Applied Economics, 2014
Vol. 46, No. 15, 1728–1750, http://dx.doi.org/10.1080/00036846.2014.881973

Routledge
Taylor & Francis Group

Reversal in the relative performance of state- and legal person-owned companies during the Chinese split share structure reform

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The split share structure reform was started in 2005 with the object of re-designating state-related, nontradable shares into tradable shares. The article compares the two major forms of state ownership in China (direct or indirect ownership) showing that, close to the reform period, companies directly held by the state experience a significant increase in market performance relative to indirectly held companies. Results suggest that investors' perception about the worth of these two forms of state ownership may have suffered a reversal, thus bringing to light value-related consequences ensuing from protective schemes usual in China and elsewhere. The article also addresses a recurrent pitfall relating to the use in empirical models of fractions of the same total and shows that U-shaped patterns found in the relationship between ownership and performance are transient rather than stable.

Keywords: corporate ownership; ownership and performance; Chinese privatization; legal person

JEL Classification: G18; G32

I. Introduction and Hypotheses

China has experienced sweeping economic reforms over three decades, moving from a planned economy into a largely market-oriented economy. After an initial period where unprofitable small- and medium-sized state-owned enterprises (SOEs) were either privatized or merged while large SOEs were converted into mixed shareholding companies with limited liability, some of the latter were then selected to enlist in newly created exchanges. The first stock exchange in China, the Shanghai Stock Exchange (SHSE), was inaugurated in 1990 and soon after the Shenzhen Stock Exchange (SZSE) was established. At the year-end of 2008, a total of 1604 firms, with a market capitalization of RMB 12136.644 billion, had been listed in these two exchanges.

Although Chinese exchanges serve as important channels for companies' capital raising activities, they were criticized for the small proportion of equity shares in circulation. Nontradable shares, owned by the state or by legal representatives on its behalf, totally accounted for about two-thirds of shares of Chinese companies listed in domestic markets. The existence of such large volume of nontradable shares was referred to as the split share structure – the biggest impediment to the development of China's equity market (Inoue, 2005). Amongst its many negative effects, it stands out the fact that, with such limited proportion of shares being traded, the market

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cannot discipline the management of listed companies. Companies' prices can be manipulated and the rights of minority shareholders (holders of tradable shares) can be violated by majority shareholders (holders of nontradable shares).

Two attempts to release nontradable shares onto the market (in 1999 and in 2001) ended in failure as markets reacted negatively to the huge supply of new shares and also to the established offer price of those shares. Stock prices plunged and the Chinese authorities were forced to postpone all selling outs. Based upon these failures, the Chinese government published in February 2004 a blueprint for reforming the country's capital markets (the 'State Nine Opinions'). The 'Opinions' stressed the importance of converting nontradable shares into tradable shares while safeguarding the interests of owners of tradable shares. On April 2005, the government launched a new pilot programme to dispose of state-owned shares. This time, rather than imposing a one-size-fits-all solution, the programme tried to be flexible. Owners (both of tradable and of nontradable shares) were allowed to come up with their own proposals on how to dispose of nontradable shares. Each of the proposed sale methods should be approved by an extraordinary shareholders' meeting and supported by at least two-thirds of the tradable shares' owners, thus explicitly safeguarding the interests of smaller investors. Where sale proposals were approved, owners of nontradable shares were forbidden to sell their shares for the first year and the sale in the following year was limited to no more than 5% of all outstanding shares. The first phase of the pilot programme included four medium-sized companies. Then, in the second phase, a total of 42 companies took part. Due to the programme's flexibility and the consideration of the interests of owners of tradable shares and also due to the trading conditions on the secondary market, stock prices remained stable thus fostering the progress of the reform. Soon after the second phase another 40 companies unveiled their reform proposals and then an average of 20 companies did so every week. The reform swiftly extended across the whole *A* share[1] market and the fact that it was well received encouraged virtually all issuers on the SHSE and SZSE to support it.

This study draws attention to a fundamental distinction between direct and indirect state ownership during privatization processes. In China, in addition to direct state ownership, there is also an institutional type of indirect state ownership known as 'legal person' ownership. Legal persons are companies legally mandated to hold shares of other companies on behalf of the state and following the state's policies.[2] Although this type of ownership is specific to China, its tenet is widespread. Indeed, the sole originality of Chinese legal persons stems from being institutional; otherwise, state indirect influence in companies can be found in many other countries.

The study hypothesizes that impending privatization is capable of inducing a reversal in the perception of investors regarding the relative worth of companies directly and indirectly held by the state. Expectations regarding the easing of multiple principal costs plus risk premium effects associated with share disposals are the two major reasons adduced in the article for expecting such reversal.

So long as state intervention in the economy is expected to last, companies where legal entities own shares on behalf of the state are likely to be favoured by investors. It is believed that agency costs associated with state ownership are mitigated in this case. Legal persons tend to be more profit-oriented than the state, having expertise and incentives to monitor companies they own (Xu and Wang, 1999; Qi *et al*., 2000; Delios and Wu, 2005; Wei *et al*., 2005); they also have better connections with other enterprises and with local governments (Sun and Tong, 2003); they may even enjoy lower financing and bankruptcy costs. In contrast, agency arguments, summarized in the 'Literature review' section, fully apply to companies directly held by the state. Indeed, during the period preceding the initial attempts to re-designate nontradable shares into tradable shares, direct state ownership was not favoured by investors as noted by Xu and Wang (1999), Qi *et al*. (2000), Delios and Wu (2005), and by Wei *et al*. (2005).

When privatization is announced or when it is perceived by investors as forthcoming, it is likely that indirectly held companies, now striped from privileges, may face an increase in costs whereas, for directly held companies, investors most likely will focus on gains in efficiency and reductions in agency costs. We believe, however, that the major reason to expect a reversal in investors' perception of the relative worth of state- and legal person-owned companies is the risk premium associated with share disposals. Legal persons, now fully oriented towards profit, may diversify their holdings (Li *et al*., 2011) or, more likely, they may sell unattractive companies while keeping attractive ones. McGuinness (2009) mentions reformed companies where legal holders sought to impose lock-up arrangements on their re-designated shares that go well beyond official requirements of the reform. Investors will thus be aware of this, that legal share sell-outs may bring about not just dilution but also a winner's curse. In contrast, state sell-outs are expected to take into account general welfare imperatives. It is not plausible, for instance, that state holdings be sold in the face of a feeble

[1] *A* shares owned by Chinese domestic investors, *B* shares owned by foreign investors in Chinese exchanges, *H* shares domestic companies traded in Hong Kong, *N* shares domestic companies traded in the United States.

[2] 'Legal persons are domestic institutions such as other stock companies, state-private mixed enterprises and nonbank financial institutions' (Qi *et al*., 2000).

market; nor would the state engage in rigid profit-seeking policies namely diversification policies suggested by Li *et al*. (2011) in connection with the reform. In this respect, we believe that a clear distinction should be drawn between state and legal owners. Finally state sell-outs, when they come, will follow general guidelines rather than a sense of opportunity (Inoue, 2005) and compensation ratios[3] are also more generous in the case of state-held companies (Firth *et al*., 2010).

The plunge of Chinese *A* shares before the reform (2002–2004) was most likely driven by dilution fears; later on, when the reform took hold, such fears waned as the various moratoria and other protective devices built-into and around the reform made it clear to all that re-designation would not make it easier for state-related parties to sell-out (McGuinness, 2009). With dilution fears placated, agency costs become affordable and companies' internal efficiency expands, as observed in 2006 and 2007. The global financial crisis, which intensified in 2008, may also have helped widening the price gap between re-designated state- and legal person-held shares. State control is reassuring to investors at times of crisis as it signals greater and easier access to capital when and if needed. The mentioned unwillingness to worsen feeble market conditions and even a belief in state intervention to boost markets in extreme cases also plays an important role in adding value to state-held companies. But, as this article documents, the observed reversion had begun much earlier.

Given the above, companies informally favoured by the state may end up losing value during privatization processes. The intention behind the enacting of Chinese legal persons, to provide companies with some type of indirect control and support, is akin to other protectionist policies abundant in Southern Europe and in Latin America. Thus conclusions to be drawn from the Chinese case are probably applicable elsewhere.

Concerning the extant literature, the article shows legal person ownership in a new light. Legal entities are by far the biggest shareholders in Chinese markets but, after being the object of some interest, they now tend to be regarded either as an extension of local governments or as unconnected, inconsistent group of designations with little in common (Sun *et al*., 2002; Chen *et al*., 2009; Kang and Kim, 2012; and others). Our results suggest that, in spite of their diversity, legal entities educe a clear, consistent reaction in markets. Such reaction stems, in our view, from investors' perception that there is a trait which is common to all legal persons: that of being a protective scheme with associated future costs.

The article uses straightforward methodologies which, in some cases, compare favourably with recent trends. For instance, instead of the popular method of matching, the article uses residuals to make observations comparable. By fully encompassing the available data, residuals increase the sample power while avoiding selection biases inseparable from matching. The article also offers an in-depth discussion of a recurrent pitfall relating to the use, in empirical models, of fractions of the same total. Finally, in the face of frequent claims that the relationship between state ownership and performance should be U-shaped, the article argues that such pattern may be transient.

The remainder of the article is organized as follows: Section II reviews the literature on privatization; Section III describes data and introduces methodologies employed; and Section IV reports results. Finally Section V offers some concluding remarks.

II. Literature Review

Agency costs theory (Jensen and Meckling, 1976) suggests that company performance should depend on the distribution of share ownership amongst managers and other owners. The theory thus highlights the possibility that different types of share owners may influence performance differently. Where the types of share owners considered are specifically the state versus private owners, the body of literature known as property rights theory (Alchian, 1961; Williamson, 1969) suggests that privately held companies should outperform state-held companies and that privatization should impact corporate performance positively. The agency argument for privatization is that shares distributed to private investors should incentive the monitoring of agents. In addition, privatization reduces agency costs by partially solving the agent's conflict in dealing with diverging state objectives for social welfare maximization versus firm objectives for profit maximization. To this, the property rights theory adds that the state is not effective in promoting and monitoring performance as specialization of ownership cannot take place in this case (De Alessi, 1980).

