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Contributions of Growth in State-owned and Private-owned Firms to the Economy in China

Gaolu Zou[1,*], Jiang Ling[2], Wang Jingru[2], Xiao Wuhe[3]

[1,*]School of Tourism and Economic Management, Chengdu University, Chengdu, China

[2]Tourism Management Speciality 2014-3, School of Tourism and Economic Management, Chengdu University, Chengdu, China

[2]Tourism Management Speciality 2014-3, School of Tourism and Economic Management, Chengdu University, Chengdu, China

[3]Tourism Management Speciality 2013-1, School of Tourism and Economic Management, Chengdu University, Chengdu, China

Abstract: **Efficient firms may contribute more to aggregate industrial growth than inefficient. This paper takes the growth of China's state-owned, private and foreign firms' value added as a case. Data were monthly changes for 2006-2017. The study tested for differentials of the contribution of three types of firms to aggregate industrial growth. Variables contained a unit root but not cointegrated. A first-differenced VAR(4) was estimated. Significant findings are that the value added in private, foreign and state-owned firms increased by 1%, total industrial value added grew by 1.06%, 0.70% and 0.39%, respectively. Although private firms held the smallest asset size, private enterprises contributed most to industrial growth in China. State-owned firms held the largest asset size but contributed the least to industrial growth. State-owned firms have the highest share of lost firms and the smallest profits compared with private and foreign firms. This study supplies new evidence for the greater efficiency of private firms (including foreign firms) than that of state-owned firms.**

Keywords: **Industry, growth, state, private, foreign, firm.**

I. INTRODUCTION

China's industrial firms largely contain state-owned, private and foreign firms. The total amount of state-owned firm assets was RMB 41.77 trillion in 2016 [1]. Private and foreign firms held RMB 23.95 and 21.27 trillion, respectively. Hence, state-controlled firms account for a considerable share of the industry regarding aggregate assets.

Government monopolised firms are regarded as lower efficient firms. Non-state-owned firms have greater efficiency than state-owned firms [2, 3]. This article aims to test for the differential effects between state-owned, private, and foreign firms on total industrial growth in China. Empirical evidence may be used to assess the efficiency of various firms further.

II. METHODOLOGY

Unit root tests applied the ADF, PP, and DF-GLS tests. [4-12]. Cointegration test applied the Engle-Granger and Johansen trace methods [13-16]. A VAR was constructed and estimated for an $I(1)$ but not cointegrated variables.

III. DATA

Data contained four monthly time series. Total industrial valued added growth (*Industrial IVA*) contains three components: Growth of state-owned industrial valued added (*State IVA*), private industrial valued added (*Private IVA*), and foreign industrial valued added (*Foreign IVA*). Data was collected from the National Bureau of Statistics of China [17]. Table 1 presents details of the data. Figure 1 plots the four series variables.

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TABLE I: DESCRIPTIVE STATISTICS

Definition	**National industrial value added growth (% onwards from Jan)**	**State-owned industrial value added growth (% onwards from Jan)**	**Private industrial value added growth (% onwards from Jan)**	**Foreign industrial value added growth (% onwards from Jan)**
Variable	*Industrial IVA*	*State IVA*	*Private IVA*	*Foreign IVA*
Period	2006-2017			
Frequency	Monthly			
Seasonal adj.	X12 (additive)			
Logarithm	Yes			
Mean	11.48	7.79	16.50	9.52
Median	9.92	6.39	16.84	7.59
Maximum	21.08	21.38	27.65	20.72
Minimum	4.20	-1.16	5.81	-3.16
Std. Dev.	4.61	5.08	6.68	5.66
Skewness	0.26	0.28	0.03	0.34
Kurtosis	1.59	2.36	1.71	1.98
Jarque-Bera	13.49	4.44	9.99	9.00
Probability	0.00	0.11	0.01	0.01

