Emerging Markets Review 36 (2018) 110–129

Contents lists available at ScienceDirect

Emerging Markets Review

journal homepage: www.elsevier.com/locate/emr

Government connections and the persistence of profitability: Evidence from Chinese listed firms☆

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ARTICLE INFO

Keywords:
Government connections
Mean reverting
Profitability
State control
Politically connected executives

ABSTRACT

We find that state owned enterprises (SOEs hereafter) have lower (higher) mean-reverting rates when profitability is better (worse) than the norm; while non-SOEs with politically connected executives have lower (higher) mean-reverting rates when profitability is extremely better (worse) than the norm. In addition, SOEs controlled by the central government have lower mean-reverting rates than those controlled by local governments. Our results are robust to a series of robustness tests and a test using alternative measures of profitability. We argue that government connections help firms maintain a relatively competitive advantage and thus have an important influence on mean-reverting patterns of profitability for Chinese firms.

1. Introduction

The topic of persistence of profitability derives from economic competition theory, which presumes that, if a market is efficient and competitive, profit above or below the norm should quickly vanish. This is because market competition works to bring all returns back to competitive levels, through driving investment away from unprofitable firms and flowing into profitable firms. This means that corporate profitability should follow a mean-reverting pattern in a competitive market. Empirical evidence has provided substantial proof of the mean-reverting process of profitability of firms for a number of countries, including the US, UK, Norway and China.[1] However, there is still a lack of evidence for how the mean-reversion pattern is impacted by the competitive advantages of firms that are created by their strategic resources, such as government connections (including both state control and politically connected executives).

Previous studies have documented that the phenomenon of political connections is widespread (Faccio, 2006). Firms with government connections tend to receive preferential treatment in accessing various resources, such as better access to bank loans, lower bank borrowing costs, being more likely to receive government bailouts, favourable tax treatment, and even having better access to the equity financing market.[2] Therefore, government connections serve as important political capital for connected firms. We argue that, according to resource-based theory, government connections can be considered as a valuable resource as they create a

☆ Qigui Liu acknowledge the financial support from the National Natural Science Foundation of China (Grant No. 71702163).
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[1] Fama and French (2000) find a mean-reversion rate of around 38% per year in the US, and Allen and Salim (2005) report a rate of 25% in 987 UK listed firms. Bjørn and Bjørn and Næs (2010) find evidence of a mean-reversion rate of 44% per year for unlisted Norwegian firms. Jiang and Kattuman (2010) document an average mean-reverting rate of 55% in listed Chinese firms over a 11-year period to 2005.

[2] See, for example, Li et al. (2009), Agrawal and Knoeber (2001), Khwaja and Mian (2005), Claessens et al. (2008), Faccio (2006), Faccio et al. (2006), Li et al. (2008), Liu et al. (2013), and Bradshaw et al. (2013).

https://doi.org/10.1016/j.ememar.2018.04.002
Received 27 April 2017; Received in revised form 27 March 2018; Accepted 3 April 2018
Available online 07 April 2018
1566-0141/

competitive advantage over other firms. Empirical evidence also shows that state ownership and political connections have an important influence on firm value.[3] However, most previous studies focus on the cross-sectional analysis of firm value or performance, and reach opposite conclusions. Less attention has been paid to the issue of whether government connections have any impact on the time-series properties of profitability, that is, the impact of government connections on the persistence of abnormal profit. We argue that the traces of movement in profitability along a time series capture the value of government connections more appropriately. Moreover, although firms of all types tend to follow the mean-reverting pattern in a competitive market, the mean-reverting rate may differ because firms with government connections may have a competitive advantage compared to other firms, at least in short term. For example, according to resource-based theory, government connections bring additional financial resources and competitive advantage to firms, thus we may observe that positive (negative) abnormal profitability should persist for a longer (shorter) period of time in those firms. In this study, we aim to fill this gap in the current literature, and provide empirical evidence using a sample of Chinese listed firms.

Compared to prior studies that examine state ownership using a broad set of European firms (Borisova and Megginson, 2011) and US banks (Bayazitova and Shivdasani, 2012), this study takes advantage of Chinese listed firms. This is because an institutional environment with the following characteristics is necessary to conduct the present study: firstly, government intervenes in the economy and plays an important role in listed firms, hence firms' government connections are considered valuable; and secondly, overall the market is competitive. The emerging market of China provides us with an ideal environment to conduct our study. After 30 years of economic reform, China has transferred from being a regulated economy to a market economy. It has established a competitive market and direct government intervention has been greatly reduced. Firms in the Chinese market nowadays have equal access to the resource market, for instance they can freely apply for loans and choose projects to invest in. Therefore, firms with government connections are expected to be less likely to enjoy persistent competitive advantage over firms without such connections. Although direct government intervention has been minimized, the literature has shown that firms with government connections, through either state ownership or politically connected managers, can always obtain favourable terms and treatment, bringing competitive advantage to connected firms over firms without such connections. However, these competitive advantages are assumed to be short-lived, for the following reasons: (1) the provision of indirect favourable government treatment has become more expensive over time and has attracted criticism as the overall market environment has become competitive. Therefore, the government has attempted to limit such favourable treatment, to some extent. Government support is frequently observed when connected firms have bad or extremely bad performance, resulting in a faster mean-reverting rate in these connected firms compared with firms without government connections. (2) Government connections, especially the ones through politically connected managers, in our context, are a valuable asset to connected firms. This type of government connection can be replicated, although this is not easy and takes long time; therefore, over time some firms may establish political connections and other firms lose political connections for various reasons. Hence, we expect that government connections in China could not bring persistently abnormal profitability to those connected firms, which means firms with government connections should also follow a mean-reverting pattern. However, because government connections bring competitive advantages to connected firms, even though these are short-lived, we expect that connected firms retain positive abnormal profitability for a longer period of time and recover more quickly from poor profitability.

We first conduct our estimation by applying Fama and French's (2000) partial adjustment model to investigate whether the mean-revering rate (speed) and pattern differ between firms with and without government connections, using a sample of firms from 2002 to 2010. We select this research period starting from 2002 because China joined the World Trade Organisation (WTO) in 2001, and since then the Chinese market has been widely identified as being a more competitive market than previously. We find that the overall mean-reverting rate of Chinese listed firms is about 70.05%. This suggests that the profitability of Chinese firms can close more than two-thirds of their deviation from the mean within one year. There is no significant difference between the mean-reverting rate of SOEs (71.80%) and non-SOEs (68.04%). However, the non-linearity and asymmetry in the mean-reverting processes are significantly different for SOEs and non-SOEs. In particular, the profitability of SOEs tends to rebound more quickly when it is below the expected value, and reverts to the norm at a lower rate when profitability is above the norm. Our findings indicate that SOEs have the ability to maintain a superior performance once they have performed better than the predicted company-specific mean level, and they can recover more quickly from poor performance; whereas non-SOEs find it harder to maintain their competitive advantage in the market than do SOEs.

We further examine the mean-reverting rate of firms with and without politically connected executives. We find that the mean-reverting rates of SOEs with and without politically connected executives are similar; whereas, unlike non-SOEs without politically connected executives, non-SOEs with politically connected executives tend to recover from extremely poor performance more quickly. In sum, although the Chinese market is competitive, non-SOEs could establish a competitive advantage by employing a politically connected executive.

In addition, we investigate whether the mean-reverting rates between central government-controlled SOEs and local government-controlled SOEs differ. Our findings show that the average mean-reverting rate of local government-owned firms is significantly higher than that of central government-owned firms. Furthermore, we find that SOEs controlled by the central government have a very slow mean-reverting pattern when their profits are better than the norm. These results are reasonable, given that SOEs controlled by local governments are subject to much more intense competition than are those controlled by the central government.

[3] For example, Chen et al. (2011a, 2011b), Fisman (2001), Johnson and Mitton (2003), Li et al. (2008), and Ramalho (2007) provide evidence from various countries that politically connected executives improve firm value. Fan et al. (2007) find that politically connected executives in Chinese state-owned firms have lower post-IPO performance, while Chaney et al. (2011) find that politically connected firms have worse profit quality.

Our additional tests confirm that government connections do bring benefits to connected firms, and are helpful for firms to overcome the negative effect from the global financial crisis; thus, firms with government connections are more likely to survive (less likely to receive "special treatment"). Our results are robust when we use cash flow from operation as an alternative measure of profitability.

By examining the mean-reverting rate of Chinese listed firms, this study makes the following contributions to the literature. Firstly, previous studies on government connections (state control and political connections) mainly focus on how government connections affect firm value/performance based on cross-sectional analyses. Our study extends the literature by examining the effect of government connections on the time-series change in firms' performance. Our results confirm the value of government connections in an emerging market such as China, by providing additional evidence that, although the Chinese market is competitive overall, SOEs and non-SOEs with politically connected executives can still enjoy competitive advantages that enable them to maintain positive abnormal profitability for a longer period and to recover from negative abnormal profitability more quickly. Therefore, this study makes a substantial contribution to the literature on the value of government connections in emerging markets. In addition, although the time-series properties of profitability have been documented by previous studies, our study extends the literature by providing evidence that the mean-reverting rates of SOEs and non-SOEs on the one hand, and firms with and without politically connected executives on the other hand, differ. The dual role played by the Chinese government, as owner of SOEs and as the regulator, is attracting increasing criticism. This study provides direct evidence that, although China has established a generally competitive market in the post-WTO period, SOEs and firms with politically connected executives still enjoy a competitive advantage because the government still intervenes in the economy. Thus, proper measures that could minimize government intervention would assist overall market competition and create a fairer and more competitive environment.

The remainder of this paper is organized as follows. Section 2 reviews prior literature and develops testable hypotheses. Section 3 examines the association between the mean-reversion pattern of profitability and government connections. Section 4 presents and discusses the additional empirical analyses; and Section 5 concludes the paper.

2. Literature review and development of hypothesis

2.1. Related literature

This study relates to two main strands in the literature: the time-series properties of profitability; and the effect of government connections on firm performance. The first strand of literature, built upon economic competition theory, suggests that profits usually follow a mean-reverting trend, under the assumption that the market is competitive. The first paper that documented the mean-reverting trend of profit is Mueller (1977), which examines the persistence of excess profits and finds that profitability tends to converge over time. Similar findings are documented in subsequent studies, for example: Geroski and Jacquemin (1988) use a stochastic persistence model on European data; Goddard and Wilson (1999) use a sample of UK manufacturing firms; and Schohl (1990) uses the polynomial convergence model and the partial adjustment model on German firms. More recently, Fama and French (2000) propose a cross-sectional estimation approach, and argue that it is more advantageous than other statistical models. They find that the profitability of US companies reverts to the mean at a rate of 38% per year. Following the approach of Fama and French (2000), Allen and Salim (2005) find that the mean-reversion of profitability in the context of UK firms is 25%; while Bjørnand and Bjørn and Næs (2010) provide evidence of a mean-reversion pattern of profitability among Norway's non-listed firms.

Although the aggregate time-series behaviour of profitability follows a mean-reversion process, researchers find that a number of firms experience above-average profits that may persist over time (Bourlakis, 1997; McGahan and Porter, 1999, 2003). Prior literature focuses on industry-level factors, such as industry structures, the segment influence, and the barriers to entry and exit, and finds that they are associated with the sustainability of superior performance over a longer time period (Cable and Mueller, 2008; Kambhampati, 1995; McGahan and Porter, 1999, 2003). Other researchers apply resource-based theory to investigate the effect of corporate and business-specific factors on the dynamics of abnormal performance. As an example, Roberts and Dowling (2002) show that firms with a good corporate reputation have a greater chance of sustaining a superior performance over time.

