small enterprises “Granger cause” SOE policy incidence. In other words, we can predict the incidence of SOEs policy with the Ministry of Finance policy and People’s Daily mention of small enterprises. The result is consistent with the baseline results in Table 3.

Table 7 Granger causality test of VAR model

Equation	Excluded	chi2	df	Prob > chi2
SOE	MOF	17.828	2	0.000
	SE	17.342	2	0.000
	ALL	33.083	4	0.000
MOF	SOE	2.7713	2	0.250
	SE	3.9302	2	0.140

¹ In the frame work of Granger causality test, causality is defined as that the lags of variables can predict one specific variable (the lags’ coefficients are significant), which is often interpret as predictability rather than causality.

	ALL	8.22	4	0.084
SE	SOE	.02572	2	0.987
	MOF	5.2943	2	0.071
	ALL	6.8189	4	0.146

Impulse Response. After exploring the forecasting property of the VAR model, the impulse response is applied to study the dynamic relationship between the variables. The basic concept of impulse response is that when the error term of one specific variable changes with other conditions unchanged, other variables will respond in the following periods. Figure 4 reports the results of the impulse response, and we can see that SOE policies respond differently to different variables. Generally, SOE policy responds positively to the impulse of all variables.

Specifically, for the impulse of SOE policy itself, SOE policy responds immediately in period 0 and decreases in an exponential way in the following period, reducing to zero around period 4. For the impulse of Ministry of Finance policy, SOE policy responds positively in period 1; however this reverses to negative in period 2 and then decreases to zero. For the impulse of People’s Daily mention of small enterprises, SOE positively responds in period 1, and remains this effect till period 3 and then decreases to zero. We can conclude that, compared to SOE policy and Ministry of Finance policy, People’s Daily mention of small enterprises tends to have a more lasting effect, although the magnitude is smaller than SOE policy itself.

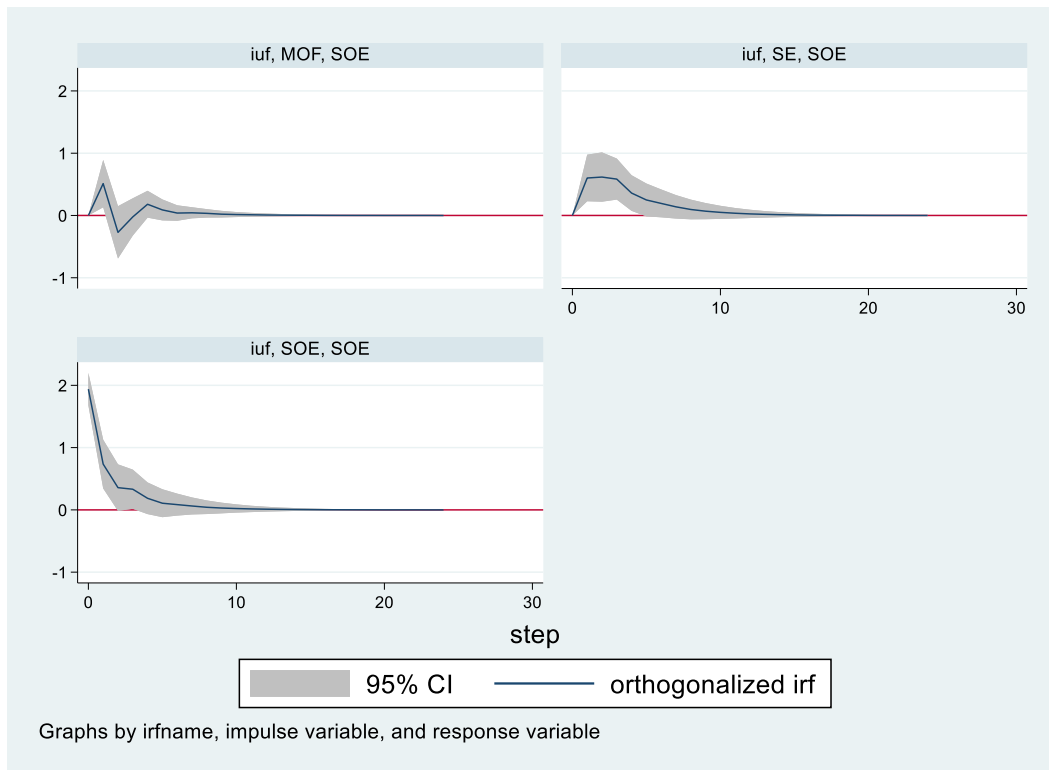


Figure4 The impulse response of SOE policy

Variance Decomposition. To study the relationship between different variables, variance decomposition assigns the variance of one specific variable on different variables, e.g., how one variable' change can be explained by other variables. Figure 5 reports the results of variance decomposition of SOE policy incidence. As shown in the figure, the variance decomposition of SOE policy incidence can be explained by these three variables. In the short run (period 0), 87% of SOE policy variance can be explained by itself, Ministry of Finance policy (5%) and People's Daily mention of small enterprises (7%). While in the long run (period 24), 73% of SOE policy's variance can be explained by itself, Ministry of Finance policy (6%) and People's Daily mention of small enterprises (21%). So, in the long run, consensus building process seems to matter more than agenda-setting channel in explaining the SOE policy incidence.