Privatization leads to the decentralization of state property rights, so that resource allocation mechanisms no longer focus on central planning but on the market. This increases both control or income rights to private owners and managers, being therefore likely to improve performance (Aharoni, 2000). Although privatization is considered as an important means to invigorate SOEs, evidence on the effect of privatization on corporate performance is mixed: Boardman and Vining (1989), Vining and Boardman (1992), Megginson *et al*. (1994), Boycko *et al*. (1996), and Dewenter and Malatesta (2001) among others, empirically show that government ownership is less efficient than private ownership; but Caves and

[3] When the Chinese state re-designates shares in a company, every holder of tradable shares is offered new shares in proportion to his/her holdings. This is known as the compensation or consideration ratio.

Christensen (1980), Wortzel and Wortzel (1989), Martin and Parker (1995), and Kole and Mulherin (1997) suggest the opposite.

Regarding specifically the Chinese privatization process, Graf *et al*. (1990) find that the management of state enterprises is highly hierarchical: the Assets Management Bureau is on the top of a pyramid which spreads down to local bureaus responsible for the appointment of managers, typically having to monitor the performance of thousands of SOEs. Such a top-down approach is ineffective in recruiting capable managers and in monitoring them. Thus privatization should benefit firm performance. In spite of this, the literature on privatization in China is far from unanimous. Lardy (1998), after enumerating problems in both SOEs and the banking sector, suggests that privatization is the only means to successfully reform the state-owned sector. Zhang (2006), based on what he perceives as serious governance problems in SOEs, concludes that privatization is the only way out. Xu and Wang (1999) note that Chinese privatization efforts are ineffective, leading to little or no changes in board composition. Empirical findings reported by Wei and Varela (2003), Sun and Tong (2003), and others confirm that privatization is beneficial to performance but Chen (2001) finds a positive relation between state ownership and performance, thereby casting doubts on the potential benefits of privatization. Sun *et al*. (2002) support this view, adding that performance is hampered by too much or too little of state ownership. Wei (2007) also notes that large state holdings impede performance while Qi *et al*. (2000) find that privatization is effective in improving sales and workers' productivity but not profit returns.

In an attempt to sort out contradictory views, Chen *et al*. (2009) propose a division of Chinese state-related holdings in three groups (Asset Management Boards, local and central government) suggesting that such division better explains performance. Kang and Kim (2012) propose a division based on the type of dominant owner while Gunasekarage *et al*. (2007) and Ma *et al*. (2010) note that ownership concentration rather than type is the major factor in explaining performance.

Most authors test the significance of squared fractions of state and other ownership fractions, searching for U- or inverted U-shaped relationships with performance. Wei and Varela (2003), Delios and Wu (2005), Wei *et al*. (2005), Ng *et al*. (2009), Hess *et al*. (2010), and others found that the best performance is observed in both wholly private and wholly intervened companies; Sun *et al*. (2002) contends that the opposite is verified. Reasons adduced by the authors to expect U- or inverted U-shaped patterns mostly apply to stable periods and are worth noting so long as it is believed that such patterns are stable as well.

The hypothesis that legal person ownership has a positive impact on performance is discussed by Xu and Wang (1999), Qi *et al*. (2000), and Sun *et al*. (2002) using performance measures other than Tobin's *Q*. In general it is found that legal persons do benefit performance while direct state ownership impedes it; but the latter authors contend that legal persons perform a similar role as that of the state thus (according to their view) improving performance. Of greater interest to this study are authors that assess performance using Tobin's *Q*: Sun and Tong (2003) observe the period 1994–1998, finding that legal person ownership benefits performance while direct state ownership hampers it; Wei *et al*. (2005) and Delios and Wu (2005) both observe the period 1991–2001, finding a negative relationship between state ownership and performance while for legal persons their views diverge; Wei and Varela (2003) observe the period 1994–1996 finding that state ownership hampers performance.

An early study on the reform is Zhao *et al*. (2006) who study its price impact. Jiang *et al*. (2008) find that just before the reform, the fraction of state-held shares favours performance. Firth *et al*. (2010) note that compensation offered to holders of tradable shares is high for state owners when compared to mutual fund owners. To this Li *et al*. (2011) contend that compensation should decrease with a high bargaining power of nontradable shareholders who may also raise compensation to sell holdings and diversify. Liao *et al*. (2011) examine the price reaction on the expiration day of lockup periods. Hou and Lee (2012) find that the discount at which Chinese foreign-owned shares are traded lessens after the reform, suggesting the easing of conflicts of interest between dominant and minority shareholders. Beltratti *et al*. (2012) find that the reform benefits small, less liquid, and historically neglected stocks. Yu (2013) finds that the reform improves profitability in state-held firms.

III. Data and Empirical Methodology

The study uses yearly data from companies listed on the SHSE and the SZSE during the period 2002–2008. In the case of the SZSE, both the main board and the small- and medium-sized firms board (SME) are included. The China Stock Market and Accounting Research Database (CSMAR) is the major source of our data. Abnormal stocks (ST, PT),[4] issuers of *B* shares only (Sun *et al*.

[4] According to the Chinese Securities Law and Company Law, companies become ST (special treatment) when (a) suffer net losses in two consecutive years or market value descends below book value; (b) are ordered by the CSRC to fix significant accounting mistakes leading to near 2-year losses after the fixing; (c) are ordered to fix accounting information within a larger period; (d) are not able to provide semi-annual or annual reports within a regulated period of time. PT (Particular Transfer) companies are those with 3-year losses.

2002), and financial services are excluded. Companies with less than five consecutive years recorded are also excluded as, at least, years 2004 (the year previous to the reform), 2005 and 2006 (the years where the reform took hold) must be examined. The final sample contains 1183 companies: 402 from the SZSE, 38 from the SZSE SME (those that were listed during its first trading year, 2004), and 743 from the SHSE.

As a measure of market performance Tobin's Q is adopted, following, amongst others, Sun and Tong (2003), Wei and Varela (2003), Delios and Wu (2005), Wei *et al*. (2005), Ng *et al*. (2009), and Ma *et al*. (2010). Underpinning the use of Q is the assumption that the market values the firm as a bundle of additively separable tangible and intangible assets (Griliches, 1981) and that ownership is amongst those intangible assets valued by the market (Morch *et al*., 1988; McConnell and Servaes, 1990; and others). It follows from the same underpinning that additive effects such as ownership are associated with the logarithm of Q. The study uses the natural logarithm of Q[5] achieving a major increase in homoscedasticity and normality of error terms in models.

Another performance measure adopted is Return on Assets (ROA), widely used in the literature (Wang, 2005; Chen *et al*., 2009; Ma *et al*., 2010; and others). Rather than expectations regarding future profits, ROA reflects competitiveness and internal efficiency (cost reduction capacity, for instance). In case managers were led to regard the impending reform as selective, then ROA may have reflected an effort to qualify.

Yearly frequencies or averages of key variables are shown in Table 1. Performance, as reflected by Tobin's Q, plunges from 2.5 in 2002 to less than 1.5 in 2005, then it surges to a maximum of 3.5 in 2007, and plunges again in 2008. ROA and Market-to-Book ratio follow the same pattern as Q. Leverage increases slowly over the period from values around 0.5 to near 0.6; a slight contraction is observed in 2006 and 2007, followed, in 2008, by a robust increase. Assets of Chinese companies increase 1.5 times during the period 2002–2007 and then suffer a slight contraction in 2008. Ownership concentration (the largest 10 owners' share) decreases over the period from 60% to below 50% with just a slight increase in 2004. In no instance did the Chinese state or legal persons create new positions in traded firms nor did they expand existing positions during the period:[6] growing legal person average fractions stem from the entrance of new firms, not from increases in holdings. This precludes speculation about endogeneity in models explaining performance in terms of state ownership: as the state never increased any of its holdings, it did not boost positions in firms that became attractive during the period; it might have sold positions in unattractive firms before 2005 but, after that, the dimension and swiftness of the reform precludes selective re-designation.

In the study, only initial ownership positions are considered, referring always to the first year recorded (for most companies, this year is 2002). For data interpretation purposes, initial state (S) and legal person (L) share fractions are encoded into four ordinal classes: firms where S initially owns no shares ($S = 0\%$), those where S owns up to 25% of shares ($0\% < S < 25\%$), those with 25–50% of shares ($25\% \leq S < 50\%$) and finally firms with over 50% of shares ($S \geq 50\%$). Similar encoding is applied to L.[7] Ordinal classes encoded from S and L are referred to here as S_CL and L_CL.

The $L = 0\%$ class mostly comprises firms traded in the SZSE SME board. The majority of these firms has less than 5 years recorded (trading in the SZSE SME board begun in 2004) having thus been excluded. Classes $S = 0\%$ and $L \geq 50\%$ account for more than half of the sample, largely including the same firms.[8] They are the 'rank and file' amongst Chinese companies, being smaller and less leveraged than average and also the less loved by investors, their Tobin's Q (Q) and ROA being below average. The $S \geq 50\%$ class and the few $L = 0\%$ cases include some 190 companies, larger but not more leveraged than the average. They are the reform net winners: from 2004 on, Q surpasses the average; ROA is below average at the beginning of the period but a surge in 2003 leads to a higher than average ROA.

Ownership type clearly influences leverage, size, and other variables: companies where initially the state or legal persons had no holdings are, until 2007, the less leveraged of all; but then, in the course of 1 year, they became the most leveraged of all. Heavily intervened companies ($S \geq 50\%$) are 1.6 times bigger in terms of assets as a tighter state control is exerted over firms employing significant workforce, distributing business amongst smaller companies. For classes $S = 0\%$ and $L = 0\%$, the average number of shares held by the board increases steadily from almost nothing in 2002 to many millions in 2008 while class $S \geq 50\%$ shows no shares in

[5] Tobin's Q is computed as the sum of the market value of equity, the book value of short-term debt, and the book value of long-term debt, divided by the book value of total assets.