The second strand of literature studies the impact of government ownership and political connections on the level of firm performance, but reaches inconclusive results. One research stream views government ownership and political connections as valuable resources for firms (the resource-based theory), because they can help firms attain economic benefits in the form of bank loans, lower-cost financing, preferential government policies, favourable tax treatment, government bailouts in cases of financial distress, and preferential access to the equity market (Li et al., 2009; Firth et al., 2009; Li et al., 2008; Faccio et al., 2006; Faccio, 2009; Liu et al., 2013). According to resource-based theory, government connections are associated with better performance. For example, Goldman et al. (2009) find that, in the United States, the market views the political connections of board directors as creating value for the firm. Similarly, Cooper et al. (2010) examine firms' contributions to United States political campaigns from 1979 to 2004 and their future equity returns, and document a strong correlation between their contributions and future returns. Research conducted on other countries (Chen et al., 2011, 2011; Fisman, 2001; Johnson and Mitton, 2003; Li et al., 2008; Ramalho, 2007) lends support to the value-creating effect of government connections. On the other hand, another research stream views government connections as being detrimental to firm performance. Governments utilize their control over the connected firms to pursue social objectives or private gain at the firms' expense, which therefore decreases firm performance (Fan et al., 2007; Chen et al., 2011, 2011).

To sum up, although previous studies have examined both the mean-reverting properties of profitability and the implication of government connections in the corporate finance area, there is a lack of evidence for whether government connections have an impact on the time-series properties of firm profitability. This study seeks to fill this gap by examining how government connections influence the dynamic change in firm profitability over a longer time period.

2.2. Development of hypotheses

2.2.1. The mean-reverting of profitability in China

Over the past three decades, the Chinese economy has gradually been transformed from a centrally planned to a market-oriented economy. During this process, the government has encouraged entrepreneurs to set up privately owned firms, and promoted an open-door policy that fosters foreign investment into business enterprises. The Chinese market has become increasingly competitive, particularly after 2001 when China joined the WTO and introduced global market competition into the domestic market. The Chinese government has also retreated from most fully competitive industries to facilitate market competition with minimized political intervention. Although SOEs still have an enormous influence in some industries, they operate to maximize economic interests (just like foreign firms and privately owned firms) and compete with their peers under the same market rules. Market forces have become the main determinant of price formation and economic behaviour (Conway et al., 2010). Therefore, it is reasonable to expect an overall competitive market in China. If market competition is intense, the flow of resources into firms earning excess profits and the flow of resources from firms earning less-than-normal profits will eventually bring all the profits to a competitive level. Hence, we expect that the aggregate profitability of Chinese firms should follow a mean-reverting process. However, as per our discussion in the following section, the mean-reversion rate may vary among firms because some firms may establish relative competitive advantage through controlling key internal resources.

2.2.2. Government connections and the mean-reverting of profitability of Chinese firms

Resource-based theory considers a firm's distinctive and valuable internal resources and capabilities as being the best source of competitive advantage over other firms: to the extent that these resources are unique and stable over time, they could be used to develop a sustained competitive advantage, which in turn helps firms maintain a superior abnormal profit for a longer period (Barney, 1991).

Government connections, in the form of government ownership and politically connected executives, could be a valuable resource for a firm, particularly in China, where the government's influence on the economy is still prevalent and the government still controls most of the financial resources.

There are two reasons that SOEs are more likely to gain supporting resources from the central and local governments. Firstly, the Chinese banking system is dominated by state-owned commercial banks (SOCBs) with organizational structures and administrative styles similar to those of SOEs, an inheritance from the centrally planned economy. State-owned commercial banks have maintained a much longer relationship with SOEs than with non-SOEs, so they are more likely to grant loans to SOEs. Secondly, the governments act as regulators that allocate the resources, and simultaneously are owners of SOEs. Therefore, governments prefer to distribute scarce resources to firms they own rather than to other firms. Moreover, SOEs assist to reduce the unemployment rate and retain a higher GDP growth rate, so government officials usually have a strong incentive to bail them out when they are in trouble. For instance, to alleviate the debt burden of SOEs, the Chinese government directly injected 360 billion RMB into SOEs from 1997 to 2000, and introduced monetary and statutory policies that include the reduction of the interest rates, and debt-equity swap and debt write-off (Sun and Tong, 2003). Empirical evidence has also documented how important government ownership is in obtaining resources from the government. Li et al. (2009) and Firth et al. (2009) document that firms with state ownership have better access to external financial resources; while Brandt and Li (2003) and Cull et al. (2009) find evidence that non-SOEs are discriminated against when applying for bank loans and have to resort to more expensive trade credits instead. If government connections can bring competitive advantage to SOEs, it is then reasonable to expect that SOEs are able to maintain superior profitability for a longer period and/or recover sooner from bad performance, compared to non-SOEs. Based on the above discussion, we develop the following hypothesis:

H1a. SOEs can maintain superior profitability for a longer period and recover sooner from poor performance than non-SOEs.

Similarly, politically connected executives, another type of government connection, can also bring competitive advantage to connected firms, because governments have more incentive to bail out firms with politically connected top executives in both developed and developing economies (Faccio, 2009; Johnson and Mitton, 2003). Firms with politically connected executives receive preference in bank loans, a lower cost of borrowing, government bailouts, and easier access to the equity market (Khwaja and Mian, 2005; Faccio et al., 2006; Faccio, 2006; Liu et al., 2013). Furthermore, prior studies assert that politically connected executives are more valuable in non-SOEs (Wu et al., 2012; Liu et al., 2013), because it is assumed that the value of politically connected executives is diluted in SOEs by the presence of government controlling shareholders. It is, therefore, expected that, compared to non-SOEs without politically connected executives, non-SOEs with politically connected executives are able to maintain superior profit for a longer period and/or recover from periods of poor performance more quickly; thus, we develop the following hypothesis:

H1b. Non-SOEs with politically connected executives will maintain superior profitability for a longer period and recover sooner from poor performance than non-SOEs without such connections.

3. Government connection and mean-reverting rate of profitability

In this section, we aim to provide empirical evidence to our main hypotheses through examining whether the mean-reverting rate of profitability varies across different groups of firms, especially firms with and without government connections.

3.1. Methodology

To estimate the degree of mean reversion among Chinese publicly listed firms, we use the partial-adjustment model developed by Fama and French (2000), where the change in profitability is explained by the deviation of profitability from its expected value and the first-order autocorrelation. In the Chinese context, this approach addresses the research question better because it preserves a large sample of firms and overcomes the survivor bias.[4] Following Petersen (2009) and Gow et al. (2010), we control the year and firm-fixed effects to control for cross-sectional correlation. The statistical models are specified in detail as follows.

The equation to explain the change in profitability for a firm from year t to year $t+1$ is:

$$ROA_{i,t+1} - ROA_{i,t} = \alpha + \beta \times [ROA_{i,t} - E(ROA_{i,t})] + \gamma (ROA_{i,t} - ROA_{i,t-1}) + \varepsilon_{t+1} \quad (1)$$

ROA is the return on total assets. It is used as a proxy for profitability and defined as the net profit before extraordinary items, but after taxes, relative to the year-end total assets. $E(ROA_{i,t})$ is the predicted value of profitability for firm i at year t, which will be discussed later.

To simplify the expression in the Eq. (1), $ROA_{i,t+1} - ROA_{i,t}$ is denoted by $\Delta ROA_{i,t+1}$ and $ROA_{i,t} - E(ROA_{i,t})$ is denoted by $DV_{i,t}$, from which we obtain the following Eq. (1a).

$$\Delta ROA_{i,t+1} = \alpha + \beta \times DV_{i,t} + \gamma \times \Delta ROA_{i,t} + \varepsilon_{t+1} \quad (1a)$$

The coefficient β in the equations captures the rate of mean reversion in profitability, while the lagged change in profitability accounts for potential autocorrelation over time. Apart from the specification in Eq. (1), we also run the regression without constraining the slopes of $ROA_{i,t}$ and $E(ROA_{i,t})$ with all other things being equal. The partial adjustment model predicts that the slope of $ROA_{i,t}$ will be negative and the slope for $E(ROA_{i,t})$ will be positive. With a small error in the prediction of $E(ROA_{i,t})$, the two slopes should have equal absolute values and also capture the mean reversion speed.

Eq. (1) assumes that each firm reverts towards its firm-year-specific expected profitability. To run the regression, we must first estimate the expected firm-year-specific profitability, denoted by $E(ROA_{i,t})$. Following prior literature, this study uses the following regression to capture the expected profitability:

$$\begin{aligned} ROA_{i,t} = {} & d_0 + d_1 \times V_{i,t} + d_2 \times DD_{i,t} + d_3 \times DVD_{i,t} + d_4 \times \ln(SALE_{i,t}) + d_5 \times \ln(CAPIN_{i,t}) + d_6 \times \ln(LEVERAGE_{i,t}) \\ & + d_7 \times \ln(EFFICIENCY_{i,t}) + d_8 \times GROWTH_{i,t} + d_9 \times SOE_{i,t} + d_{10} \times \mathrm{IND} + e_{i,t} \end{aligned} \quad (2)$$

$V_{i,t}$ is firm value divided by total assets at the end of year t. Firm value is the sum of the market value of equity and the book value of total liability. $DD_{i,t}$ is a dummy indicator equalling 1 for non-dividend payers and 0 for dividend-payers; and $DVD_{i,t}$ is the ratio of the dividend paid to the book value of common equity at the end of year t. Jiang and Kattuman (2010) argue that these three variables may not be enough to explain the cross-sectional variation in the Chinese context, and suggest to include additional variables in the model. Following their suggestion, we include: the log of net sales ($ln(SALE_{i,t})$) to account for firm size; the log of total accumulated depreciation to total assets ratio ($ln(CAPIN_{i,t})$) to capture the capital intensity; the log of debt to equity ratio ($ln(LEVERAGE_{i,t})$) to account for the capital structure; the log of total sales to total assets ($\ln(EFFICICENCY_{i,t})$) to capture operating efficiency; invested capital growth ($GROWTH_{i,t}$) to account for growth opportunity; a dummy variable ($SOE_{i,t}$) to indicate whether a firm is a state-owned enterprise (SOEs), to account for the potential difference in profitability between SOEs and non-SOEs (Sun et al., 2002; Wu et al., 2012); and finally, we include a series of industry dummy variables to control for the potential variation from industry. We then use the fitted values from the Eq. (2) as the value for $E(ROA_{i,t})$ to be used in Regression (1).

3.2. Sample selection and variable definition

To investigate how the rate of mean reversion of profitability is influenced by government connections, we use all the listed firms from 2002 to 2010, but exclude the following observations. Firstly, the financial industry is excluded because of the special accounting standards used by financial firms. Secondly, firms with a negative book value of equity are excluded, because Eq. (2) uses the book value of equity as a denominator. Including a negative book value of equity may bias the estimation. After applying these filtering criteria, the final sample consists of 11,799 firm-year observations from 2002 to 2010 (7851 SOEs and 3948 non-SOEs). A sample after 2001 is chosen because China entered the WTO in 2001 and opened its economy to foreign competition. The change in the business environment may have influenced the competitive intensity, and we are more interested in the Chinese market after the WTO. All the financial data used in this study are obtained from the CSMAR database.