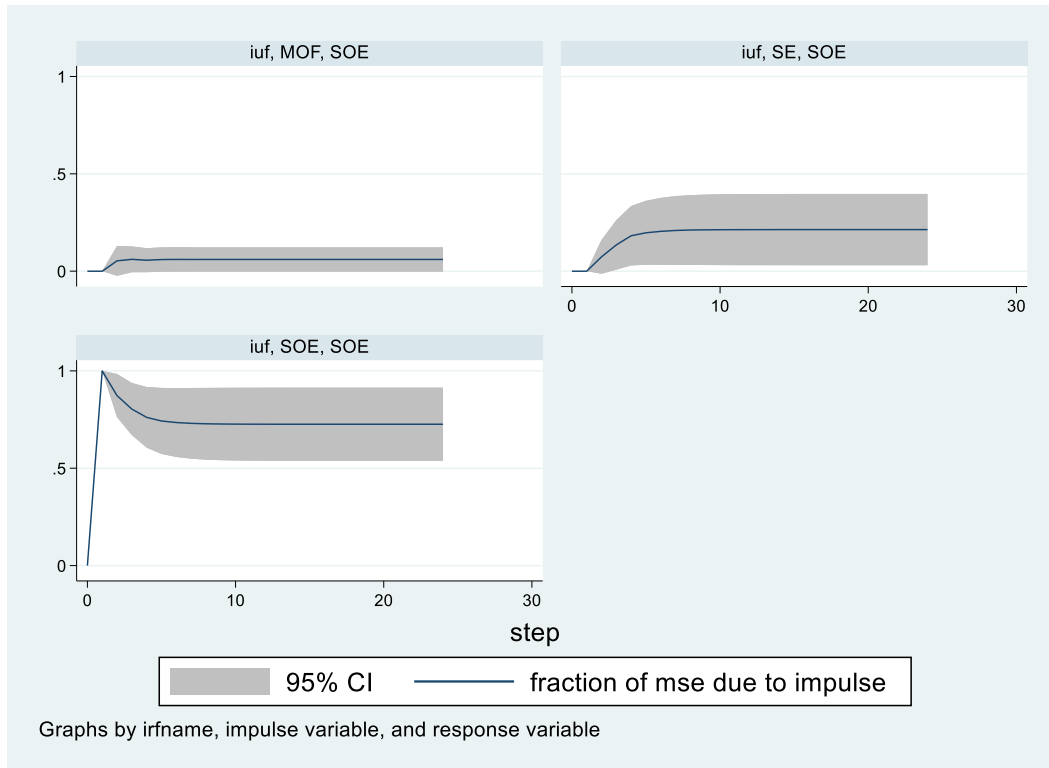


Figure5 The variance decomposition of VAR model

Discussion and Conclusion

We use the VAR model to explore the relationship between SOE policy incidence, Ministry of Finance policy and People's Daily mention of small enterprises. This paper reveals that the SOE policy is predictable by its own lags as well as the other variables, Ministry of Finance policy and People's Daily mention of small enterprises. In the short run the agenda-setting channel seems to matter more than consensus building process, while in the long run consensus building matters more. For enterprises, the predictability of SOE policy can reduce the economic policy uncertainty and hence bring them great reduction in costs.

The results show a strong autocorrelation within SOE policy creation. SOE policy creation is likely on a downward trend because China's economy and policy environment are maturing, with less need for further regulations. This does not mean that future SOE policies are not significant; some of the most impactful SOE regulations, such as the SOE mixed ownership policy, were created in more recent years.

Due to data limitations, we faced challenges in drilling down further into exploring the factors contributing to specific types of SOE policies made. As more data is collected, under the growing use of big data and machine learning, we expect to have a better ability to predict specific types of SOE policies.

We also note that there are several caveats to this type of analysis. One is that data trends change over time, and that this type of analysis needs to be applied to time series data regularly to understand how new or different variables may play a role in predicting policies. Another is that not all data is available; if researchers had access to all points of economic, political, and social data, predicting policies would become much easier. One way to overcome this lack of data is to mine existing data such as media resources manually or using natural language processing.

Our findings underscore the characteristic of state-owned enterprises as agents of the state, as it is Ministry of Finance policies and government-run newspaper articles that telegraph new policies. This is a somewhat indirect process, since the Ministry of Finance is a department that does not directly set the agenda of state-owned enterprises, but it does represent the overall trajectory of government macroeconomic and fiscal policy, both of which guide the daily functioning of state owned enterprises. People's Daily mention of small enterprises may impact the incidence of SOE policies by acting as a proxy for people's concern for small firms, which are sensitive to the economic environment.

Interestingly, Chinese SOE policymaking is not dependent on macroeconomic or microeconomic as is Chinese policymaking for other bodies (we have found). This is not something that we would have expected, and policymaking/ SOE theory does not include such indicators as relevant.

This represents a new area of research that will help to reduce uncertainty. We expect that analysis of China's policy influences will apply, to some extent, to other countries. It is likely that other countries respond to economic conditions or social trends by creating policies. Determining which policies will be implemented in the near future can help companies and governments plan investments and regulations going forward.

China's policy-making landscape is unique, as regulations are top-down. Even though there are feedback loops between the policy and economy, there is little to no bottom-up policymaking. This means that determinants of Chinese policies are unique to China, and are unlikely to be exactly the same as in other countries.

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