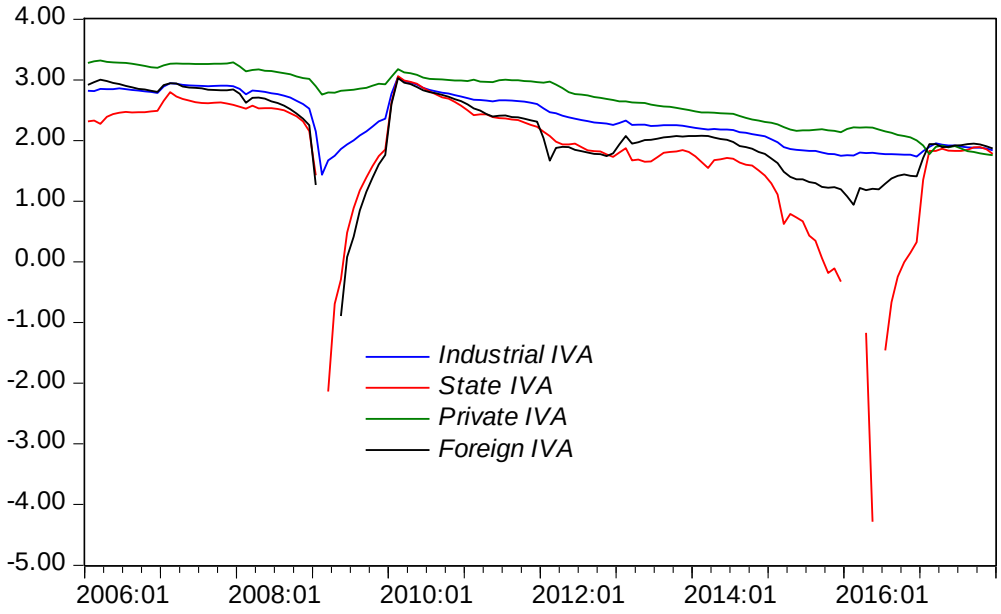

FIG. 1. MONTHLY GROWTH IN CHINA'S INDUSTRIAL VALUE ADDED (IVA) (2006-2017)

IV. EMPIRICAL RESULTS

Four variables could be approximated by a unit root (Table 2).

The Engle-Granger test indicated no cointegration (Tables 3). Allowing for a small sample, the Johansen test also indicated no cointegration (Tables 4). Thus, the four variables were not cointegrated.

Hence, VARs in first differences were estimated. Regarding the effect of various industrial value added changes on total industrial value added (Table 5, column 2), while *State IVA* grew by 1%, *Industrial IVA* grew by 0.39%. While *Private IVA* grew by 1%, *Industrial IVA* grew by 1.06%. While *Foreign IVA* grew by 1%, *Industrial IVA* grew by 0.70%.

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TABLE II: THE UNIT ROOT TESTS

Variable	***k***	**Level**	***k***	**First difference**	***k***	**Second difference**
		ADF				
Industrial IVA	12	-2.53	11	-5.29***		
State IVA	11	-3.08	11	-5.49***		
Private IVA	3	-3.18	2	-5.37***		
Foreign IVA	12	-2.77	11	-5.01***		
Industrial IVA	2	-2.83	2	-5.29***		
State IVA	12	-2.14	2	-5.02***		
Private IVA	2	-2.50	7	-2.65	13	-2.19
Foreign IVA	2	-2.52	9	-2.85	0	-13.71***
Industrial IVA	5	-2.82	3	-7.27***		
State IVA	5	-2.73	2	-6.89***		
Private IVA	5	-2.69	0	-8.61***		
Foreign IVA	5	-2.61	3	-7.47***		

Notes: Lag *k* was chosen by *t*-Statistic for ADF tests [6], modified AIC for DF-GLS tests, and the Newey-West method for PP tests [18]. Figure 1 shows that series were mean nonzero and may contain a trend; hence, test equations contained the trend and constant [19, 20]. **, ***denotes rejection of a unit root at the 5% and 1% levels, respectively.

TABLE III: THE ENGLE-GRANGER TESTS

Log dependent variable	z_α	***P*-value***
Industrial IVA	-7.30	0.91
State IVA	-8.51	0.88
Private IVA	-12.92	0.65
Foreign IVA	-10.05	0.81

Notes: Test equations included the trend and constant. Lag was decided using the modified AIC. *denotes MacKinnon *P*-values [21].

TABLE IV: THE JOHANSEN COINTEGRATION TRACE TEST

r	***k***	**Trace**	**5% O-L***	***P*-value****	**C-L*****	**Reinsel-Ahn********
0	3	65.20	63.88	0.04	69.09	58.41
≤1		27.33	42.92	0.66	46.42	24.48
≤2		11.70	25.87	0.83	27.98	10.49
≤3		3.03	12.52	0.87	13.54	2.71

Notes: Hypothesis 4 in the Johansen test was used [14, 22]. *k* was chosen using AIC, while considering serial correlations. Portmanteau *Q* for up to lag 4=14.54 (*P* = 0.97). *Osterwald-Lenum 5% asymptotical critical values [23]. **MacKinnon-Haug-Michelis (1999) *P*-values [24]. ***Cheung-Lao 5% finite-sample critical value [25]. ****Reinsel-Ahn finite-sample trace corrections [26].