SOEs are defined such that, if a firm's ultimate shareholder is a government agency, it is classified as a SOE, and if not, it is classified as a non-state-owned enterprise (non-SOE). The presence of government as an ultimate shareholder has been used by prior research investigating the impact of political connections (e.g. Sun et al., 2002). Connectedness with the government via ownership is assumed to be paramount and a more direct way of capturing political influence.

Government connections can also be established via a politically connected executive. Following Fan et al. (2007), if either the

[4] Two methodologies, i.e. time-series and cross-section approaches, have been used predominantly in the prior literature to capture the dynamics of profitability. However, time-series tests require a long profitability history, and usually at least 20 observations at the annual frequency to enhance the power of inference. The Chinese capital market opened in 1990 and began with a few listed firms, which means that there are only a few listed firms with a long history of performance available in China. An associated limitation is the survivor bias. The behaviour of profitability observed from long-term survivors may not represent the population.

Table 1
Sample distribution: test of mean-reversion pattern of profitability and government connection.

Panels A and B report sample distribution across different dimensions (year and industry). Panel A reports the number of firms within each industry group in each year over the period 2002–2010. The industry index is officially coded by the China Securities Regulatory Commission (CSRC). The total sample is classified into each industry, based on the reported top-level CSRC industry code. The industry codes are, 1: Agriculture; Forestry and Fishing; 2: Mining; 3: Manufacturing; 4: Electricity, Gas, and Water Production and Supply; 5: Construction; 6: Transportation and Warehousing; 7: Information Technology; 8: Wholesale and Retail Trade; 9: Real Estate; 10: Services; 11: Communication; 12: Multi-industry. Panel B gives sample distribution by owner identity, i.e., state-owned enterprises (SOEs) and non-state-owned enterprises (non-SOEs). SOE samples are further divided into central government-controlled SOEs (CSOE) and local government-controlled SOEs (LSOE). Both SOE and non-SOE samples are further divided into firms with personal political ties and firms without personal political ties.

Panel A: Sample distribution across industries and years

Year\Industry	1	2	3	4	5	6	7	8	9	10	11	12	Sum
2002	29	16	612	47	16	44	63	85	52	35	9	70	1078
2003	28	17	654	51	17	49	65	87	53	35	10	72	1138
2004	27	19	684	53	23	53	73	87	53	35	9	72	1188
2005	33	20	739	60	26	56	73	87	55	36	9	70	1264
2006	34	19	735	61	27	57	72	85	56	35	8	67	1256
2007	34	22	783	62	30	60	80	86	60	39	7	71	1334
2008	35	32	848	62	34	60	87	85	68	45	9	68	1433
2009	34	36	875	63	33	61	88	90	82	44	10	67	1483
2010	36	39	956	65	34	64	113	100	94	49	14	61	1625
Sum (%)	290 (2.46)	220 (1.86)	6886 (58.36)	524 (4.44)	240 (2.03)	504 (4.27)	714 (6.05)	792 (6.71)	573 (4.86)	353 (2.99)	85 (0.72)	618 (5.24)	11,799

Panel B: Sample distribution across ownership identity

Year	SOEs	Non-SOEs	SOEs		SOEs		Non-SOEs	
	Total (%)	Total (%)	Central (%)	Local (%)	PC (%)	Non-PC (%)	PC (%)	Non-PC (%)
2002	861 (79.87)	217 (20.13)	139 (16.14)	722 (83.86)	145 (16.84)	716 (83.16)	37 (17.05)	180 (82.95)
2003	865 (76.01)	273 (23.99)	141 (16.30)	724 (83.70)	181 (20.92)	684 (79.08)	59 (21.61)	214 (78.39)
2004	858 (72.22)	330 (27.78)	166 (19.35)	692 (80.65)	208 (24.24)	650 (75.76)	82 (24.85)	248 (75.15)
2005	898 (71.04)	366 (28.96)	168 (18.71)	730 (81.29)	208 (23.16)	690 (76.84)	80 (21.86)	286 (78.14)
2006	848 (67.52)	408 (32.48)	165 (19.46)	683 (80.54)	189 (22.29)	659 (77.71)	87 (21.32)	321 (78.68)
2007	865 (64.84)	469 (35.16)	167 (19.31)	698 (80.69)	178 (20.58)	687 (79.42)	87 (18.55)	382 (81.45)
2008	907 (63.29)	526 (36.71)	168 (18.52)	739 (81.48)	181 (19.96)	726 (80.04)	83 (15.78)	443 (84.22)
2009	901 (60.76)	582 (39.24)	175 (19.42)	726 (80.58)	167 (18.53)	734 (81.47)	83 (14.26)	499 (85.74)
2010	848 (52.18)	777 (47.82)	163 (19.22)	685 (80.78)	138 (16.27)	710 (83.73)	87 (11.20)	690 (88.80)
Sum	7851 (66.54)	3948 (33.46)	1452 (18.49)	6399 (81.51)	1595 (20.32)	6256 (79.68)	685 (17.35)	3263 (82.65)

Chairman or CEO of a firm currently works for or formerly served in the local/central governments, or is a deputy of the People's Congress or the People's Political Consultative Conference, firms are defined as being politically connected (PC). This measure of political connection has been widely used by researchers in both developed and developing economies (Boubakri et al., 2008; Liu et al., 2013; Faccio et al., 2006). For each sample firm, the profiles of CEO and Chairman of the Board of Directors are obtained from annual financial reports, and are used to identify whether they have a connection with government. Our study examines the effect of politically connected executives in the subsample of SOEs and non-SOEs separately, to identify whether such connections have a different impact on the mean-reverting of firms with and without government ownership.

3.3. Descriptive statistics and univariate tests

Table 1, panel A shows the sample distribution over industries and years from 2002 to 2010, represented by the number of firms. The sample increases from 1078 firms to 1625 firms over the years. Overall, 58.36% of the observations come from the Manufacturing industry (industry code 3), followed by 6.71% from the Wholesale and Retail Trade industry (code 8), while only 0.72% of the observations come from the Communication industry (code 11). To understand whether the sample selection process is biased towards certain industries, we check all the Chinese listed firms, and find that, over the years, Chinese listed firms have invariably been concentrated in the manufacturing industry. Thus, for robustness of our results, we later conduct a separate analysis using the sample of firms from the manufacturing industry; but for brevity, the results are not presented.

Panel B of Table 1 provides the yearly sample distribution of SOEs and non-SOEs. It shows that the proportion of SOEs decreases from 79.87% in 2002 to 52.18% in 2010, while the number of non-SOEs increases over the years accordingly. Overall, the declining trend in proportion of SOEs is consistent with the government's policy that SOEs gradually be privatized. More than 80% of the SOEs are ultimately controlled by local governments. Table 1, panel B also presents the yearly sample distribution of executive politically connected (PC) and non-politically connected (NPC) firms within the subsamples of SOEs and non-SOEs, respectively. The proportion of PC peaks in 2004 (24.24% for SOEs and 24.85% for non-SOEs) and then gradually declines after 2004 for both SOEs and non-SOEs, arriving at 16.27% for SOEs and 11.2% for non-SOEs in 2010. Overall, the proportions of PC in both SOE and non-SOE subsamples are relatively stable. These statistics provide implicit evidence that PC is difficult, if not impossible, to replicate in the short term. The process of establishing PC at executive levels may involve a high degree of causal ambiguity, which makes the competitors difficult to imitate. The statistics are similar to those reported in prior studies such as Wu et al. (2012), who also found a steady distribution of non-SOE firms with politically connected executives over the years from 1999 to 2006, with 27% on average.

The descriptive statistics of profitability, including the yearly cross-sectional mean, median, and standard deviation of profitability, are reported in Table 2. The results in panel A show that the profitability of the total sample varies over the sample period, with the lowest profitability of 0.66% in 2003 and the highest level of 5.58% in 2010. On average, SOEs perform better than non-SOEs during the years 2002 to 2006, but this has changed since 2007 when non-SOEs' profitability is much higher than that of SOEs. It is not surprising that, in the earlier sample period, the average performance of SOEs is better than that of non-SOEs, because during the initial process of privatization, only those SOEs with the best performance were transformed into publicly listed firms on the stock market. Later, however, with more weakly performing SOEs being listed on the capital market and increased competition from non-SOEs, the overall profitability of SOEs tends to decline.

Panel B of Table 2 reports the profitability for both local and central SOEs. In the earlier sample period, firms controlled by the central government perform better than those controlled by local governments, especially from 2002 to 2004; but again, this pattern appears to be diluted with more intense competition from the market. Starting from 2005, there is no significant difference of profitability between central and local SOEs. When we look at SOEs with and without PC, we find that, apart from 2004, there is no significant difference between these two subgroups. The same comparison within non-SOEs is presented in panel C. It is interesting to note that, in general, in our earlier sample period, non-SOE firms with PC perform better than non-SOEs without PC, although statistical significance is only observed in 2002 and 2003.

Table 3 presents the summary statistics for key variables in this study. The pooled mean, median, and standard deviations are calculated based on the total sample and two subsamples: SOEs and non-SOEs. In general, SOEs underperform non-SOEs in terms of ROA. For the total sample, the average scaled firm value (measured by the ratio of firm value to total assets) is 2.27, and on average 48% of the sample pays no dividend. For those firms that do pay a dividend, the value of dividend paid accounts for 1.91% of total book value of equity. Compared to SOEs, non-SOEs have a lower sales revenue, lower capital intensity and lower leverage, but have a higher scaled firm value, higher operating efficiency, and more growth opportunities. Non-SOEs are more likely to pay dividends, but the level of dividend paid (standardized by book value of equity) is much lower than for SOEs. The significant difference in these variables between SOEs and non-SOEs confirms the necessity to control for owner identity, i.e. SOEs and non-SOEs, in estimating the expected level of profitability in Regression (2).

3.4. Mean-reversion of profitability: SOEs versus non-SOEs

3.4.1. Linear regression analysis

We first estimate the magnitude of mean-reversion rate of profitability, and then proceed to test hypotheses that the mean-reversion rate of profitability is associated with government connections. To estimate the mean-reversion rate in general, we begin by estimating the Regression (2) in order to derive the expected profitability ($E(ROA_{i,t})$). Table 4 reports the average slopes from year-by-year regressions for expected profitability. The reported *t*-statistics are based on a two-way standard error estimation accounting for fixed-firm effect and fixed-time effect (Petersen, 2009). Consistent with prior research (e.g. Fama and French, 2000; Allen and

Table 2
Descriptive statistics on profitability.

Table 2 reports the cross-sectional mean (%), median (%) and standard deviation (%) of profitability along each year. It also reports a two-sample *t*-test assuming equal mean but with different variance for different subsamples. Panel A reports the total sample, SOE and non-SOE subsamples and t-statistics for these two subsamples. Panel B reports local government-controlled and central government-controlled within SOEs and firms with and without politically connected executives within SOEs. Panel C reports firms with and without politically connected executives within non-SOEs. *** indicates 0.01 significant level; ** indicates 0.05 significant level; * indicates 0.1 significant level.