[6] In four cases (two in SZSE and two in SHSE) shares were swapped between state and legal persons.

[7] Encoding of ownership into classes has been used by Ma *et al*. (2010) amongst others. Contrary to such authors, classes of ownership levels above 50% are not considered here as we believe that associated control possibilities, not only relative magnitudes are significant for investors.

[8] Most of the $L \geq 50\%$ companies are also $S = 0\%$ companies but the reverse is not true.

Table 1. Number of companies listed and averages by year (2002–2008)

Year	2002	2003	2004	2005	2006	2007	2008
Number of listed companies	1008	1079	1165	1178	1181	1161	1173
Number of reformed companies	0	0	0	219	854	77	18
Average fraction of state shares	0.161	0.142	0.126	0.104	0.013	0.004	0.001
Average fraction of legal persons shares	0.429	0.442	0.449	0.364	0.037	0.007	0.002
Average Tobin's Q (Q)	2.3025	1.8736	1.6583	1.3376	1.7483	3.4123	1.6043
Average Return on Assets (ROA)	2.4635	2.8936	3.3991	1.8807	2.3555	4.7086	2.0336
Average Market-to-Book ratio	2.3594	3.0389	2.3129	1.8472	2.2834	6.9112	2.2597
Average logarithm of assets (SIZEN)	9.1657	9.2023	9.1955	9.2322	9.2589	9.3210	9.3282
Average Leverage (LEV)	0.4488	0.4651	0.4815	0.5024	0.5178	0.5041	0.5208
Average share of 10 largest shareholders (TOP10)	0.6210	0.6195	0.6260	0.6108	0.5551	0.5356	0.5246
Average log of number of shares in the board (NSH_B)	5.5571	5.9799	6.2309	6.3434	6.4072	6.4726	6.6568

Notes: Finance industry and companies with less than 5 years recorded are excluded. Average fractions of shares held by the state and by legal persons are set to zero when a company is reformed. 15 companies were not reformed during the period. Tobin's Q is the sum of the market value of equity, the book value of short-term debt and the book value of long-term debt, divided by the book value of total assets; ROA is the ratio of Net Income to Total Assets; Market-to-Book ratio is the market value divided by Owner's Equity; LEV is the ratio of Total Debt to Total Assets; SIZEN is the logarithm of Total Assets; TOP10 is the fraction of the 10 largest holdings; NSH_B is the decimal logarithm of the number of shares in the board. Assets, Debt, Equity, and Net Income are adjusted for inflation with 2002 as the base year.

the board until 2006 and then it surges vigorously; but boards where legal persons prevail ($L > 25\%$ and above), show little appetite for shares throughout. The appendix contains descriptive statistics for Q, ROA, and leverage by year and by ownership class.

When companies are grouped into classes of initial state and legal ownership (S_CL, L_CL) and averages of Q are plotted year by year, a reversal in investors' perception of the relative worth of S and L ownership becomes apparent. Figure 1 graphically illustrates the unfolding of such reversal.

In the case of ROA, it was mentioned that ownership classes $S \geq 50\%$ and $L = 0\%$ favour efficiency, the opposite of that verified for classes $S = 0\%$ and $L \geq 50\%$. China's surging growth rates through the period meant that its most strategic companies (i.e., those with higher state control) became more profitable. Small- and medium-sized listed enterprises, mostly owned by legal persons, are likely to be less protected from competition than their larger counterparts. The massive increase in the number of privately controlled firms (many of which are unlisted) in China during the period would likely have eaten-into

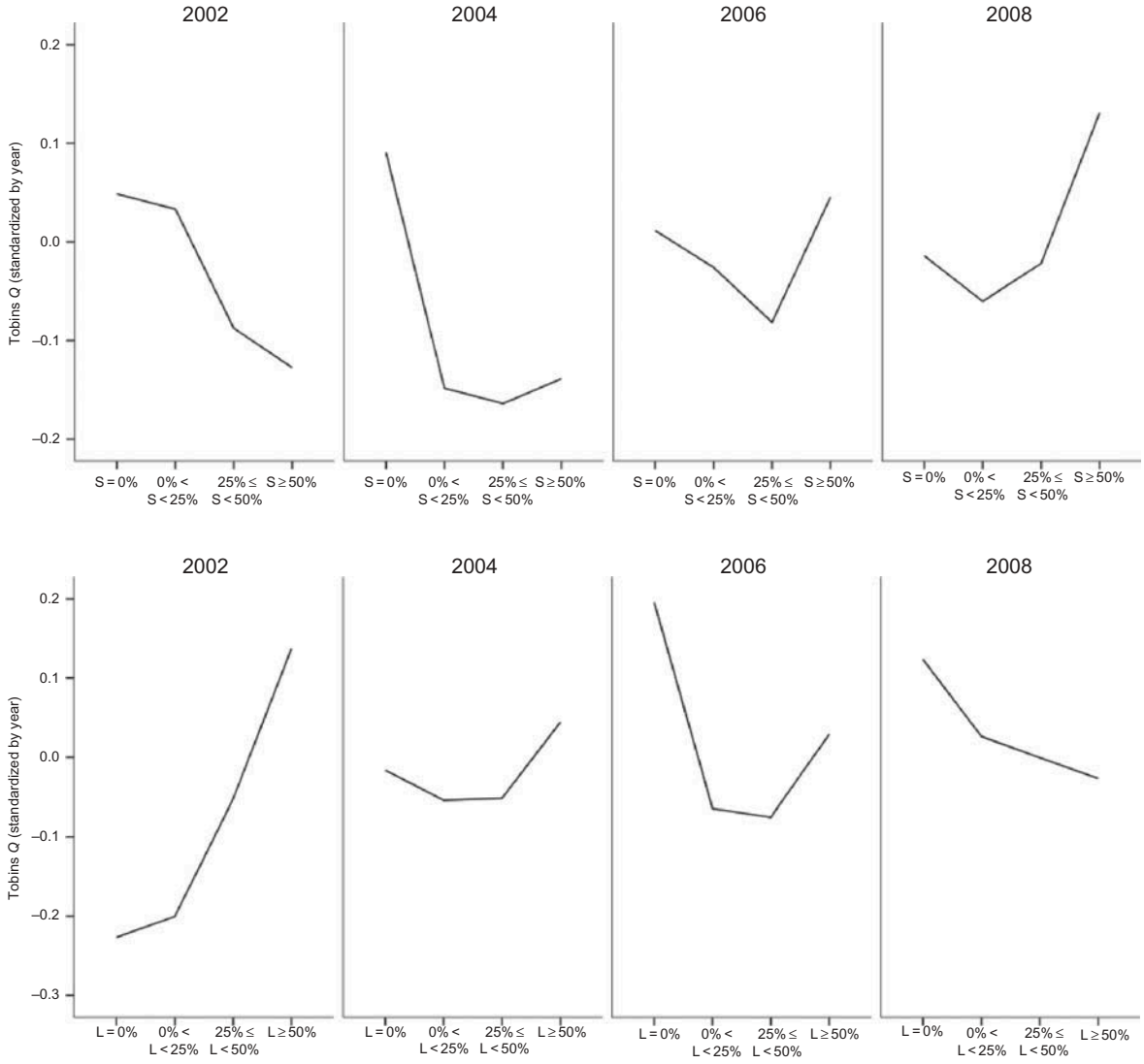

Fig. 1. How Tobin's Q interacts with increasing state and legal person ownership classes along the period 2002–2008

Notes: X-axes show S_CL and L_CL classes of increasing state and legal person ownership: state classes (S_CL) are shown above, legal person classes (L_CL) are shown below. Y-axes show corresponding mean Tobin's Q standardized separately by year so that graphics may share the same Y-axis. In 2002, performance is hampered by increasing state ownership while, for legal persons it is favoured. In 2008, for the same companies, performance now is favoured by state ownership above the $S < 25\%$ level while, for legal person ownership, it is hampered. Tobin's Q is computed as the sum of the market value of equity, the book value of short-term debt and the book value of long-term debt, divided by the book value of total assets, with Assets, Debt, and Equity adjusted for inflation with 2002 as the base year.

market share and eroded profit margins for many such companies.[9] Then a reversal in ROA is also expectable.

It is worth asking whether such reversals are significant and if so, whether they bear relation to the concomitant reform. In order to test these hypotheses, a linear modelling tool[10] is first used to obtain comparable performance in the form of residuals: variability unaccounted for by effects introduced in a model. The objective is similar to the matching of cases or the adjustment of returns for risk. The use of pooled fixed effects helps reducing omitted variables' and selection biases. Linear models can be described as a combination of three types of effects: factors (which partition the sample into cells), covariates, and interactions between effects:

$$Y_i = \mu_0 + \Sigma D_K + \Sigma b_j X_{ij} + \Sigma I_m + R_i \qquad (1)$$

here the residual or unexplained variability R_i is obtained from Y_i, the ith case in Y. Factor k explains Y_i as a deviation D_k from an overall mean effect μ_0; the jth covariate, X_j explains Y_i by means of a slope coefficient b_j; interactions I_m capture relationships amongst effects. Besides the logarithm of Tobin's Q, (LOG_Q), residuals are obtained from ROA and also from leverage (LEV) for contrasting purposes. Effects used to make observations comparable include year (YEAR), exchange (EXCH), and industry (IND)[11] factors plus covariates such as the logarithm of Total Assets (SIZEN) as a proxy for size and, for LOG_Q and ROA, also the ratio of Total Debt to Total Assets (LEV).[12] Note that the YEAR factor accounts for yearly levels thus effectively equalizing observations with regard, not just to market level, but also to the period's broad trends.