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TABLE V: ESTIMATES OF VARS IN FIRST DIFFERENCES

	Industrial IVA	***t***	***State IVA***	***t***	***Private IVA***	***t***	***Foreign IVA***	***t***
Industrial IVA$_{t-1}$	2.01*	3.28	1.21	1.50	1.26*	2.97	1.15	1.26
Industrial IVA$_{t-2}$	0.32	0.38	-0.44	-0.41	-0.34	-0.59	1.32	1.07
Industrial IVA$_{t-3}$	-1.61*	-2.05	-0.81	-0.78	-0.91*	-1.68	-2.93*	-2.51
Industrial IVA$_{t-4}$	0.02	0.03	-0.29	-0.37	-0.19	-0.48	0.25	0.29
State IVA$_{t-1}$	0.01	0.07	1.15*	4.47	-0.15	-1.13	0.09	0.32
State IVA$_{t-2}$	-0.29	-1.06	-0.56	-1.56	-0.01	-0.05	-0.50	-1.24
State IVA$_{t-3}$	0.39*	1.62	0.52*	1.66	0.17	1.03	0.68*	1.91
State IVA$_{t-4}$	-0.02	-0.13	-0.06	-0.27	0.08	0.62	-0.15	-0.58
Private IVA$_{t-1}$	-0.54*	-1.72	-0.91	-2.21	0.66*	3.04	-0.80*	-1.73
Private IVA$_{t-2}$	-0.06	-0.15	0.67	1.22	-0.23	-0.79	-0.15	-0.25
Private IVA$_{t-3}$	1.06*	2.61	0.59	1.09	0.77*	2.74	1.58*	2.60
Private IVA$_{t-4}$	-0.37	-1.28	-0.22	-0.58	-0.15	-0.76	-0.55	-1.27
Foreign IVA$_{t-1}$	-0.18	-0.70	-0.13	-0.40	-0.45*	-2.54	0.90*	2.38
Foreign IVA$_{t-2}$	-0.50	-1.38	-0.28	-0.60	0.07	0.27	-1.22*	-2.27
Foreign IVA$_{t-3}$	0.70*	1.95	0.42	0.89	0.35	1.40	1.31*	2.45
Foreign IVA$_{t-4}$	-0.02	-0.09	0.04	0.13	0.04	0.21	-0.07	-0.20
Error	0.70	1.75	0.76	1.44	0.47	1.71	0.87	1.46
R-Squared	0.98		0.97		0.99		0.96	
Adj. *R*-Squared	0.97		0.96		0.99		0.96	
Sum Sq. Resids	69.54		119.86		33.15		153.73	
S.E. Equation	0.75		0.99		0.52		1.12	
F-Statistic	315.05		226.94		1362.59		200.89	
Log Likelihood	-149.67		-187.78		-97.82		-205.20	
Akaike Aic	2.38		2.93		1.64		3.17	
Schwarz Sc	2.74		3.28		2.00		3.53	
Mean Dependent	11.32		7.72		16.20		9.24	
S.D. Dependent	4.58		5.13		6.52		5.48	

Notes: Lag *k* was chosen using AIC, while taking serial correlations into account. Portmanteau *Q* for up to lag 5=23.36 (*P* = 0.10). *denotes statistically significant estimates.

V. CONCLUDING REMARKS

This paper argues that efficient firms contribute more to industrial growth than inefficient. China's firms are mostly composed of state-owned, private and foreign types. State-owned firms hold the largest assets, and foreign firms and private firms follow.

The study tested for differentials of the contribution of three types of firms to aggregate industrial growth in China. It estimated the first-differenced VAR. There was a three-month lagged effect of state-owned, private and foreign firms on total industrial growth. A 1% increase in private, foreign and state-owned firms may suggest the 1.06%, 0.70% and 0.39% growth in industrial value added. Therefore, private firms contributed most to the total industrial growth, and foreign and state-owned firms' contribution followed. In 2015, the share of lost state-owned firms, foreign firms and private firms was 30%, 20% and 10%, respectively [1]. Total profits of private firms were RMB 2.43 trillion. Total profits of foreign firms were RMB 1.59 trillion. Total profits of state-owned firms were only RMB 1.14 trillion. Hence, holding the smallest asset size and the largest profits, private firms contributed most to industrial growth in China. State-owned firms contributed the least although they hold the largest asset size.

Overall, either private or foreign (private owned in fact) firms have greater efficiency than state-owned.

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