Panel A: Total

	Total Sample	Non-SOEs				SOEs				
Year	Mean	*N*	Mean	Median	S.D.	*N*	Mean	Median	S.D.	*t*-Tests
2002	1.42	217	1.37	2.41	7.13	861	1.43	2.48	7.03	−0.11
2003	0.66	273	0.89	2.19	8.66	865	2.18	2.36	6.28	−2.68***
2004	1.34	330	0.36	2.03	9.85	858	2.22	2.33	6.57	−3.78***
2005	0.80	366	0.33	1.90	8.22	898	1.33	1.92	7.09	−2.17**
2006	1.84	408	1.85	2.27	8.92	848	2.64	2.40	5.14	−1.97*
2007	5.02	469	4.70	3.97	13.25	865	3.86	3.39	8.23	1.42
2008	3.31	526	3.20	2.93	7.24	907	2.01	2.29	7.36	2.95***
2009	3.26	582	3.94	3.65	6.98	901	2.58	2.67	6.49	3.80***
2010	5.58	777	5.50	4.49	10.63	848	3.95	3.11	6.85	3.52***

Panel B: SOEs

	Local				Central				
Year	*N*	Mean	Median	SD	*N*	Mean	Median	SD	*t*-Tests
2002	722	1.16	2.42	7.36	139	2.82	2.75	4.69	−2.56**
2003	724	1.89	2.26	6.53	141	3.69	3.38	4.52	−3.13***
2004	692	1.89	2.20	6.74	166	3.60	2.89	5.65	−3.01***
2005	730	1.21	1.88	7.08	168	1.86	2.45	7.13	−1.08
2006	683	2.57	2.32	5.08	165	2.88	2.56	5.39	−0.69
2007	698	3.74	3.27	8.80	167	4.34	3.66	5.18	−0.85
2008	739	1.93	2.19	7.50	168	2.40	2.63	6.72	−0.75
2009	726	2.72	2.70	6.56	175	2.02	2.57	6.20	1.28
2010	685	4.07	3.23	7.25	163	3.43	2.77	4.77	1.09
	NPC firms				PC firms				
2002	716	1.31	2.38	7.24	145	2.04	2.74	5.83	−1.14
2003	684	2.09	2.34	6.72	181	2.51	2.52	4.21	−0.79
2004	650	2.61	2.37	6.01	208	1.03	2.20	8.00	3.02***
2005	690	1.15	1.88	7.51	208	1.92	2.04	5.47	−1.37
2006	659	2.64	2.41	5.26	189	2.63	2.28	4.73	0.02
2007	687	4.08	3.55	8.55	178	3.00	3.02	6.81	1.57
2008	726	1.96	2.33	7.49	181	2.23	2.16	6.81	−0.45
2009	734	2.49	2.66	6.87	167	2.99	2.71	4.49	−0.91
2010	710	3.97	3.02	7.26	138	3.83	3.28	4.07	0.22

(*continued on next page*)

Table 2 (*continued*)

Panel C: Non-SOEs									
	NPC firms				PC firms				
2002	180	0.89	2.29	7.38	37	3.69	3.53	5.26	−2.19**
2003	214	0.36	2.05	9.46	59	2.82	2.60	4.24	−1.94*
2004	248	−0.10	1.84	10.56	82	1.75	2.73	7.16	−1.48
2005	286	0.10	1.85	8.58	80	1.14	2.31	6.77	−1.00
2006	321	1.61	2.19	9.27	87	2.72	2.55	7.48	−1.02
2007	382	4.29	3.84	9.48	87	6.50	4.48	23.53	−1.41
2008	443	3.27	2.94	7.33	83	2.82	2.87	6.74	0.52
2009	499	3.98	3.73	7.26	83	3.69	3.33	5.00	0.35
2010	690	5.60	4.64	11.11	87	4.68	3.36	5.58	0.76

Table 3
Summary statistics.

Table 3 gives pooled mean, median and standard deviation of key variables in this study for the whole sample and two subsamples: SOEs and non-SOEs. *ROA* is the return on asset and is used as a proxy for profitability. *V* is firm value, scaled by total assets. Firm value is calculated as the sum of the market value of equity and the book value of total liability. *DD* is a dummy indicator equalling 1 for non-dividend payers and 0 for dividend-payers, and *DVD* is the ratio of the dividend paid to the book value of common equity. ln(*SALE*) is the natural log of net sales, which is a proxy for firm size. ln (*CAPIN*) is the natural log of accumulated depreciation to total assets which is a proxy of capital intensity. ln (*LEVERAGE*) is the natural log of debt to equity ratio which is a proxy for capital structure. ln (*EFFICIENCY*) is the natural log of total sales to total assets which is a proxy for operating efficiency. *GROWTH* is invested capital growth following Liu et al. (2015) which is a proxy for growth opportunity. Two-sample *t*-test statistics assuming equal mean but with different variance for the two subsamples are reported. *** indicates 0.01 significant level; ** indicates 0.05 significant level; * indicates 0.1 significant level.

Variable	Total sample	Non-SOEs (N = 3948)			SOEs (N = 7851)			T
	Mean	Mean	Median	SD	Mean	Median	SD	
ROA(%)	2.65	3.03	3.07	9.55	2.46	2.54	6.89	3.75***
V	2.27	2.70	2.07	2.13	2.06	1.65	1.43	19.19***
DD	0.48	0.52	1	0.50	0.45	0	0.50	6.43***
DVD (%)	1.91	1.76	0	2.84	2.06	0.91	2.97	−5.22***
ln(*SALE*)	20.80	20.34	20.40	1.38	21.03	20.93	1.44	−24.85***
ln(*CAPIN*)	−1.98	−2.11	−1.95	0.69	−1.71	−1.79	0.58	−15.97
ln(*LEVERAGE*)	−0.03	−0.10	−0.03	1.00	0.00	0.05	0.91	−5.14***
ln(*EFFICIENCY*)	0.65	0.74	0.66	0.85	0.61	0.56	0.75	8.54***
GROWTH	0.19	0.28	0.09	1.63	0.07	0.11	1.79	2.11**

Table 4
Estimated parameters for explaining the level of profitability.

Table 4 reports the results from the regression shown below for explaining the level of profitability:

$ROA_{i,\ t} = d_0 + d_1 \times V_{i,\ t} + d_2 \times DD_{i,\ t} + d_3 \times DVD_{i,\ t} + d_4 \times \ln(SALE_{i,\ t}) + d_5 \times \ln(CAPIN_{i,\ t}) + d_6 \times \ln(LEVERAGE_{i,\ t}) + d_7 \times \ln(EFFICIENCY_{i,\ t}) + d_8 \times GROWTH_{i,\ t} + d_9 \times \mathrm{SOE} + d_{10} \times \mathrm{IND} + e_{i,\ t}$ (2).

$V_{i,\ t}$ is firm value, divided by total assets at the end of year *t*. Firm value is calculated as the sum of the market value of equity and the book value of total liability. $DD_{i,\ t}$is a dummy indicator equalling 1 for non-dividend payers and 0 for dividend-payers, and $DVD_{i,\ t}$ is the ratio of the dividend paid to the book value of common equity at the end of year *t*. $ln(SALE_{i,\ t})$ is the log of net sales at end of year *t* which is included for the effect of firm size. $ln\ (CAPIN_{i,\ t})$ is capital intensity measured as log of total accumulated depreciation to total assets ratio. $ln(LEVERAGE_{i,\ t})$ is the log of debt to equity ratio. *ln(EFFICIENCY)* is the operating efficiency as measured by log of total sales to total assets ratio. GROWTH is grow opportunity measured by invested capital growth following Liu et al. (2015). $SOE_{i,\ t}$is a dummy variable which takes the value of 1 if the firm is ultimately controlled by state-owned enterprises and 0 otherwise. *IND* is the industry dummy variable which takes value of 1 if a firm belongs to a relevant industry and 0 otherwise. The unparalleled panel data from 2002 to 2010 are used. T-values are calculated and given in parentheses. The reported mean and standard deviation for both dependent and independent variables in the regression are calculated as pooled mean and pooled standard deviation. *** indicates 0.01 significant level; ** indicates 0.05 significant level; * indicates 0.1 significant level.

	CONST	*V*	*DD*	*DVD*	*ln*(*SALE*)	*ln*(*CAPIN*)	*ln*(*LEVERAGE*)	*ln*(*EFFICIENCY*)	*GROWTH*	*SOE*	*IND*	Adj.R^2
Mean	−0.24***	0.01***	−0.02***	0.44***	0.01***	−0.01	−0.02***	0.01**	0.00	−0.01***	Included	0.27
t	(−16.94)	(4.65)	(−11.22)	(15.37)	(17.88)	(−6.57)	(−7.28)	(1.88)	1.42	(−4.36)		
	ROA	*V*	*DD*	*DVD*	*ln*(*SALE*)	*ln*(*CAPIN*)	*ln*(*LEVERAGE*)	*Ln*(*EFFICIENCY*)	*GROWTH*	*SOE*		
Mean	0.03	0.66	0.48	0.02	20.80	−1.98	−0.03	0.65	0.19	0.67		
S.D.	0.08	0.53	0.50	0.03	1.46	0.63	0.95	0.79	7.87	0.47		

Salim, 2005; Jiang and Kattuman, 2010), the total-assets-scaled firm value ($V_{i,\ t}$) is significantly positively related to expected profitability. Two dividend variables capture the variability in expected profitability. The coefficient of $DVD_{i,\ t}$ is 0.43 (t = 9.64), which suggests that a higher dividend level implies higher future profitability. The coefficient of $DD_{i,\ t}$ is −0.02 (t = − 6.32), which indicates that the relationship between profitability and dividends is non-linear, and the expected profitability of firms that do not pay dividends is 0.02 lower than what would have been predicted by the relationship between $ROA_{i,\ t}$and $DVD_{i,\ t}$.The absence of dividend payout signals the prospect of lower profitability.

Variables that are adopted to contextualize the model for China capture more of the firm-specific profitability. All of them have significant ability to explain the variation in profitability, except for capital intensity and growth opportunity. The positive coefficient on *ln*(*SALE*) indicates that large firms are associated with superior profitability, probably due to scales of economy and/or dominance. The negative coefficient on *ln*(*LEVERAGE*) suggests that higher risks arising from a higher leverage ratio lead to lower than expected profitability. As expected, operating efficiency and growth opportunity are both found to have positive effect on profitability, and the coefficient for the former is statistically significant. This result confirms that efficiency and growth are both important for profitability, and the former appears to play a more important role. The coefficient on SOE is negative, suggesting that the profitability of SOEs is lower than that of non-SOEs. This negative effect of government ownership on profitability is also found by Xu and Wang (1999) and Jiang and Kattuman (2010). Our result is different from that of Jiang and Kattuman (2010), where they identify considerable sectoral heterogeneity in profitability. The possible reason for the difference is that our sample covers only the post-

Table 5
Estimated parameters for explaining the change in profitability: SOEs and non-SOEs.

Table 5 reports the regression results for mean reversion in profitability:

$ROA_{i,\,t+1} - ROA_{i,\,t} = \alpha + \beta \times [ROA_{i,\,t} - E(ROA_{i,\,t})] + \gamma(ROA_{i,\,t} - ROA_{i,\,t-1}) + \varepsilon_{t+1}$ (1).

$\Delta ROA_{i,\,t+1} = \alpha + \beta \times DV_{i,\,t} + \gamma \Delta ROA_{i,\,t} + \varepsilon_{t+1}$ (1a).

$\Delta ROA_{i,\,t+1} = \alpha + \beta_1 \times ROA_{i,\,t} - \beta_2 E(ROA_{i,\,t}) + \gamma \Delta ROA_{i,\,t} + \varepsilon_{t+1}$ (1b).

$\Delta ROA_{i,\,t+1} = \alpha + \beta \times DV_{i,\,t} + \gamma \Delta ROA_{i,\,t} + a * SOE + b * SOE * DV_{i,\,t} + c * SOE * \Delta ROA_{i,\,t} + \varepsilon_{t+1}$ (1c).