We have also drawn on other authors' findings and test the equalizing potential of ownership structure covariates such as concentration (TOP10 as in Wang, 2005; Ma *et al*., 2010) and variables relating to the board of directors[13] such as the number of shares in the board (NSH_B). Binary factors signalling regulated companies (DUM_I, Sun *et al*., 2002) and companies with *A* shares only (DUM_A) are also used for the same purpose. Regulated companies are, in average, 2.5 times larger and 5% less leveraged than the nonregulated ones. The 10% of companies that issue shares other than the A (domestic investor) type are larger, less efficient and more leveraged than the average.[14]

All variables mentioned above are examined as candidates to explain performance. Effects or interactions which do not apportion any increase in explained variability are then removed from the final model. *A priori* excluded are variables that may convey information on ownership (*S*, *L*, *A*, *B*, *H*, *N* share types, S_CL, L_CL ownership classes, and others) or performance variables other than the variable explained.

After obtaining residuals, the likelihood of observing a reversal of a given magnitude when in the population it does not occur is tested using within effects designs: regressions explain final residual performance *R_fin* in terms of initial residual performance *R_ini*, ownership fractions *S* and *L* at the beginning of the period and control variables X_k:

$$R\_fin_i = C_s + b_{Rs} R\_ini_i + b_s S_i + \Sigma b_{Sk} X_{ki} + \varepsilon_{Si} \qquad (2)$$

$$R\_fin_i = C_L + b_{RL} R\_ini_i + b_L L_i + \Sigma b_{Lk} X_{ki} + \varepsilon_{Li} \qquad (3)$$

C are constant terms, b are slope coefficients, X_k are control variables, and the ε_i account for unexplained variability. The null hypothesis is rejected if b_S, b_L are significant with positive and negative signs, respectively. Repeated measures are used to the same end, apportioning two types of tests: within subject tests, assessing the significance of interactions between changes in performance (the tested effect) and ownership fractions; and between-subject tests, assessing the effect of ownership fractions on initial and on final performance separately. The null hypothesis is rejected when interactions are significant. A full reversal would also require that final performance is significantly improved by *S* and hampered by *L*, the opposite being verified for initial performance.

As depicted above, the significance of *S* and *L* coefficients is estimated separately. The simultaneous inclusion of S and *L* into the same model would distort results, not just *via* multicolinearity (Wei *et al*., 2005; Chen *et al*., 2009) but principally because negative correlation between S and *L*, being spurious, may induce deceptive

[9] An anonymous reviewer, to whom the authors are grateful, contributed the two sentences.
[10] GLM, a well-known algorithm embedded in most statistical packages.
[11] Year factor: 2002 to 2008, 7 partitions. Exchange factors: SHSE, SZSE, SZSE SME, 4 partitions. 21 industrial partitions: Agriculture, Conglomerates, Construction, Electronics, Financials (excluded), Food & Beverage, Information Technology, Machinery, Media, Metals and Nonmetals, Mining, Other manufacturing, Paper and Printing, Petrochemicals, Pharmaceuticals, Real Estate, Social Service, Textiles and Apparel, Timber and Furnishings, Transportation, Utilities, Wholesale, and Retail.
[12] Total Assets, Total Debt, Total Equity, and Net Income are adjusted for inflation with 2002 as the base year.
[13] Number of directors and independent directors; ratio of the two; number of shares held by the board; ratio of this to number of outstanding shares; yearly number of board meetings.
[14] This contradicts the view that companies with foreign owners (*B, H*, or *N* shares) exhibit better performance due to their access to international capital and pressure for performance. McGuinness and Ferguson (2005) examine the relationship between ownership and performance of Chinese companies listed in Hong Kong (*H* shares), finding a negative relationship between the proportion of tradable shares and performance.

conclusions. Since $S + L + T = 1$ (T being the remaining, mostly tradable fraction), the joint distribution of S, L, and T is bi-dimensional: in the Cartesian axes defined by S, L, and T, all cases lie in a plane inclined 45° in relation to axes, intercepting each axis at the value of 1. When S and L are large, cases tend to form a band or 'milky way' parallel to the S, L plane. Negative correlation observed between S and L stems from the projection of such band into the S, L plane, thus being intrinsic to the relationship, not to data. For this reason, the inclusion of S and L in a single model aimed at explaining performance amounts to the addition of a nearly constant value, reducing, rather than increasing, unexplained sums of squares. Differences in performance driven by S or L are obscured by such reduction in variability. Only where two such fractions are small (or at least one of them is) can they safely be put together in a regression or other modelling tool where estimated covariances play a role. This is not the case of the Chinese split share structure where typical $S + L$ amount to two-thirds of the total.[15]

Since S and L are separately tested, a conservative rule of thumb is adopted in the article to test the hypothesis that the unique event *S and L* is significant: the null hypothesis is rejected when both p-values associated with S, L coefficients are below the usual level (typically 0.05) while their product is below that level squared (0.0025). T is included in all tests, ensuring that the separate testing of S and L will not induce dependence in error terms *via* omitted variables' bias. Indeed, the only difference between models using pairs $\{S, T\}$, $\{L, T\}$, or $\{S, L\}$ lies in the angle from which the same variability is assessed; but importantly, in $\{S, T\}$, $\{L, T\}$ cases, fraction T is small.

Finally the article investigates whether the reform influences the reversal. In the face of previous attempts to sort out the split share structure, investors may have assumed a perception bordering on privatization well in advance of the reform year. The reversal may have begun unfolding earlier as well. But although the reform cannot explain the reversal, it may have fostered it, restrained it, or in some other way interacted with it. In order to investigate such link, companies are lined up according to their reform's year and then performance is explained in terms of ownership fractions S and L and by control variables. If, say, in the year –1 before reform a significant deviation from zero is observed in mean residuals and if such deviation is absent from earlier years, then it may be concluded that the reform left a mark. Recall that mean residuals are zero for all years, exchanges, industries, sizes, and other variables used to obtain them. The difficulty here is that 854 out of 1183 companies are reformed in the same year, 2006. Differences from zero that may remain are necessarily small, not because the reform effect is itself small but because most of it was removed together with the 2006 effect.

IV. Results

Table 2 summarizes the outcome of the model-building process employed to obtain effect-free residuals from LOG_Q, ROA, and LEV. Asterisks signal interactions. All effects are fixed effects and type III sums of squares are used in computations.

In the case of LOG_Q, the effect of each of the 21 industrial classes is accounted for in an overall basis but the effect of each of the 3 exchange boards is accounted for on a yearly basis. Only year-specific interactions are significant and only four amongst all covariates are significant, the effects of concentration and number of shares in the board being overall whereas size and leverage are yearly. Most of the variability of LOG_Q is explained by cross-section effects. Once yearly interactions enter the model, the main effect YEAR apportions no extra variability, being excluded but, indeed, yearly residual averages equal zero. The explained variability is high (56%).

It should be noted that YEAR is not a sequence nor is the model intended to recognize serial correlation. Residuals thus preserve time-related information, namely the way initial state and legal ownership may affect final performance.

Table 3 shows initial and final Q, ROA, LEV, and the respective residuals for each company, averaged by class of initial ownership S_CL and L_CL. The corresponding changes from initial to final observations are also displayed. In the case of Tobin's Q, changes are negative denoting an overall decrease in performance; but the larger initial state ownership is, the smaller such negative change is; in the case of legal ownership the opposite is verified. Apparently, state ownership has favoured market performance during the period while legal person ownership has hampered it, the result being a reversal in the relationship observed at the beginning of the period.

The reversal is observed in residuals of LOG_Q and ROA but not in LEV's residuals. This strongly suggests that reversals are effects on their own right, not just the result of spurious or inevitable influences. Figure 2 shows the unfolding over the period of trends that may exist in residuals of companies with similar ownership structures, displaying yearly averages of differences between initial residuals and each year's residual. For LOG_Q and ROA, classes $S \geq 50\%$ or $L = 0\%$ show upward trends while classes $L \geq 50\%$ or $S = 0\%$ show downward trends.

Again, LEV and its residuals are affected by initial ownership but not in the way Q or ROA are: increases

[15] The literature mentions other cases where boundaries constrain and unduly reduce variability (Trigueiros, 1995). Instruments or transformations (Chen *et al*., 2009) may reduce the S, L correlation thus avoiding multicolinearity.

Table 2. Linear model used to generate residuals of LOG_Q, ROA, and LEV

Source of variability	Sum of squares	DF	Mean square	*F* ratio	Significance
I: Dependent variable: natural logarithm of Tobin's *Q* (LOG_Q)					
Corrected model	1007.889	68	14.822	152.346	0.000
Overall mean effect	250.919	1	250.919	2579.051	0.000
IND	44.851	20	2.243	23.050	0.000
YEAR * EXCH	12.866	12	1.072	11.021	0.000
NSH _B	2.644	1	2.644	27.178	0.000
TOP10	72.704	1	72.704	747.286	0.000
YEAR * SIZEN	243.380	7	34.769	357.367	0.000
YEAR * LEV	14.499	7	2.071	21.289	0.000
YEAR * DUM_I	4.409	7	0.630	6.473	0.000
YEAR * DUM_A	2.952	7	0.422	4.334	0.000
Error	766.361	7877	0.097		
Corrected total	1774.250	7945			
Adjusted $R^2 = 0.56$					
II: Dependent variable: return on assets (ROA)					
Corrected model	117771.034	51	2309.236	60.691	0.000
Overall mean effect	9591.052	1	9591.052	252.071	0.000
IND	5960.944	20	298.047	7.833	0.000
EXCH	2251.441	2	1125.721	29.586	0.000
YEAR * DUM_A	1318.978	13	101.460	2.667	0.001
TOP10	3433.225	1	3433.225	90.232	0.000
NSH _B	271.329	1	271.329	7.131	0.008
YEAR * SIZEN	17989.198	7	2569.885	67.541	0.000
YEAR * LEV	79587.096	7	11369.585	298.814	0.000
Error	300473.326	7897	38.049		
Corrected total	481497.874	7949			
Adjusted $R^2 = 0.28$					
III: Dependent variable: debt to assets ratio (LEV)					
Corrected model	38.677	43	0.899	24.784	0.000
Overall mean effect	1.134	1	1.134	31.238	0.000
IND	13.499	20	0.675	18.597	0.000
EXCH	1.403	2	0.702	19.331	0.000
YEAR * DUM_I	0.830	13	0.064	1.759	0.044
TOP10	1.118	1	1.118	30.808	0.000
YEAR * SIZEN	9.719	7	1.388	38.259	0.000
Error	286.889	7905	0.036		
Corrected Total	325.566	7948			
Adjusted $R^2 = 0.11$					