$ROA_{i,\,t}$ is return on asset for firm i in year t and used as a proxy for profitability, defined as the net profit before extraordinary items, but after taxes, relative to the year-end total assets. $E(ROA_{i,\,t})$ is the predicted value of profitability for firm i at year t. $DV_{i,\,t}$ is the deviation of realized ROA and expected ROA, calculated as $ROA_{i,\,t} - E(ROA_{i,\,t})$. SOE is a dummy variable, and takes a value of 1 if the firm is state owned and 0 otherwise. We use unparalleled panel data from 2002 to 2010. T-values are calculated and given in parentheses. Firm, industry and year fixed effects are controlled. Panel A provides results for the total sample. Panels B and C report results based on separated SOE and non-SOE samples. *** indicates 0.01 significant level; ** indicates 0.05 significant level; * indicates 0.1 significant level.

CONST	*DV*	*ROA*	*E(ROA)*	*ΔROA*	*SOE*	*SOE * DV*	*SOE * ROA*	*SOE * E(ROA)*	*SOE * ΔROA*	Adj. R^2
Panel A: Total sample (N = 11,799)										
−0.0036***				−0.3812***						0.14
(−4.54)				(−23.34)						
−0.0022	−0.7005***			−0.0277						0.29
(−0.45)	(−19.75)			(−0.75)						
0.0006		−0.7249***	0.6462***	−0.0269***						0.31
(0.81)		(−14.87)	(15.55)	(−2.66)						
−0.0050	−0.7180***			0.0024	0.0041	0.0376			−0.0649***	0.29
(−0.77)	(−9.44)			(0.07)	(1.02)	(0.40)			(−3.01)	

CONST	*DV*	*ROA*	*E(ROA)*	*ΔROA*	Adj. R^2
Panel B: SOEs (N = 7851)					
−0.0022				−0.3952***	
(−2.59)				(−15.76)	
−0.0009	−0.6804***			−0.0625*	0.28
(−0.19)	(−21.48)			(−1.44)	
0.0026***		−0.6737***	0.5546***	−0.0665***	0.28
(2.89)		(−18.64)	(21.78)	(−5.04)	
Panel C: Non-SOEs (N = 3948)					
−0.0062***				−0.3682***	
(−3.86)				(−15.4)	
−0.0050	−0.7180***			0.0024	0.30
(−0.77)	(−9.44)			(0.07)	
−0.0038**		−0.7720***	0.7745***	0.0100	0.35
(−2.31)		(−16.61)	(20.22)	(0.62)	

WTO period, where we believe that entry barriers were further removed after WTO and the market became more competitive. The average R-square is a respectable 0.27. Our model for expected profitability explains at least as much of the variation in profitability for China as does the Fama and French (2000) model for the US.

After obtaining the firm-specific profitability based on the results from the Regression (2), the second stage involves estimating the Regression (1) to understand the dynamics of profitability, i.e. the mean reversion of profitability. The results are reported in Table 5. Panel A shows the results based on a full sample, which includes SOEs and non-SOEs. Panels B and C present the results of SOEs and non-SOEs, respectively.

We find from panel A that the coefficient of DV in Eq. (1a) is −0.7005 (t = −19.75), suggesting that profitability in China follows a mean-reversion pattern and reverts to a mean at a rate of 70.05% per year. The results are slightly different from those of Jiang and Kattuman (2010), who find an average mean-reverting rate of 55% in listed Chinese firms over a 11-year period to 2005. A possible explanation for the different results could be that our study covers only the post-WTO period. The lagged change in ROA is found to have a negative and statistically significant effect on change in ROA. This result suggests that change in ROA is not persistent, i.e. a firm that has a high ROA increase in year t will have a low ROA increase in year $t + 1$, which reflects the mean-reverting pattern in profitability of Chinese firms. Moreover, the regressions from the unconstrained model, Eq. (1b), are consistent with the partial adjustment predictions, where the coefficient of *ROA* is negative (−0.7249 with t = −14.87) and the coefficient of *E*(*ROA*) (0.6462 with t = 15.55) is positive.

In order to examine whether the mean-reverting rate between SOEs and non-SOEs differs, we conduct a pooled regression with a dummy variable SOE, a dummy that equals 1 if a firm is an SOE and 0 otherwise, and interact it with our main independent variables (Eq. (1c)). The interaction terms SOE and DV are positively related to changes in profitability, but the coefficient is statistically insignificant, suggesting that the mean-reverting rate of SOEs is similar to that of non-SOEs. Similar results are found in panels B and C of Table 5, where the variable DV is negative and statistically significant for both SOEs in panel B and non-SOEs in panel C. The results show that the mean-reverting rate for SOEs is 68.04% and 71.80% for non-SOEs. A comparison of the coefficients on DV for

SOEs and non-SOEs using *t* test suggests no significant difference. This suggests that both SOEs and non-SOEs follow a mean-reverting pattern and that the reverting rate is similar.

3.4.2. Non-linear analysis

To this point, our analysis indicates that the mean-reverting rates of SOEs and non-SOEs do not differ, on the basis of our linear regression. However, prior theoretical and empirical analyses indicate that a firm's mean reverting process tends to exhibit a non-linear and asymmetric behaviour (e.g. Fama and French, 2000). Specifically, when profitability is below the norm, the reversal is stronger, but when profitability has deviated far from its mean, it tends to revert to its mean faster. Thus, in order to provide further evidence on the mean-reverting rate of SOEs and non-SOEs, we estimate the following non-linearity regression model (Eq. (3)), following Fama and French (2000). To examine the effect of state ownership on a firm's mean-reverting rate, we run the following regression separately for SOEs and non-SOEs:

$$\Delta ROA_{i,t} = \beta_1 \times DV_{i,t} + \beta_2 \times DV_{i,t} \times NDV_{i,t} + \beta_3 \times DV_{i,t} \times DV_{i,t} \times NDV_{i,t} + \beta_4 \times DV_{i,t} \times DV_{i,t} \times PDV_{i,t} + \gamma_1 \times \Delta ROA_{i,t} + \gamma_2 \times \Delta ROA_{i,t} \times N\Delta ROA_{i,t} + \gamma_3 \times \Delta ROA_{i,t} \times \Delta ROA_{i,t} \times N\Delta ROA_{i,t} + \gamma_4 \times \Delta ROA_{i,t} \times \Delta ROA_{i,t} \times P\Delta ROA_{i,t} + \varepsilon_{t+1} \quad (3)$$

Definition of variables, in Appendix A. β_2 captures the mean reversion rate when profitability is below the norm. β_3 describes the reverting rate when profitability deviates far below the norm, and β_4 measures the mean reversion rate when profitability is far above the norm. γ_2, γ_3 and γ_4 measure the non-linearity in the autocorrelation of changes in profitability.

We simplify the expression in the Eq. (3) and restate it as follows:

$$\Delta ROA_{i,t+1} = \alpha + \beta_1 \times DV_{i,t} + \beta_2 \times NDV_{i,t} + \beta_3 \times SNDV_{i,t} + \beta_4 \times SPDV_{i,t} + \gamma_1 \times \Delta ROA_{i,t} + \gamma_2 \times N\Delta ROA_{i,t} + \gamma_3 \times SN\Delta ROA_{i,t} + \gamma_4 \times SP\Delta ROA_{i,t} + \varepsilon_{t+1} \quad (3a)$$

Table 6 reports the results of the non-linearity regression where panels A and B report the regression results for SOEs and non-SOEs, respectively. For completeness and robustness, we conduct a regression analysis in panel C based on the full sample, which includes a dummy variable SOE. The dummy variable SOE is interacted with the main independent variables to reflect the potential differences in the mean-reverting rate between SOEs and non-SOEs.

Firstly, we compare the mean-reverting rate for SOEs and non-SOEs when they both achieve a higher than expected firm-specific profitability. The coefficients on *DV* are −0.1548 ($t = -5.75$) for SOEs (in panel A) and −0.4649 ($t = -5.42$) for non-SOEs (in panel B). They suggest that the mean-reverting rate in SOEs is approximately 31.01% (46.49%–15.48%) lower than that in non-SOEs, and this difference is economically significant. Moreover, the results in panel C show that the coefficient on DV is significantly negative, and the coefficient on the interacted variable SOE*DV is statistically significant and positive. This indicates that the profitability of SOEs reverts to its mean at a lower rate than that for non-SOEs, when both achieve a better performance than the

Table 6

Non-linear regressions to explain the change in profitability: SOEs and Non-SOEs.

Table 6 reports the results from the non-linear regression for explaining the change in profitability:

$$\Delta ROA_{i,t+1} = \alpha + \beta_1 \times DV_{i,t} + \beta_2 \times NDV_{i,t} + \beta_3 \times SNDV_{i,t} + \beta_4 \times SPDV_{i,t} + \gamma_1 \times \Delta ROA_{i,t} + \gamma_2 \times N\Delta ROA_{i,t} + \gamma_3 \times SN\Delta ROA_{i,t} + \gamma_4 \times SP\Delta ROA_{i,t} + \varepsilon_{t+1} \text{ (3a).}$$

$DV_{i,t}$ is the deviation of realized ROA and expected ROA, calculated as $ROA_{i,t} - E(ROA_{i,t})$. NDV is a dummy variable which takes a value of 1 when $DV < 0$ and 0 when $DV > 0$. *SNDV* is the square of DV multiplied by NDV. *PDV* is a dummy variable which takes value of 1 when DV > 0 and 0 when DV < 0. *SPDV* is the square of DV multiplied by *PDV*. *NΔROA* is a dummy variable taking the value of 1 when ΔROA < 0 and 0 otherwise. *PΔROA* is a dummy variable taking the value of 1 when ΔROA > 0 and 0 otherwise. *SNΔROA* and *SPΔROA* are the square of *ΔROA* multiplied by NΔROA and the square of ΔROA multiplied by PΔROA, respectively. We use unparalleled panel data from 2002 to 2010. T-values are calculated and given in parentheses. Firm, industry and year fixed effects are controlled. Panel C provides results for the total sample. Panels A and B report results based on separated SOE and non-SOE samples. *** indicates 0.01 significant level; ** indicates 0.05 significant level; * indicates 0.1 significant level.

CONST	*DV*	*NDV*	*SNDV*	*SPDV*	*ΔROA*	*NΔROA*	*SNΔROA*	*SPΔROA*	Adj. R^2		
Panel A: SOEs (N = 7851)											
0.0030**	−0.1548**	−0.5803***	0.5586***	−0.5516***	−0.1598**	0.2508**	0.0280	0.1304	0.30		
(2.19)	(−5.75)	(−4.76)	(2.61)	(−4.07)	(−2.34)	(2.17)	(0.87)	(1.18)			
Panel B: Non-SOEs (N = 3948)											
0.0066***	−0.5649***	−0.3115***	0.3201***	−0.2097***	−0.1501**	0.4523***	0.1005***	0.0218	0.39		
(2.84)	(−5.42)	(−3.18)	(3.79)	(−3.68)	(−2.26)	(5.70)	(3.74)	(0.50)			
Panel C: Total sample (N = 11,799)											
CONST	*DV*	*NDV*	*SNDV*	*SPDV*	*SOE*	*SOE*DV*	*SOE*NDV*	*SOE*SNDV*	*SOE*SPDV*	*ΔROA*	*Adj.* R^2
0.0010	−0.6199***	−0.1623***	0.3701**	−0.1509***	−0.0034**	0.3285***	−0.4474***	0.3281***	−0.2253***	−0.0141**	0.34
(0.58)	(−18.48)	(3.96)	(2.04)	(−8.97)	(1.99)	(6.91)	(−5.45)	(6.64)	(−3.49)	(−2.41)	

norm. Overall, the results are consistent with hypothesis H1a. Although the mean-reverting pattern is prevalent in the Chinese market, SOEs are able to maintain their good performance for a longer time period when their profitability is above the norm. Our results provide evidence consistent with our argument that the potential benefit of government ownership could assist SOE profitability to be sustained above the norm for a longer period of time.

Secondly, we compare the rate of mean reversion of SOEs with that of non-SOEs when profitability is below the mean. The result in panel A of Table 6 shows that the coefficient of *NDV* for SOEs is −0.5803 ($t = -4.76$), which means that the mean-reverting rate for SOEs is 58.03% when profitability is lower than normal. Similarly, panel B shows that the mean-reverting rate for non-SOEs is 31.15% (−0.3115 with$t = -3.18$). When these results are combined with the results in panel C, where the coefficient on the interacted variable SOE*NDV is significantly negative in our pooled regression, this provides evidence that SOEs recover more quickly when their profitability is below the norm. Thus, our hypothesis H1a is supported.

Finally, we compare the mean-reverting rate of SOEs and non-SOEs when they have outperformed, or underperformed, exceptionally. Panels A and B of Table 6 show the coefficients on *SNDV* and *SPDV* for SOEs are 0.5586 ($t = 2.61$) and −0.5516 ($t = -4.07$), respectively, compared to 0.3201 ($t = 3.79$) and −0.2097 ($t = -3.68$) for non-SOEs. This suggests that SOEs tend to revert to the mean faster than do non-SOEs, whenever they divert far from the expected level of profitability. This result is not surprising, given a higher profitability reverting rate for SOEs when they have extremely underperformed. However, it is worth noting that SOEs tend to revert their profitability to a normal level more quickly than do non-SOEs, when they achieve extremely good performance (the coefficients of SPDV for SOEs and non-SOEs are −0.5507 and −0.2326, respectively). This is probably because extremely well-performing SOEs may be persuaded by a government to merge with poorly performing SOEs to fulfil government shareholders' social objectives (Liu et al., 2018).

Overall, our empirical tests provide evidence to support our hypothesis that government connections through direct government ownership assist SOEs to sustain persistent abnormal profits, by showing that SOEs have a significantly lower (higher) mean-reverting rate when they have better (worse) profitability. To further investigate whether other channels of government connections also represent a competitive advantage of a firm, in the next section we examine the effect of politically connected executives on the mean-reverting rate of profitability.

3.5. Mean-reversion of profitability: firms with and without politically connected executives

As discussed above, the other major type of government connection is politically connected executives, especially in non-SOEs which do not have direct connections to government through government ownership. On that basis, we test the mean-reverting rate of firms with and without politically connected executives. Prior studies have documented that the value of politically connected executives depends on whether firms are SOEs or non-SOEs, because the effect is more pronounced in non-SOEs than in SOEs which have direct government ownership (Wu et al., 2012; Liu et al., 2013). We therefore divide our subsamples of SOEs and non-SOEs into four groups, SOEs with and without politically connected executives, and non-SOEs with and without politically connected executives; and then conduct our empirical estimations on those subsamples. The results are reported in panels A and B of Table 7.

Panel A of Table 7 reports the mean-reversion pattern of profitability for SOEs with and without politically connected executives. The results of the linear regressions indicate that the mean-reverting rate of SOEs with politically connected executives is 77.24%, similar to SOEs without politically connected executives (63.73%). This result, as expected, shows that politically connected executives in SOEs do not have a significant influence on the mean-reverting of profitability. The results of the non-linearity regression further show that SOEs with politically connected executives appear to have a similar mean-reverting rate (the coefficients of DV, NDV, SNDV and SPDV are −0.1844, −0.5311, 0.8207 and −0.4373, respectively) to that of SOEs without politically connected executives (coefficients of those variables are −0.1703, −0.5117, 0.7978 and −0.4130, respectively). Moreover, the coefficients on the interactions of PC dummy with the four independent variables (DV, NDV, SNDV, and SPDV) are all statistically insignificant. Overall, our results suggest that politically connected executives appear to have insignificant influence over the mean-reverting pattern of SOEs regardless of whether profitability is better or worse than normal. Our findings are consistent with Liu et al. (2013), who find that politically connected executives do not add value to SOEs.

Panel B of Table 7 reports the mean-reversion pattern of profitability for non-SOEs with and without politically connected executives. The results show that non-SOEs with politically connected executives have a higher overall linear mean-reverting rate (89.86%) than non-SOEs without politically connected executives (65.14%). Furthermore, the results of the non-linear regression indicate that non-SOEs with politically connected executives have a much higher mean-reverting rate (55.13%) than do non-SOEs without politically connected executives (16.37%), when profitability deviates extremely below the norm, and they also have a much lower mean-reverting rate (11.27% vs. 58.18%) when profitability is extremely higher than the norm. The results are similar when we include a dummy variable PC and interact it with the main independent variables, capturing the different mean-reverting rates of non-SOEs with and without politically connected executives. The results suggest that politically connected executives assist non-SOEs to recover from extremely low profitability much faster and to maintain a higher level of profitability for a longer period of time. This provides supporting evidence for our hypothesis H1b.

3.6. Additional analysis: mean-reverting rate of SOEs controlled by the central and local governments

SOEs are ultimately controlled by either the central government or local governments. Recent studies by Chen et al. (2009) and Cheung et al. (2012) find that SOEs controlled by the central government perform better than those controlled by local governments, because the central government is more powerful than local governments and can bring more valuable resources to its SOEs.

Table 7

Estimated parameters for regression to explain the change in profitability in different subsamples.

Panel A reports the regression results for explaining the changes in profitability of SOEs by personal political connection. Panel B reports the regression results for explaining the changes in profitability of non-SOEs by personal political connection. Panel C reports the regression results for explaining the change in profitability of central government-controlled SOEs (CSOE) and local government-controlled SOEs (LSOE). In panels A and B, PC is a dummy for political connection of managers; in panel C, CEN is a dummy for CSOE. We use unparalleled panel data from 2002 to 2010. T-values are calculated and given in parentheses. Firm, industry and year fixed effects are controlled. *** indicates 0.01 significant level; ** indicates 0.05 significant level; * indicates 0.1 significant level.

CONST	*DV*	*ROA*	*E(ROA)*	*NDV*	*SNDV*	*SPDV*	*ΔROA*	*NΔROA*	*SNΔROA*	*SPΔROA*	*Adj.R²*
Panel A: SOEs with and without politically connected executives											
SOE with PC (N = 1598)											
0.0023	−0.7724***						−0.0804***				0.31
(0.56)	(−31.34)						(−2.16)				
0.0070***		−0.8045***	0.5780***				−0.0546				0.32
(3.24)		(−17.30)	(9.08)				(−1.46)				
−0.0041***	−0.1844***			−0.5311***	0.8207***	−0.4373**	0.0325	−0.2240**	−0.7061	0.2231***	0.33
(−1.11)	(−3.80)			(−3.21)	(3.08)	(−2.02)	(0.62)	(−2.22)	(−1.29)	(3.11)	
SOE without PC (N = 6253)											
−0.0006	−0.6373***						−0.0713***				0.26
(−0.71)	(−34.12)						(−5.14)				
0.0016		−0.6418***	0.5441***				−0.0654***				0.27
(−0.07)		(−34.37)	(19.73)				(−4.70)				
0.0042***	−0.1703***			−0.5117***	0.7978***	−0.4130***	−0.0890***	0.2942***	−0.5813	0.1213	0.30
(2.78)	(−13.12)			(−5.02)	(11.14)	(−3.56)	(−2.99)	(2.50)	(−0.09)	(0.18)	
Pooled SOEs (N = 7851)											
CONST	*DV*	*NDV*	*SNDV*	*SPDV*	*PC*	*PC * DV*	*PC * NDV*	*PC * SNDV*	*PC * SPDV*	*ΔROA*	*Adj.R²*
0.0022*	−0.2504***	−0.2114***	0.7474***	−0.3390***	−0.0007	0.2134	−0.5071	−0.5137	−0.0897	−0.0423***	0.30
(1.66)	(−15.36)	(−4.74)	(10.21)	(−8.30)	(−0.24)	(1.06)	(−1.40)	(−0.59)	(−1.25)	(−3.23)	
Panel B: Non-SOEs with and without politically connected executives											
Non-SOE with PC (N = 687)											
0.0016	−0.8986***						−0.0291				0.62
(0.43)	(−22.71)						(−0.81)				
−0.0013		−0.8978***	1.0198***				−0.0303**				0.62
(−0.30)		(−22.69)	(10.20)				(−0.399)				
0.0091	−0.3927***			−0.3599	0.5513**	−0.1127**	−0.1053	0.5132**	0.1896*	−0.0278	0.64
(1.45)	(−4.81)			(−0.95)	(3.27)	(−2.29)	(−1.22)	(2.40)	(1.90)	(−0.35)	
Non-SOE without PC (N = 3261)											
−0.0046***	−0.6514***						0.0183				0.22
(−3.14)	(−24.93)						(1.01)				
−0.0039**		−0.6519***	0.6291***				0.0191				0.22
(−2.26)		(−24.94)	(14.85)				(1.05				
0.0053**	−0.3720***			−0.3743***	0.1637*	−0.5818***	−0.0714***	0.4074***	0.1037**	0.0197	0.24
(2.05)	(−5.66)			(−3.96)	(2.72)	(−2.85)	(−2.83)	(4.69)	(2.48)	(0.31)	
Pooled Non-SOEs (N = 3948)											
CONST	*DV*	*NDV*	*SNDV*	*SPDV*	*PC*	*PC * DV*	*PC * NDV*	*PC * SNDV*	*PC * SPDV*	*ΔROA*	*Adj.R²*
−0.0006***	−0.4931***	−0.0289	0.2789**	−0.4779***	0.0061	−0.1767	0.2074	0.4322*	0.4375***	0.0184***	0.39
(−3.27)	(−11.58)	(−0.16)	(2.21)	(−4.97)	1.11	−1.76	0.77	1.91	3.25	3.14	
Panel C: Estimated parameters for regression to explain the change in profitability: CSOE and LSOE firms											
CSOE firms (N = 1905)											
−0.0033**	−0.4953***						−0.1303***				0.26
(−2.20)	(−16.42)						(−4.34)				
0.0152		−0.5431***	0.3258***				−0.0392				0.20
(1.21)		(−4.77)	(3.98)				(−0.71)				
−0.0078**	0.0357***			−0.4717	2.8531***	−0.3099**	−0.1314**	−0.1013	−1.9137***	−0.1039	0.30
(−1.91)	(−3.26)			(−1.02)	(9.52)	(−2.69)	(−2.22)	(−1.23)	(−6.07)	(−0.29)	
LSOE (N = 5946)											
0.0011	−0.6852***						−0.0604***				0.28
(1.25)	(−43.02)						(−4.17)				
0.0030***		−0.6886***	0.5891***				−0.0554***				0.28
(3.02)		(−35.03)	(19.84)				(−3.82)				
−0.0009**	−0.1296***			−0.7138***	0.5969***	−0.4529***	−0.1107***	0.2217***	0.0531	0.0331	0.38
(−2.38)	(−2.98)			(−10.61)	(5.38)	(−11.32)	(−5.01)	(4.67)	(1.19)	(1.17)	
Pooled SOEs (N = 7851)											
CONST	*DV*	*NDV*	*SNDV*	*SPDV*	CEN	*CEN * DV*	*CEN * NDV*	*CEN * SNDV*	*CEN * SPDV*	*ΔROA*	*Adj.R²*
−0.0071***	−0.1951***	−0.4541***	0.6205***	−0.4235***	0.0043	−0.2231**	0.5683**	1.0021**	−0.0069	−0.0473***	0.36
(−6.79)	(−4.17)	(−7.31)	(7.98)	(−13.71)	1.29	(−2.22)	(3.91)	(1.88)	(−0.31)	(−4.14)	

According to the resource-based theory, we expect that valuable resources could help SOEs controlled by the central government to maintain their superior performance for longer periods of time, and also provide assistance to recover quickly from poor performance. We partition SOEs into SOEs controlled by central government (hereafter CSOEs) and SOEs controlled by local government (hereafter LSOEs), and repeat the above analyses on these subsamples. Panel C of Table 7 reports the results.