Notes: Three linear models where LOG_Q, ROA and LEV are dependent variables. LOG_Q is the natural logarithm of Tobin's *Q*, the sum of the market value of equity, the book value of short-term debt and the book value of long-term debt, divided by the book value of total assets. ROA is the ratio of Net Income to Total Assets. LEV is the ratio of Total Debt to Total Assets. Assets, Debt, Equity and Net Income are adjusted for inflation with 2002 as the base year. YEAR is the factor accounting for yearly effects; EXCH accounts for exchange effects; IND accounts for industry effects; SIZEN, a covariate, is the logarithm of Total Assets; TOP10 is a share concentration covariate indicating the fraction of the 10 largest holdings; NSH_B is the number of shares in the board; DUM_I signals regulated companies (1 and 0 otherwise); DUM_A signals companies with *A* shares only (1 and 0 otherwise). Asterisks signal interactions. DF means degrees of freedom. Residuals are the variability unexplained by models.

along the period are observed for $L > 50\%$ and $S = 0\%$, these being classes where *Q* and ROA decrease along the period. Thus patterns observed for performance and efficiency do not replicate themselves in the case of leverage.

The significance of the reversal is now tested. Regressions explain final performance (R_Q_FIN) in terms of initial performance (R_Q_INI), ownership fractions (*S*, *L* separately tested plus *T*, broadly the fraction of tradable shares), efficiency at the end of the period (R_ROA_FIN), the number of years in series (N_YEARS), and dummies signalling companies where the first year recorded is 2003 (DUM_3) or 2004 (DUM_4), capturing year-dependent 'going public' or like effects. Other candidates to explain final

Table 3. Averages of initial, final and changes in *Q*, ROA and LEV and in their residuals by initial ownership class of *S* and *L*

	Tobin's *Q*			Residuals of LOG_Q			ROA			Residuals of ROA			Leverage			Residuals of Leverage		
Init. ownership classes	Initial	Final	Change	Initial	Final	Change	Initial	Final	Change	Initial	Final	Change	Initial	Final	Change	Initial	Final	Change
$S = 0\%$	2.391	1.610	−0.780	−0.001	−0.016	−0.015	3.719	2.031	−1.688	0.556	−0.253	−0.808	0.416	0.514	0.098	−0.022	−0.001	0.021
$0\% < S < 25\%$	2.302	1.583	−0.719	0.000	0.007	0.007	2.335	2.101	−0.234	0.309	0.834	0.525	0.449	0.536	0.087	−0.003	0.010	0.012
$25\% \leq S < 50\%$	2.177	1.584	−0.593	−0.023	0.016	0.040	1.160	1.917	0.757	−0.090	0.992	1.082	0.508	0.539	0.031	0.049	0.006	−0.043
$S \geq 50\%$	2.167	1.783	−0.385	0.012	0.079	0.067	1.927	1.715	−0.212	−1.186	−0.273	0.913	0.457	0.558	0.100	0.010	0.026	0.016
$L = 0\%$	2.069	1.720	−0.349	0.023	0.097	0.075	0.875	1.876	1.001	−1.973	−0.685	1.288	0.464	0.520	0.056	0.008	−0.012	−0.020
$0\% < L < 25\%$	2.174	1.666	−0.507	−0.006	0.039	0.045	2.894	2.597	−0.297	0.532	0.831	0.299	0.472	0.544	0.072	0.019	0.010	−0.009
$25\% \leq L < 50\%$	2.292	1.621	−0.671	−0.012	0.009	0.022	2.301	1.190	−1.111	−0.018	−0.271	−0.253	0.435	0.518	0.084	−0.011	0.001	0.013
$L \geq 50\%$	2.427	1.603	−0.825	0.000	−0.025	−0.026	3.573	2.049	−1.524	0.447	−0.096	−0.542	0.421	0.522	0.101	−0.016	0.007	0.023
All cases	2.322	1.628	−0.694	−0.002	0.004	0.006	2.988	1.979	−1.009	0.203	0.023	−0.181	0.437	0.526	0.088	−0.006	0.005	0.011

Notes: Initial averages refer to the first year recorded in companies' series (for most companies, this year is 2002) averaged by initial state, *S* (above) and legal person, *L* (below) ownership class. Final averages refer to the last year recorded (for most companies this year is 2008) averaged by initial state and legal person ownership class. Changes refer to differences between final and initial values averaged by initial ownership class. Tobin's *Q* is the sum of the market value of equity, the book value of short-term debt and the book value of long-term debt, divided by the book value of total assets. LOG_Q is the natural logarithm of Tobin's *Q*. ROA is the ratio of Net Income to Total Assets. LEV is the ratio of Total Debt to Total Assets. Assets, Debt, Equity and Net Income are adjusted for inflation with 2002 as the base year. Residuals refer to the same variables after yearly effects, industry and exchange effects, size and other effects have been accounted for (Table 2 describes models used to obtain residuals).

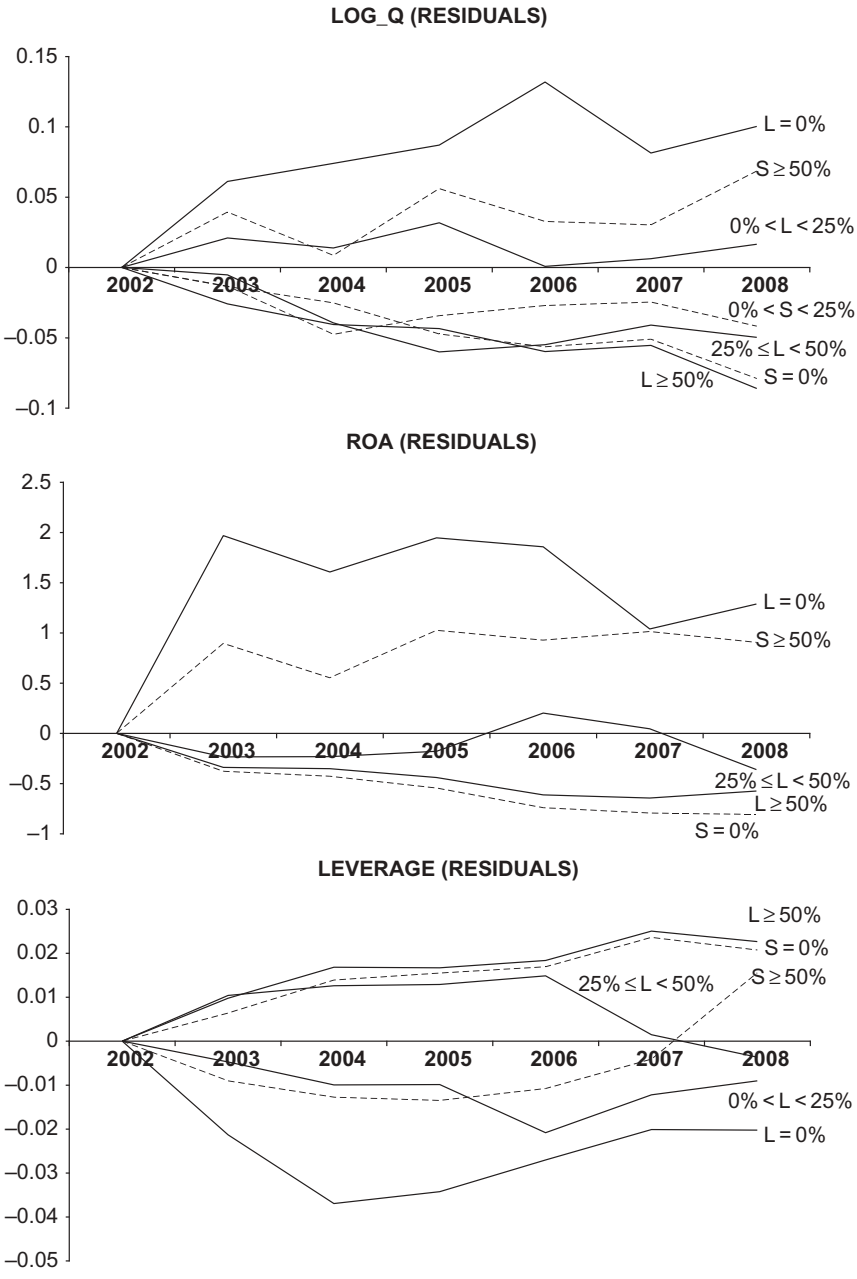

Fig. 2. How performance, efficiency, and leverage evolves during the period 2002–2008 for different ownership classes
Notes: X axes show the year; Y axes show changes from the initial value in series to that year's value, averaged by initial ownership class. Each line shows one specific class of state (dashed lines) or legal person (solid lines) initial ownership. See notes to Table 2 for the meaning of LOG_Q, ROA, and LEVERAGE (or LEV), their residuals and how they are obtained.

performance such as squared *S*, *L* fractions, initial ROA, initial LEV, and others, being nowhere significant, are withdrawn from the final model.

Final ROA (R_ROA_FIN) is similarly explained by initial ROA (R_ROA_INI) where R_Q_FIN is used to account for end-of-period effects while other controlling variables are the same as in previous regressions. For contrasting purposes, final leverage (R_LEV_FIN) is also explained by initial leverage (R_LEV_INI). The outcome of the model-building process is depicted in Table 4 together with results. There are 1183 cases, each company contributing one case.