The coefficient on *DV* in the linear regression reported for CSOEs is −0.4953 ($t = -16.42$) and the corresponding coefficient for LSOEs is −0.6852 ($t = -43.02$). The results show that, on average, the rate of mean-reversion is lower for CSOEs, which indicates that, relatively speaking, CSOEs could retain their profitability for a longer period. A further non-linear analysis shows that, although LSOEs have a strong mean-reverting pattern when they perform well (the coefficient of DV is −0.1296, $t = -2.98$), CSOEs show a very slow mean-reverting pattern when they achieve better than expected firm-year-specific levels of profitability (the coefficient on DV is 0.0357, $t = 3.26$). This result is consistent with our expectation that firms controlled by the central government possess unique resources that enable them to remain persistently above the norm of profitability. In addition, results from the non-linear analysis show that CSOEs tend to recover from bad performances sooner than do LSOEs (the coefficients of NDV for CSOEs and LSOEs are −0.4717 and −0.7138, respectively). Overall, our results suggest that government connections with the central government bring an additional marginal value to SOEs and help create a consistently superior performance.

4. Robustness tests

We conduct the following additional tests to provide robustness evidence to our findings: (1) we examine the channel through which government connections yield economic benefits; (2) we further examine how our results are influenced by the global financial crisis; (3) we examine whether firms' survival rate differs between firms with and without government connections; and (4) we re-estimate our main results using operational cash flow rather than ROA as an alternative measure of firm profitability. We report and discuss our results in this section.

4.1. The channel through which government connections yield economic benefits

As discussed above, government connections may bring competitive advantage to those connected firms, through bank loans, low-cost financing, preferential government policies, favourable tax treatment etc. Therefore, in this subsection, we aim to provide direct evidence for this argument by examining how government connections have influence on firms' access to bank loans, cost of borrowing, and effective tax rate. The empirical results are reported in Table 8.

Table 8
The effect of government connections on firms' bank loan ratio, borrowing cost and effective tax rate.

Table 8 reports the regression results of the effect of government connections on bank loan ratio, borrowing cost and effective tax rate. The dependent variables are BANK, INTEREST, TAX that are measured by total bank loan to total assets, total interest expense to total bank loans, and total tax the firm paid to earnings before tax, respectively. SOE and PC are dummies if the firm is a SOE and has politically connected managers, respectively. T-values are calculated and given in parentheses. *** indicates 0.01 significant level; ** indicates 0.05 significant level; * indicates 0.1 significant level.

Var.	BANK			INTEREST			TAX		
	ALL	SOE	NONSOE	ALL	SOE	NONSOE	ALL	SOE	NONSOE
SOE	0.0158***			−0.0042***			−0.0812***		
	(5.22)			(−3.19)			(−2.93)		
PC		0.0005	0.0208***		−0.0012	−0.0054*		0.0330	−0.1412***
		(0.11)	(3.60)		(−0.74)	(−1.86)		(0.02)	(−2.74)
AGE	0.0019***	0.0005	0.0034***	0.0011***	0.0007***	0.0018***	−0.0637*	−0.0374	−0.0597
	(5.28)	(1.08)	(6.41)	(6.71)	(3.66)	(5.92)	(−1.77)	(−1.48)	(−0.67)
ROA	−0.4896***	−0.6277***	−0.3215***	−0.0217**	−0.0223**	−0.0161	0.5952	0.5503	0.4502
	(−28.51)	(−25.43)	(−13.91)	(−2.45)	(−2.05)	(−1.04)	(0.35)	(0.43)	(0.12)
SIZE	0.0327***	0.0315***	0.0374***	−0.0062***	−0.0048***	−0.0103***	0.1204	0.0486	0.3173
	(25.62)	(20.63)	(16.13)	(−10.88)	(−7.53)	(−8.20)	(0.93)	(0.60)	(0.82)
TANGIBLE	0.0380***	0.0850***	0.0154*	−0.0132***	−0.0141**	−0.0095	1.9876*	0.3021	3.8586
	(3.54)	(5.84)	(1.99)	(−2.74)	(−2.35)	(−1.16)	(1.83)	(0.40)	(1.49)
SALE_GROWTH	−0.0000	0.0009	−0.0000	−0.0000	0.0003	−0.0000	0.0001	0.0119	−0.0001
	(−0.46)	(1.45)	(−0.74)	(−1.22)	(1.40)	(−1.22)	(0.01)	(0.39)	(−0.02)
BOARDSIZE	0.0006	0.0003	0.0007	−0.0009***	−0.0009***	−0.0011**	−0.0051	−0.0012	0.0017
	(0.89)	(0.41)	(0.58)	(−3.13)	(−2.78)	(−1.89)	(−0.08)	(−0.03)	(0.01)
BOARDIND	0.0009	0.0150	−0.0424	−0.0024	−0.0029	−0.0029	0.8086	0.3940	1.6932
	(0.04)	(0.58)	(−1.31)	(−0.27)	(−0.28)	(−0.18)	(0.39)	(0.29)	(0.31)
CONST	−0.4087***	−0.3891***	−0.4837***	0.1978***	0.1618***	0.2824***	−3.1593	−1.3291	−6.5347
	(−13.67)	(−10.47)	(−9.07)	(14.80)	(10.68)	(9.89)	(−1.05)	(−0.68)	(−0.73)
Year	YES	YES	YES	YES	YES	YES	YES	YES	YES
Industry	YES	YES	YES	YES	YES	YES	YES	YES	YES
R^2	0.1551	0.1542	0.1948	0.1558	0.1502	0.1678	0.0541	0.0252	0.1178
N	11,799	7851	3948	11,799	7851	3948	11,799	7851	3948

Table 9
Non-linear regressions to explain the change in profitability: SOEs and Non-SOEs before and after the global financial crisis.

Table 9 reports the results from non-linear regression for explaining the change in profitability for SOEs and non-SOEs and before and after the global financial crisis. $DV_{i,\ t}$ is the deviation of realized ROA and expected ROA, calculated as $ROA_{i,\ t} - E(ROA_{i,\ t})$. *NDV* is negative *DV*. *SNDV* is the square of negative *DV*. *SPDV* is the square of positive *DV*. *NΔROA* is negative *ΔROA,* and *SNΔROA* and *SPΔROA* are the square of negative *ΔROA* and the square of positive *ΔROA* respectively. We use unparalleled panel data from 2002 to 2010. CRISIS is a dummy equal to 1 for the period 2008–2010 and 0 for the period 2002–2007. T-values are calculated and given in parentheses. Firm, industry and year fixed effects are controlled. Panels A to C present the results for SOEs and panels D to F present the results for non-SOEs. *** indicates 0.01 significant level; ** indicates 0.05 significant level; * indicates 0.1 significant level.

CONST	*DV*	*NDV*	*SNDV*	*SPDV*	*ΔROA*	*NΔROA*	*SNΔROA*	*SPΔROA*	Adj. R^2
Panel A: SOEs before the financial crisis (2002–2007, $N = 5195$)									
−0.0089***	−0.1579**	−0.6041***	0.5611***	−0.5714***	−0.1197**	0.2391***	−0.0566	0.1436	0.29
(−7.11)	(−2.31)	(−6.28)	(3.91)	(−8.17)	(−2.16)	(2.98)	(−0.33)	(1.23)	
Panel B: SOEs after the financial crisis (2008–2010, $N = 2656$)									
CONST	*DV*	*NDV*	*SNDV*	*SPDV*	*ΔROA*	*NΔROA*	*SNΔROA*	*SPΔROA*	Adj. R^2
−0.0041	−0.1757***	−0.5431***	0.5073***	−0.5351***	−0.1829***	0.2432***	0.0187	0.0731	0.42
(−1.39)	(−3.73)	(−3.68)	(6.77)	(−6.36)	(−4.21)	(3.61)	(0.58)	(0.91)	

Panel C: Change in profitability of SOEs after the financial crisis ($N = 7851$)

CONST	*DV*	*NDV*	*SNDV*	*SPDV*	*CRISIS*	*CRISIS*DV*	*CRISIS*NDV*	*CRISIS*SNDV*	*CRISIS*SPDV*	Adj. R^2
−0.0091	−0.1047**	−0.5525***	0.6641***	−0.5147***	0.0070***	−0.1359	0.1225	0.3133	−0.0557	0.32
(−7.13)	(−2.11)	(−7.17)	(6.76)	(−7.88)	(3.15)	(−1.61)	(1.00)	(1.61)	(−0.82)	

Panel D: NON-SOEs before the financial crisis (2002–2007, $N = 2063$)

CONST	*DV*	*NDV*	*SNDV*	*SPDV*	*ΔROA*	*NΔROA*	*SNΔROA*	*SPΔROA*	Adj. R^2
−0.0079***	−0.3967***	−0.3133**	0.4007***	−0.2537***	−0.1398**	0.3163**	−0.1051	0.0176	0.34
(−3.15)	(−4.53)	(−2.11)	(6.43)	(−3.29)	(−2.46)	(2.47)	(1.18)	(0.22)	
Panel E: NON-SOEs after the financial crisis (2008–2010, $N = 1885$)									
CONST	*DV*	*NDV*	*SNDV*	*SPDV*	*ΔROA*	*NΔROA*	*SNΔROA*	*SPΔROA*	Adj. R^2
0.0021	−0.5475***	−0.0595**	0.1339**	−0.2211	−0.0539	0.1140	0.0311	0.0811	0.53
(0.41)	(−8.41)	(−2.42)	(2.61)	(−1.57)	(−0.90)	(1.41)	(1.21)	(0.67)	

Panel F: Change in profitability of NON-SOEs after the financial crisis ($N = 3948$)

CONST	*DV*	*NDV*	*SNDV*	*SPDV*	*CRISIS*	*CRISIS*DV*	*CRISIS*NDV*	*CRISIS*SNDV*	*CRISIS*SPDV*	Adj. R^2
−0.0073***	−0.4057***	−0.3127**	0.4559***	−0.2358***	0.0099***	−0.1539**	0.2117**	−0.3563*	0.0677	
(−2.79)	(−6.18)	(−2.19)	(4.18)	(−3.81)	(2.64)	(2.43)	(2.27)	(−1.91)	(1.21)	0.40

Consistent with our expectation, firms with government connections (SOEs and politically connected non-SOEs) have a significantly higher level of bank loans, lower cost of borrowing, and lower effective tax rate. The results suggest that our main findings are robust, because we do find that government connections bring benefits to connected firms.

4.2. The mean-reverting rate of SOEs and non-SOEs before and after the global financial crisis

One interesting extension of our paper is to examine whether the role played by government connections is strengthened or weakened when the macroeconomic environment changes during the global financial crisis period. We therefore partition the total sample into two subsamples, i.e. samples before (2002–2007) and after (2008–2010) the global financial crisis period, and repeat all analyses. For brevity, we only report the results from the non-linear regression comparing SOEs and non-SOEs in the pre- and post-crisis periods, in Table 9.

The results in panels A and B of Table 9 show that the mean-reverting rates of SOEs before and after the global financial crisis are 15.79% and 17.57%, respectively, and that SOEs recover relatively slower from poor performance in the post-financial crisis period (54.31% in the post-crisis period and 60.41% in the pre-crisis period). However, we observe from panel C that the effect of financial crisis on mean-reverting pattern of SOEs is insignificant.

With regard to the results of non-SOEs, we find that non-SOEs' mean-reverting rate increases significantly in the post-crisis period (increased by 15.08%, from 39.67% to 54.75%), and that it takes a much longer time for non-SOEs to recover when they have below-than-average profit in the post-crisis period (mean-reverting rates before and after the crisis for non-SOEs when they have less than average performance are 31.33% and 5.95%, respectively). We also observe that the financial crisis dummy has a statistically significant effect on the mean-reverting pattern of non-SOEs. Overall, our findings suggest that government connections via

Table 10
Comparison of the probability of firms receive a 'ST' between SOEs and non-SOEs and between non-SOEs with and without politically connected executives.

Table 10 reports the likelihood of firms to receive a ST cap due to two years continuous operation loss. The dependent variable is a dummy that equals to 1 if a firm receive a 'ST' cap in a particular year and 0 otherwise. SOE DUMMY is a dummy that equals to 1 if a firm is a SOE and 0 otherwise. PC is a dummy if a firm's CEO/chairman is politically connected. AGE, ROA, SIZE, TANGIBLE, SALE_GROWTH, BOARDSIZE, and BOARDIND refer to firm age, profitability, size, tangible assets, sales growth, board size and board independence. T-values are calculated and given in parentheses. *** indicates 0.01 significant level; ** indicates 0.05 significant level; * indicates 0.1 significant level.

Var.	Probability of ST		
	ALL	SOE	NONSOE
SOE	−0.1440**		
	(−2.00)		
PC		−0.1907	−0.2340*
		(−1.15)	(−1.88)
AGE	0.1468***	0.1236***	0.1717***
	(8.97)	(5.42)	(7.04)
ROA	−0.1154	0.0390	−0.3038
	(−0.21)	(0.04)	(−0.45)
SIZE	−0.7643***	−0.6869***	−0.8178***
	(−10.68)	(−7.07)	(−7.42)
TANGIBLE	−0.5178	−0.8950	−0.1076
	(−1.09)	(−1.26)	(−0.17)
SALE_GROWTH	0.0006	0.0272**	0.0005
	(0.75)	(1.99)	(0.44)
BOARDSIZE	−0.0443	−0.0199	−0.0877
	(−1.24)	(−0.43)	(−1.52)
BOARDIND	0.2402	−0.0147	0.4159
	(0.24)	(−0.01)	(0.28)
CONST	11.3420	9.7681	12.4680
	(7.17)	(4.48)	(5.05)
Year	YES	YES	YES
Industry	YES	YES	YES
PROVINCE	YES	YES	YES
Pseudo R^2	0.10	0.07	0.14
N	11,795	7851	3948

ownership help SOEs to mitigate the negative effect from the global financial crisis.

4.3. The effect of government connections on the probability of firms receiving 'special treatment' due to poor accounting performance

Another concern for our paper is survival bias, because the measurement of mean-reversion intrinsically requires firms to survive over our sample period, and firms with government connections may have a higher survival rate. As a matter of fact, Chinese listed firms have a very high survival rate. We observe that there is no firm delisted in our sample during the research period; therefore, firm survival is not an issue for our study.

Interestingly, the special treatment system in China, i.e. the 'ST system' - that is, if firms have two years of continuous negative accounting profit they will receive 'ST', and the 'ST' cap will be removed when they recover from negative accounting profit - provides an ideal setting to provide robustness evidence for our results.

Table 10 reports the regression results which compare the probability for firms to receive a 'ST' cap, between SOEs and non-SOEs, and between non-SOEs with and without political connections. As per our expectation, compared to non-SOEs, SOEs are less likely to receive 'ST' (the coefficient of the SOE dummy is, statistically, significantly negative in column 1); and compared to non-SOEs without political connections, non-SOEs with political connections are less likely to receive 'ST' (the regression coefficient of PC dummy is significantly negative in column 3). Our results complement our main argument, that firms with government connections could retain a better performance for a longer period and recover sooner when they have poor performance, by showing that government connected firms are less likely to receive a 'ST' due to continuous negative accounting performance.

4.4. Mean-reverting rate of operating cash flow of SOEs and non-SOEs

Prior studies suggest that accounting profitability may not be reliable, because companies could easily manipulate their accounting profitability through accrual manipulation (Ding et al., 2007), and thus our results may reflect accrual reversals rather than mean-reverting of profitability (Dechow et al., 2012). To mitigate this concern, we use operating cash flow to total assets as an

Table 11
Non-linear regressions to explain the change in profitability measured by cash flow from operation to total assets: SOEs and non-SOEs.

Table 11 reports the results from the non-linear regression for explaining the change in profitability measured by the cash flow from operation to total assets (CFTA). $DV_{i,t}$ is the deviation of realized CFTA and expected CFTA, calculated as $CFTA_{i,t} - E(CFTA_{i,t})$. *NDV* is negative *DV*. *SNDV* is the square of negative *DV*. *SPDV* is the square of positive *DV*. *NΔCFTA* is negative *ΔCFA*. *SNΔCFTA* and *SPΔCFTA* are the square of negative *ΔCFTA* and the square of positive *ΔCFTA* respectively. We use unparalleled panel data from 2002 to 2010. T-values are calculated and given in parentheses. Firm, industry and year fixed effects are controlled. Panel C provides results for the total sample. Panels A and B report results based on separated SOE and non-SOE samples. *** indicates 0.01 significant level; ** indicates 0.05 significant level; * indicates 0.1 significant level.

CONST	*DV*	*NDV*	*SNDV*	*SPDV*	*ΔCFTA*	*NΔCFTA*	*SNΔCFTA*	*SPΔCFTA*	Adj. R^2
Panel A: SOEs (N = 7851)									
−0.0126*	−0.1853**	−0.6234***	0.5836***	−0.6028***	−0.1347**	0.2625**	0.0381	0.1427	0.27
(−1.71)	(−2.33)	(−3.27)	(2.81)	(−4.97)	(−1.99)	(2.03)	(0.77)	(1.21)	
Panel B: Non-SOEs (N = 3948)									
−0.011	−0.4511***	−0.3227**	0.2317	−0.3125***	−0.1181**	0.5137**	0.1512*	0.0318	0.31
(−0.41)	(−4.78)	(−1.99)	(0.87)	(−5.12)	(−2.13)	(2.07)	(1.95)	(0.83)	

Panel C: Total sample (N = 11,799)

CONST	*DV*	*NDV*	*SNDV*	*SPDV*	*SOE*	*SOE*DV*	*SOE*NDV*	*SOE*SNDV*	*SOE*SPDV*	*ΔROA*	*Adj.* R^2
−0.0121**	−0.7251***	0.1925***	0.4273***	−0.1321***	−0.0131***	0.4128***	−0.4987***	0.3207***	−0.3181***	−0.0412**	0.33
(−1.56)	(−13.29)	(2.99)	(4.94)	(−6.32)	(−3.18)	(7.13)	(−6.01)	(2.71)	(−8.12)	(−2.33)	

alternative measure of profitability,[5] and repeat all estimations. The results show that our main findings do not change when we use cash flow from operating to measure firms' profitability. For brevity, we only report the results of the non-linear estimation of SOEs and non-SOEs, in Table 11, and the results are qualitatively similar to those reported in Table 6.

4.5. Other tests

It is possible that the variable DV at time t may be closely related to the lagged change in ROA, thus our results may suffer from a multi-collinearity problem when we put both variables into our regression models. In order to address this issue, we repeat all our mean-reverting tests with only one of the two variables being included. Our results show that our main findings hold, whether we include DV, ROA, or both of the two variables in our model. The empirical results are not reported to save space.

5. Conclusion

This study investigates whether and how government connections affect the time-series properties of firm profitability. More specifically, we study the mean-reverting pattern of Chinese firms and whether the mean-reversion pattern can be influenced by both government ownership control and politically connected executives. Based on a sample of Chinese listed firms during the post-WTO period from 2002 to 2010, we find that, overall, Chinese listed firms follow a mean-reverting pattern at a rate of 70.05%. Although, overall, there is no statistical difference in the mean-reverting rate between SOEs and non-SOEs, we do find evidence that, unlike their non-SOE counterparts, SOEs have a higher mean-reverting rate when their profitability is lower than normal and a lower mean-reverting rate when their profitability is higher than normal. Moreover, non-SOEs with politically connected executives have a lower (higher) mean-reverting rate when they have extremely high (low) profitability. Finally, we document that SOEs controlled by the central government have a lower mean-reverting rate than do those controlled by local governments. We further document that firms with government connections do have better access to bank loans, low-cost financing, and favourable tax treatment, and are less likely to have negative profits for two consecutive years (less likely to receive a 'ST' cap); and that government connections are valuable for firms to mitigate negative effects from the global financial crisis. Our results are robust when we use operating cash flow as an alternative measure of profitability.

To conclude, our paper provides fresh evidence that, in an emerging market such as China, where the market environment is competitive overall but political influence still prevails, government connections through government ownership control and politically connected executives represent a valuable competitive strategy for connected firms. The government connections enable the connected firms to retain superior performance for a longer period of time and/or to recover sooner from poor performance.

[5] To be consistent with other mean-reverting studies, we still keep the main results based on accounting profitability, and do some robustness tests here using operational cash flow as an alternative measure of profitability.

Appendix A. Variable definition

ROA	Net profit before extraordinary items, but after tax, divided by year-end total assets.
V	Firm value divided by total assets at the end of year t. Firm value is calculated as the sum of market value of equity and book value of total liability.
DD	A dummy indicator equalling 1 for non-dividend payers and 0 for dividend-payers.
DVD	The ratio of dividend paid to the book value of common equity at the end of year t.
DV	The difference between the actual measure and the expected value of profitability.
SALE	Net sales.
CAPIN	Total accumulated depreciation to total assets ratio.
LEVERAGE	Debt to equity ratio.
EFFICIENCY	Total sales to total assets.
GROWTH	Invested capital growth.
SOE	A dummy indicator equalling 1 if a firm is ultimately controlled by government.
PC	A dummy indicator equalling 1 if either the chairman or CEO of the company is currently or was formerly an officer of the government or military or a deputy of the People's Congress or People's Political Consultative Conference.
CEN	A dummy indicator defined within the SOE sample, which equals 1 if the SOE is owned or ultimately controlled by the central government and 0 otherwise.
NDV	A dummy variable taking the value of 1 when $DV < 0$, and 0 otherwise.
PDV	A dummy variable taking the value of 1 when $DV > 0$, and 0 otherwise.
SNDV	Square of $DV \times NDV$
SPDV	Square of $DV \times PDV$
ΔROA	$ROA_{i,\ t+1} - ROA_{i,\ t}$
NΔROA	A dummy variable taking the value of 1when $\Delta ROA < 0$, and 0otherwise
PΔROA	A dummy variable taking the value of 1 when $\Delta ROA > 0$, and 0 otherwise
SNΔROA	Square of $\Delta ROA \times N\Delta ROA$
SPΔROA	Square of $\Delta ROA \times P\Delta ROA$

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