Repeated measures explain initial and final performance (EFFECT) in terms of *S*, *L* ownership fractions separately tested plus control variables, the same as in regressions. Between-subjects tests incorporate two regressions explaining initial and final performance (the repeated measures) in terms of explanatory variables.

Table 4. Three regressions where final performance is explained by initial performance and by ownership fractions

	S is included					*L* is included				
	b	SE	*t*	Sig.	Tol.	*b*	SE	*t*	Sig.	Tol.
Dependent: R_Q_FIN										
Constant	0.404	0.164	2.464	0.014		0.490	0.167	2.936	0.003	
S	0.132	0.042	3.171	0.002	0.967					
L						−0.108	0.040	−2.708	0.007	0.897
T	0.215	0.083	2.580	0.010	0.952	0.115	0.087	1.315	0.189	0.865
R_Q_INI	0.348	0.036	9.742	0.000	0.986	0.346	0.036	9.667	0.000	0.986
R_ROA_FIN	0.006	0.001	5.245	0.000	0.994	0.006	0.001	5.243	0.000	0.994
N_YEARS	−0.122	0.040	−3.087	0.002	0.140	−0.124	0.040	−3.132	0.002	0.140
DUM_3	−0.090	0.058	1.553	0.121	0.431	−0.101	0.058	1.746	0.081	0.432
DUM_4	−0.257	0.085	3.033	0.002	0.159	−0.280	0.085	3.303	0.001	0.159
F ratio			20.542					20.109		
Sig.			0.000					0.000		
Adjusted R^2			0.104					0.102		
Durbin–Watson			2.045					2.048		
Dependent: R_ROA_FIN										
Constant	2.362	4.103	0.576	0.565		2.368	4.178	0.567	0.571	
S	0.011	1.048	0.010	0.992	0.949					
L						−0.007	0.999	−0.007	0.994	0.888
T	3.134	2.071	1.514	0.130	0.960	3.127	2.171	1.440	0.150	0.873
R_ROA_INI	0.020	0.041	0.480	0.631	0.979	0.020	0.041	0.482	0.630	0.986
R Q_FIN	3.216	0.695	4.625	0.000	0.979	3.216	0.695	4.629	0.000	0.980
N_YEARS	−0.914	0.991	−0.922	0.357	0.140	−0.914	0.992	−0.922	0.357	0.139
DUM_3	−0.689	1.453	0.474	0.635	0.430	−0.690	1.453	0.475	0.635	0.431
DUM_4	−2.115	2.127	0.994	0.320	0.157	−2.116	2.125	0.996	0.319	0.158
F ratio			3.929					3.929		
Sig.			0.000					0.000		
Adjusted R^2			0.017					0.017		
Durbin–Watson			2.008					2.008		

Dependent: R_LEV_FIN										
Constant	1.319	0.110	12.044	0.000		1.308	0.112	11.722	0.000	
S	−0.009	0.028	−0.309	0.757	0.959					
L						0.015	0.026	0.550	0.582	0.893
T	−0.076	0.055	−1.377	0.169	0.960	−0.064	0.058	−1.110	0.267	0.871
R_LEV_INI	0.442	0.037	12.003	0.000	0.939	0.442	0.037	12.031	0.000	0.941
R_ROA_FIN	0.000	0.001	−0.252	0.801	0.975	0.000	0.001	−0.252	0.801	0.975
N_ YEARS	−0.330	0.027	−12.41	0.000	0.137	−0.329	0.027	−12.39	0.000	0.137
DUM_3	−0.354	0.039	9.082	0.000	0.421	−0.353	0.039	9.059	0.000	0.421
DUM_4	−0.658	0.057	11.554	0.000	0.154	−0.656	0.057	11.527	0.000	0.155
F ratio			51.872					51.911		
Sig.			0.000					0.000		
Adjusted R^2			0.232					0.232		
Durbin–Watson			2.089					2.088		

Notes: Dependent variables are R_Q_FIN (final residual LOG_Q in series), R_ROA_FIN (final residual ROA in series) and R_LEV_FIN (final residual LEV in series). Residuals are obtained using models described in Table 2 (I, II and II) respectively. LOG_Q is the natural logarithm of Tobin's *Q*, computed as the sum of the market value of equity, the book value of short-term debt and the book value of long-term debt, divided by the book value of total assets. ROA is the ratio of Net Income to Total Assets. LEV is the ratio of Total Debt to Total Assets. Assets, Debt, Equity and Net Income are adjusted for inflation with 2002 as the base year. Variables being tested for significance are *S*, initial state-held share fraction and L, initial legal person share fraction. For each of the three dependent variables, two regressions are estimated, one where S is included as explanatory variable (on the left), the other where *L* is included as explanatory variable (on the right). Other independent variables used: *T*, the addition of initial *A, B* and *H* fractions; R_Q_INI, R_ROA_INI and R_LEV_INI initial residual *Q*, ROA and LEV respectively; N_YEARS the number of years in each companies' series (5, 6 or 7); DUM_3 and DUM_4 have the value of 1 if the initial year is 2003 or 2004 respectively and 0 otherwise. 'SE' is the standard error of the coefficient; 'Sig.' is the significance of the coefficient; 'Tol.' indicates tolerance to multicolinearity that may exist amongst independent variables: should be above 0.1.

Since previous regressions found no indication that S or L might explain ROA or LEV significantly, repeated measures are applied solely to Q. Table 5 shows results.

It is verified that regression coefficients of S and L do explain market performance significantly while coefficients' signs agree with a reversal's hypothesis. Companies where, at the beginning of the period, the state directly held large positions, perform significantly better at the end of the period while companies where legal persons had prevailed, now perform significantly worse. Interactions between S, L, and EFFECT in repeated measures' tests show that the swerving effects of S and L on performance lead to final performance significantly far apart from initial performance. At the end of the period, between-subjects effects' coefficients show that performance of companies where initially the state prevailed is now significantly higher than expected, while for legal persons it is now significantly lower than expected. The combined effects of S and L thus reverse the pattern prevailing before 2002, described by Sun and Tong (2003), Wei *et al*. (2005), and others, at a time when S used to impede performance while L favoured it. At the beginning of the period, between-subjects effects' are nonsignificant except for T[16] showing that the pattern prevailing in previous years was already abating in 2002–2004. Final ROA residuals are not significantly related to initial ownership or other variables. Initial LEV residuals show persistency over time.

The reversal is robust regarding the introduction or exclusion of effects other than S and L. R_Q_INI illustrates the persistency of Q residuals over the years while DUM_4 identifies a type of company floated in 2004 in SHSZ and in the SME board of SZSE: small, with above-average initial performance and efficiency when compared to other $S = 0$, $L > 25\%$ cases at the time, but then suffering a decline in both efficiency and in performance along 2006 and 2007. The negative, significant influence of N_YEARS on final performance is conditional on the introduction of DUM_4 into the model, both variables modelling the mentioned cluster of companies. Finally, since yearly ROA and Q are correlated, its mutual influence is accounted for in Q and ROA regressions.

Table 3 had shown that both ROA and Q suffer a reversal but now it is verified that, while for Q such reversal is significant, for ROA it is not. This simply stems from the extreme, unexplained volatility of ROA: SEs associated with mean values and coefficients are high, preventing significance. Ratios useful and even popular as tools for financial analysis are not necessarily fitted to statistical analysis as the latter adds the requirement that unexplained variability be reasonably small.

Alternative explanations for the reversal must be capable of treating differently the effects of state and legal ownership on performance, even where holdings are similar in size. Adjustment in Tobin's Q to accommodate for nontradable shares (Bai *et al*., 2006), cannot explain the reversal, being useless in this case. Indeed, classes $S \geq 50\%$ and $L \geq 50\%$ are similar in proportion of nontradable shares yet suffer an opposite fate. Earlier it is mentioned, in connection with the use of leverage as a contrasting effect, that the reversal cannot be a consequence of design, differences in class volatility or other overall mechanism. If that were the case, then the same reversal should be observed in variables such as LEV, subject to the same design and mechanism.

Each record in the series is now identified by the number of years before/after reform, NY_REFORM with values {–3, –2, –1, 0, 1, 2}. Table 6 shows mean values and SDs of residuals of LOG_Q, ROA, and LEV for each of the NY_REFORM classes. Asterisks indicate significant differences from zero mean (one sample t-tests). In the year previous to reform (NY_REFORM = –1), a significant increase is observed in mean Q residuals and the same is observed for ROA at the reform year (NY_REFORM = 0). It is not clear whether such significance should be adjusted to reflect multiple comparisons (Dunn, 1961 and others) because here differences are not expected to be found in all possible NY_REFORM classes. When corrected, levels remain significant or not depending on the adjustment used.

Given this, an in-depth test of the significance of the relationship between reform and performance is attempted using a linear model where yearly residual performances R_Q are pooled 3 years before the reform to 2 years after and then explained by initial ownership S or L, by a lineup factor (YEAR_MINUS_1) assuming the value of 1 one year before the reform and zero otherwise, by initial performance R_Q_INI, by interactions amongst the above, and by a variable controlling for yearly efficiency (R_ROA). Initial and final records are removed from the sample. Tests are also conducted for yearly residuals of ROA (R_ROA) and leverage (R_LEV). In such cases, the year of the reform (NY_REFORM = 0), not the year previous to the reform, is signalled by a lineup factor (Y_ZERO). Controlling variable for ROA is yearly market performance R_Q. Table 7 shows the outcome of the model-building process and results. Asterisks indicate interaction effects. A total of 1168 companies are pooled contributing 4567 cases.

It is concluded that S and L significantly disturb yearly Q upwards and downwards, respectively, as predicted by a

[16] The beginning-of-period between effects' model is meaningless in this case as it includes explanatory variables which make sense only when used at the period end.

Table 5. Repeated measures tests (I and II) and parameter estimates (III): interactions between *S, L* and EFFECT

I: Within subjects effects' significance	*S* is included		*L* is included	
Sources of variability	*F* ratio	Sig.	*F* ratio	Sig.
EFFECT	7.663	0.006	9.656	0.002
EFFECT * *S*	7.779	0.005		
EFFECT * *L*			4.069	0.044
EFFECT * *T*	14.074	0.000	7.197	0.007
EFFECT * R_ROA_FIN	28.313	0.000	28.322	0.000
EFFECT * N_YEARS	12.231	0.000	12.459	0.000
EFFECT * DUM_3	3.792	0.052	4.465	0.035
EFFECT * DUM_4	9.448	0.002	10.912	0.001
II: Between-subjects overall effects' significance				
Intercept	0.529	0.467	1.372	0.242
S	4.629	0.032		
L			5.822	0.016
T	0.316	0.574	2.225	0.136
R_ROA_FIN	6.017	0.014	6.014	0.014
N_YEARS	0.756	0.385	0.839	0.360
DUM_3	0.019	0.889	0.079	0.779
DUM_4	2.013	0.156	2.619	0.106

III: Between subjects' effects		*S* is included				*L* is included			
Dependent	Explanatory	*b*	SE	*t*	Sig.	*b*	SE	*T*	Sig.
	Intercept	−0.168	0.134	−1.258	0.209	−0.149	0.136	−1.093	0.275
	S	0.001	0.034	0.025	0.980				
	L					−0.026	0.032	−0.795	0.427
R_Q_INI	*T*	−0.211	0.068	−3.115	0.002	−0.229	0.071	−3.223	0.001
	R_ROA_FIN	−0.001	0.001	−1.458	0.145	−0.001	0.001	−1.466	0.143
	N_YEARS	0.053	0.032	1.634	0.102	0.052	0.032	1.619	0.106
	DUM_3	0.058	0.047	−1.224	0.221	0.057	0.047	−1.213	0.226
	DUM_4	0.058	0.069	−0.840	0.401	0.057	0.069	−0.822	0.411
	Intercept	0.346	0.170	2.028	0.043	0.439	0.173	2.532	0.011
	S	0.132	0.043	3.059	0.002				
	L					−0.117	0.041	−2.824	0.005
R Q_FIN	*T*	0.141	0.086	1.642	0.101	0.036	0.090	0.397	0.691
	R_ROA_FIN	0.006	0.001	4.654	0.000	0.006	0.001	4.655	0.000
	N_ YEARS	−0.104	0.041	−2.527	0.012	−0.106	0.041	−2.580	0.010
	DUM_3	−0.070	0.060	1.161	0.246	−0.082	0.060	1.353	0.176
	DUM_4	−0.237	0.088	2.690	0.007	−0.260	0.088	2.958	0.003

Notes: EFFECT is the repeated measures effect. Measures are initial and final residual LOG_Q in series (R_Q_INI, R_Q_FIN). Residual LOG_Q are obtained using the model described in Table 2 (I). Notes to Table 4 explain the meaning of LOG_Q, ROA, LEV, R_Q_INI, R_Q_FIN, R_ROA_FIN, *S, L* and *T* fractions, N_YEARS, DUM_3 and DUM_4. Two repeated measures are estimated, one where S is included as explanatory variable (on the left), the other where L is included as explanatory variables (on the right). The significance of within subjects' effects is displayed in sub-table I above. Between subjects effects' overall significance is displayed in sub-table II in the middle. Parameter estimates for between subjects' effects (sub-table III below) show coefficients and their significance obtained from fitting explanatory variables to each one of the two measures, (initial, above; final, below). 'SE' is the standard error of the coefficient; 'Sig.' is the significance of the effect or coefficient.

Table 6. Mean values and SDs of residuals of LOG_Q, ROA, and LEV for different years to or from the reform year

	Number of years to/from the reform year (NY_REFORM)															
	−4		−3		−2		−1		0		+1		+2		Total	
Mean values and SDs for	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
R_Q	−0.006	0.270	−0.003	0.271	−0.002	0.262	0.017*	0.279	0.002	0.332	−0.017	0.382	−0.006	0.338	−0.002	0.309
R_ROA	−0.192	6.094	−0.119	5.306	−0.375	5.556	0.157	5.369	0.431*	6.058	0.226	5.874	−0.050	7.763	0.024	6.042
R_LEV	0.004	0.187	0.002	0.211	0.000	0.192	−0.003	0.170	−0.003	0.177	−0.003	0.161	0.000	0.214	−0.001	0.188
Number of cases	872		1053		1116		1175		1168		1134		1067		7585	

Notes: R_Q is the yearly residual LOG_Q; R_ROA is the yearly residual ROA; R_LEV is the yearly residual LEV. Residuals are obtained using models described in Table 2. Notes to Table 4 explain the meaning of LOG_Q, ROA, LEV. *t*-tests found only two mean values significantly different from zero: year previous to reform year (NY_REFORM = −1) residual LOG_Q are significantly above zero ($p = 0.04$); year after the reform year (NY_RESFOR = +1) the same residuals are clearly below zero but they do not attain significance ($p = 0.1$) as an increase in SE preclude significance; reform year (NY_REFORM = 0), residual ROA are significantly higher than zero ($p = 0.01$). Asterisks highlight significance. 854 out of 1183 companies are reformed in the same year, 2006, which weakens significance.

Table 7. Searching for interactions between the reversal and the reform: pooled between-subjects effects' significance

Tests of between-subjects effects

Dependent	Included	Source of variability	*F* ratio	Sig.	*b*	SE	*t*	Sig.	Adj. R^2
R_Q	*S*	Overall mean effect	6.563	0.010	–.007	0.031	–.213	0.831	0.242
		R_Q_INI	984.180	0.000	0.496	0.016	31.372	0.000	
		Y_MINUS_1	4.854	0.028	–0.079	0.036	–2.203	0.028	
		S	7.359	0.007	0.062	0.036	1.717	0.086	
		T	6.171	0.013	–0.033	0.076	–0.439	0.661	
		R_ROA	358.782	0.000	0.014	0.001	18.942	0.000	
		Y_MINUS_1 * *S*	0.072	0.788	–0.011	0.041	–0.269	0.788	
		Y_MINUS_1 * *T*	3.019	0.082	0.151	0.087	1.737	0.082	
	L	Overall mean effect	0.000	0.985	0.044	0.039	1.130	0.259	0.242
		R_Q_INI	982.065	0.000	0.496	0.016	31.338	0.000	
		Y_MINUS_1	3.968	0.046	–0.090	0.045	–1.992	0.046	
		L	5.616	0.018	–0.053	0.035	–1.502	0.133	
		T	2.107	0.147	–0.015	0.080	–0.186	0.853	
		R_ROA	357.405	0.000	0.014	0.001	18.905	0.000	
		Y_MINUS_1 * *L*	0.059	0.807	0.010	0.041	0.244	0.807	
		Y_MINUS_1 * *T*	3.185	0.074	0.164	0.092	1.785	0.074	
R_ROA	*S*	Overall mean effect	1.032	0.310	–0.253	0.591	–0.428	0.669	0.095
		R_ROA_INI	83.832	0.000	0.129	0.014	9.156	0.000	
		Y_ZERO	0.076	0.783	–0.188	0.682	–0.275	0.783	
		S	0.627	0.428	–0.662	0.694	–0.953	0.340	
		T	2.980	0.084	1.987	1.457	1.364	0.173	
		R_Q	355.771	0.000	4.719	0.250	18.862	0.000	
		Y_ZERO * *S*	0.739	0.390	0.687	0.799	0.860	0.390	
		Y_ZERO * *T*	0.408	0.523	–1.073	1.681	–0.639	0.523	
	L	Overall mean effect	1.335	0.248	–0.579	0.741	–0.781	0.435	0.095
		R_ROA_INI	85.551	0.000	0.130	0.014	9.249	0.000	
		Y_ZERO	0.038	0.846	0.167	0.857	0.195	0.846	
		L	0.105	0.746	0.286	0.672	0.425	0.671	
		T	3.195	0.074	2.260	1.525	1.482	0.138	
		R_Q	355.099	0.000	4.714	0.250	18.844	0.000	

(*continued*)

Table 7. Continued

Tests of between-subjects effects

Dependent	Included	Source of variability	*F* ratio	Sig.	*b*	SE	*t*	Sig.	Adj. R^2
		Y_ZERO * *L*	0.169	0.681	–0.319	0.776	–0.412	0.681	
		Y_ZERO * *T*	0.609	0.435	–1.373	1.760	–0.780	0.435	
R_LEV	*S*	Overall mean effect	10.262	0.001	0.032	0.015	2.152	0.031	0.393
		R_LEV_INI	2095.712	0.000	0.576	0.023	24.895	0.000	
		Y_ZERO	0.275	0.600	–0.009	0.017	–0.525	0.600	
		S	7.862	0.005	–0.021	0.017	–1.196	0.232	
		T	6.514	0.011	–0.072	0.036	–1.970	0.049	
		Y_ZERO * *S*	0.533	0.465	–0.015	0.020	–0.730	0.465	
		Y_ZERO * *T*	0.745	0.388	–0.036	0.042	0.863	0.388	
		Y_ZERO * R_LEV_INI	7.271	0.007	0.072	0.027	2.696	0.007	
	L	Overall mean effect	0.108	0.742	0.012	0.019	0.634	0.526	0.393
		R_LEV_INI	2097.362	0.000	0.576	0.023	24.934	0.000	
		Y_ZERO	0.591	0.442	–0.016	0.021	–0.769	0.442	
		L	7.179	0.007	0.023	0.017	1.371	0.171	
		T	2.111	0.146	–0.054	0.038	–1.404	0.160	
		Y_ZERO * *L*	0.094	0.759	0.006	0.019	0.306	0.759	
		Y_ZERO * *T*	0.961	0.327	0.043	0.044	0.980	0.327	
		Y_ZERO * R_LEV_INI	7.010	0.008	0.071	0.027	2.648	0.008	

Notes: linear models (GLM) where cases are pooled three years before the reform to two years after, initial and final cases excluded. Dependent variables are R_Q (yearly residual LOG_Q), R_ROA (yearly residual ROA) and R_LEV (yearly residual LEV). For each of the three dependent variables, two models are estimated, one where *S* is included as explanatory variable, the other where *L* is included as explanatory variable. Residuals are obtained using models described in Table 2. Notes in Table 4 explain the meaning of LOG_Q, ROA, LEV and also R_Q_INI, R_ROA_INI and R_LEV_INI, *S, L* and *T* fractions. Y_MINUS_1 is a binary factor taking the value of 1 one year prior to the reform and 0 otherwise; Y_ZERO is a binary factor similarly signalling the year of the reform. Interactions are indicated with an asterisk. For binary factors and their interactions, the estimated parameters refer to the value of 0 and the significance of the *F* ratio is the same as that of the parameter's *t* while for covariates, *F* and *t* have different meanings. Significances are necessarily weak because most of the companies were reformed in the same year, 2006.

reversal's hypothesis. The reform has a significant, positive impact on Q but interactions between the reform and ownership fractions are nowhere significant: thus the reform evenly influences market performance without adding to the reversal. The strong relationship between the reform and initial leverage is unique: nowhere else initial conditions interact significantly with the reform; and the new-found significance of S and L in explaining leverage has its origin in such interaction. It seems as though state intervened, leveraged companies tried to rely less on debt, such effort being relaxed after the reform. It is worth recalling that only after 2006 did it become clear to all that the access to the reform was not to be selective.

V. Concluding Remarks

A reversal in investors' perception of the relative value of state- and legal person-owned companies is a noteworthy event. Authors tend to consider companies formerly owned by the state as doomed to exhibit low performance after privatization. The performance of companies enjoying, before privatization, some type of protective scheme from the state, has not been the object of much interest. The article has shown that direct and indirect state ownership are distinct realities leading to a diverging market performance and efficiency during privatization processes.

The relevance attributed in the article to legal ownership stems from our belief that the basic quality of legal persons is not specific of the Chinese privatization process, being found, although less institutionalized, in other countries prone to state involvement with business. Legally intervened companies are protected against hostile bids and, to a large extent, have easier access to financing as banks and other lenders regard them as covered by some warranty from the state.[17] After privatization, however, these companies are striped from their privileges and weaknesses tend to show up. Companies are left in the hands of former custodians who may drop them or not, often acting to the disadvantage of small investors. In short, although the specific form protectionism has shaped itself in China is indeed peculiar to the country, the general design and consequences that may ensue are quite general. The study's findings, therefore, are probably interesting to other ongoing privatization processes where direct state ownership coexists with state protectionism.

It is doubtful whether, at this stage, the use of more complex methodologies would lead to gains while the danger of misrepresentation would be higher. Since our goal here is the understanding of new facts, it is wiser to use simple tools on a step by step basis. First, performance and efficiency variables are equalized with regard to influences such as the year, the exchange, size, leverage, and other influences; then, the significance of the effect of direct and indirect state ownership on performance/efficiency is examined, leading to conclusions about pattern reversal during the period. A change in investors' perception seems to have taken place while the reform was hinted at then confirmed and finally took strength. Such change in perception begun years before the event that might have explained it so that, when the reform was implemented, its effect was overall. It is worth noting that the existence of any reversal inevitably implies that patterns relating ownership/efficiency to performance, namely U-shaped patterns, are transient rather than stable features.

Privatization in China was heralded as a well-planned process: state ownership was first reduced from full control (SOEs) into *inter alia* ownership, then from direct ownership into indirect ownership. At the time, such shift from direct into indirect ownership seemed capable of reconciling some type of state control and support with the quest for efficiency. The article has shown that it also led to lesser worth.

The disposal of the newly tradable shares has been at a much lower level than many might have predicted prior to the reform. If dilution fears are to be placated, gradual adjustments are indeed preferable to sweeping disposals (Kang and Kim, 2012). According to McGuinness (2009), the reform was in fact deployed to quell a building risk premium associated with state share disposals, not to foster privatization. But since institutional control was withdrawn through the reform, an indefinite delay in selling re-designated shares may give way to informal control in the part of the state and local governments, a vice which, once installed, is difficult to eradicate.

Acknowledgements

The authors acknowledge valuable contributions by two anonymous reviewers.

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[17] Table 3 documents a direct relationship between leverage and increasing levels of legal person ownership.

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Appendix Table. Descriptive statistics of *Q*, ROA and LEV by year and by initial ownership classes S_CL and L_CL

		2002			2003			2004			2005			2006			2007			2008		
S_CL, L CL ownership classes		*Q*	ROA	LEV	*Q*	ROA	LEV	*Q*	ROA	LEV	*Q*	ROA	LEV	*Q*	ROA	LEV	*Q*	ROA	LEV	*Q*	ROA	LEV
	Mean	2.356	3.12	0.426	1.895	3.216	0.446	1.736	3.804	0.466	1.347	2.047	0.49	1.759	2.40	0.507	3.423	4.593	0.496	1.591	2.094	0.511
$S = 0\%$	Variance	1.335	28.4	0.032	0.694	31.37	0.036	0.948	33.72	0.038	0.277	38.53	0.034	0.902	68.66	0.037	5.208	51.23	0.03	0.835	94.7	0.047
	No cases	592	594	594	649	649	649	727	727	727	739	739	739	739	739	739	722	722	722	732	732	732
	Mean	2.339	2.106	0.463	1.916	1.583	0.502	1.532	3.206	0.507	1.306	1.071	0.533	1.724	2.376	0.545	3.286	5.057	0.498	1.548	2.327	0.507
$0\% < S < 25\ \%$	Variance	1.094	46.25	0.032	0.689	183.6	0.067	0.305	10.32	0.061	0.316	42.5	0.074	0.749	21.31	0.137	3.132	55.3	0.036	0.46	48.74	0.04
	No cases	112	113	113	118	118	118	122	122	122	123	123	123	124	124	124	123	123	123	123	123	123
	Mean	2.206	0.935	0.511	1.767	2.102	0.517	1.518	1.874	0.525	1.294	1.183	0.534	1.671	1.81	0.54	3.37	4.705	0.534	1.584	1.917	0.539
$25\% \le S < 50\%$	Variance	1.154	47.86	0.034	0.567	18.93	0.039	0.379	22.01	0.043	0.228	31.00	0.033	0.705	33.87	0.034	7.98	32.13	0.029	1.101	74.22	0.033
	No cases	148	148	148	152	152	152	155	155	155	154	154	154	156	156	156	155	155	155	156	156	156
	Mean	2.162	1.656	0.468	1.857	3.304	0.464	1.54	3.186	0.489	1.359	2.396	0.506	1.791	2.658	0.524	3.50	4.963	0.518	1.727	1.649	0.558
$S \ge 50\%$	Variance	0.897	88.82	0.028	0.42	23.65	0.029	0.331	35.57	0.033	0.261	38.28	0.032	1.214	71.00	0.043	6.491	40.42	0.034	1.195	169.7	0.096
	No cases	153	153	153	160	160	160	161	161	161	164	164	164	164	164	164	161	161	161	162	162	162
	Mean	2.052	0.409	0.469	1.8	3.212	0.467	1.644	3.355	0.468	1.353	2.487	0.49	1.934	2.955	0.511	3.486	4.188	0.504	1.72	1.876	0.52
$L = 0\%$	Variance	0.938	155.7	0.029	0.506	20.56	0.027	0.647	40.16	0.029	0.266	28.58	0.031	1.569	43.93	0.039	6.551	45.86	0.027	0.949	181.1	0.06
	No cases	75	75	75	79	79	79	82	82	82	82	82	82	82	82	82	80	80	80	82	82	82
	Mean	2.081	2.116	0.49	1.768	2.844	0.489	1.612	3.169	0.502	1.318	2.021	0.521	1.687	2.606	0.526	3.434	5.54	0.521	1.629	2.561	0.544
$0\% < L < 25\%$	Variance	0.872	24.39	0.027	0.431	21.18	0.031	0.743	28.08	0.032	0.232	44.07	0.033	0.698	56.44	0.037	7.504	35.91	0.032	1.412	88.72	0.064
	No cases	214	214	214	227	227	227	243	243	243	246	246	246	248	248	248	245	245	245	246	246	246
	Mean	2.245	1.541	0.458	1.856	1.899	0.476	1.614	2.763	0.484	1.268	1.208	0.503	1.677	1.953	0.521	3.289	4.38	0.491	1.604	1.431	0.501
$25\% \le L < 50\%$	Variance	1.068	57.02	0.037	0.65	115	0.06	0.593	20.44	0.059	0.185	35.81	0.054	0.694	31.03	0.088	3.161	71.15	0.036	0.888	119	0.05
	No cases	202	204	204	213	213	213	235	235	235	237	237	237	238	238	238	235	235	235	236	236	236
	Mean	2.454	3.272	0.425	1.934	3.247	0.451	1.696	3.745	0.474	1.37	2.003	0.496	1.776	2.33	0.514	3.442	4.568	0.502	1.579	2.075	0.519
$L \ge 50\%$	Variance	1.414	27.48	0.033	0.725	31.77	0.036	0.786	33.58	0.039	0.322	37.64	0.035	0.972	73.69	0.038	5.526	43.12	0.03	0.656	81.41	0.046
	No cases	514	515	515	560	560	560	605	605	605	615	615	615	615	615	615	601	601	601	609	609	609

Notes: Q is computed as the sum of the market value of equity, the book value of short-term debt and the book value of long-term debt, divided by the book value of total assets. ROA is the ratio of Net Income to Total Assets. LEV is the ratio of Total Debt to Total Assets. Assets, Debt, Equity, and Net Income are adjusted for inflation with 2002 as the base year. *S* is the initial state-owned share, *L* is the initial legal person-owned share. S_CL and L_CL classes are encoded from *S* and *L* as shown in the table.