

**Lessons from the Chinese privatization process: reversal in investors' perception
of the relative value of State and Legal Person owned companies during the Split
Share Structure reform**

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Abstract

The Split Share Structure reform may be the final episode in the measured process of privatization of Chinese companies. The reform was started in May 2005 with the object of re-designating state-held shares into tradable shares. By the end of 2008, almost all of such shares had indeed become tradable. The paper compares the performance of the two major forms of state ownership (direct or indirect ownership) before and after this reform. It is shown that before the reform companies indirectly held by the state outperform directly held companies whereas after the reform the same companies now underperform directly held companies. Results suggest that the perception of investors about the relative value of these two forms of state ownership suffered a reversal. The paper thus brings to light value-related consequences from protective schemes involving the state, such as those currently found in Southern European and other countries, not just in China. Also, in the face of frequent claims that the relationship between state ownership and performance should be U-shaped, the paper establishes the transient character of such pattern. Finally, the paper also addresses a recurrent methodological pitfall relating to the use, in empirical models, of fractions of the same total.

Keywords: Corporate governance, corporate performance, privatization, state ownership, legal person ownership.

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1. Introduction and hypotheses

Having experienced sweeping economic reforms over three decades, China has been 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 on December 26, 1990 and soon after, on April 11, 1991, the Shenzhen Stock Exchange (SZSE) was established. At the year-end of 2008, a total of 1604 firms, with a market capitalization of RMB 12.136.644 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. Non-tradable 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. Only about one-third of equity shares were floating. The existence in China of a large volume of non-tradable shares was referred to as the Split Share Structure.

1.1: The Split Share Structure reform

The Split Share Structure was 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 cannot really 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 non tradable shares). Thus it was clear that the amount of equity shares allowed to circulate in Chinese exchanges should increase.

Two attempts to release non tradable 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' served as guidance for future stock markets reforms, stressing the importance of converting non tradable shares into tradable shares while safeguarding the interests of owners of tradable shares and restoring investors' confidence.

Following the 'Opinions', on April 29, 2005, the government issued the 'Notice regarding the issue of experimenting with reforms to the Split-share Structure of listed companies' and launched a new pilot program to dispose of state-owned shares. This time, rather than imposing a one-size-fits-all solution, the program tried to be flexible. Depending on the shareholding structure and the financial situation of a listed company, owners (both of tradable and of non tradable shares) were allowed to come up with their own proposals on how to dispose of non tradable 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 non tradable 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 program included four medium-sized companies. The

owners of tradable shares received compensation in either bonus shares or cash. In the second phase, a total of forty-two companies took part in the share structure reform. The type of compensation was allowed to vary, companies variously proposing partial reverse stock splits, share buybacks, warrants, and options. All except one of these forty two companies had their reform proposals accepted at their extraordinary shareholders' meetings. Due to the program's flexibility and the consideration of the interests of owners of tradable shares and also due to the trading conditions on the secondary market, the overall stock prices remained stable thus fostering the progress of the reform. Soon after the second phase, another forty companies unveiled their reform proposals and since then an average of twenty companies did so every week.

The reform extended across the whole A-share (Chinese domestic) market during the second half of 2005. The fact that it was well received by the market encouraged virtually all issuers on the Shanghai and Shenzhen Stock Exchanges to support the reform. However, at the time of writing, most of the newly tradable shares have not yet been sold, which prompted authors such as McGuinness (2009) to question the future effectiveness of the reform.

1.2: Purpose and theoretical underpinning of the study

This study draws attention to the fundamental distinction between direct and indirect state ownership, describing before- and after-reform performance of companies that were directly owned by the Chinese state and contrasting it with performance of indirectly owned companies.

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 state owned companies or others that are legally mandated to hold shares of other companies on behalf of the state and following the state's policies.

Although this indirect type of ownership is specific to China, its tenet is much more widespread. Indeed, the sole originality of Chinese legal persons stems from being institutional; otherwise, the existence of state indirect influence in companies can be found, in one way or the other, in Southern European countries and beyond.

We believe that, 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 favored by investors. Indeed, legal persons tend to be more profit-oriented than the state and to have better business connections with other enterprises and with local governments, thus being in a position to influence positively the performance of companies they own. Moreover, not necessarily in China but clearly in other cases, such companies are regarded by banks and other lenders as lower risk credit. Therefore, so long as privatization is not in sight, investors tend to consider legal person owned companies as more valuable than those held directly by the state (Xu and Wang, 1999; Qi et al., 2000; Delios and Wu, 2005 and others).

This view may change, however, when privatization is announced or when it is perceived by investors as forthcoming. Companies where state shares are expected, sooner or later, to come up for sale, are potential bargains. Indeed, state holdings are undervalued (as the literature review below suggests) while their re-designation into tradable shares, as observed from 2005 on in China, is likely to be triggered by bureaucratic imperatives rather than by a sense of opportunity (Inowe, 2005). In contrast, companies where legal persons used to play an important role may, after privatization, no longer be as attractive for investors as those held by the state. Indeed, such companies were formerly favored by the market, not being as cheap as those held by the state. Moreover, it is unlikely that legal persons decide to sell their reformed holdings, unless in cases where companies they hold are unattractive themselves. McGuinness (2009), for instance, mentions reformed companies where legal shareholders sought to impose moratoria and lock-up arrangements on their re-designated shares that go well beyond official requirements of the reform program.

Investors will thus be aware of this: that, when the time comes for legal person shares sell outs, they face a winner's curse.

It may also be noted that consideration ratios³ offered to shareholders of reformed companies are likely to be more generous in the case of state held companies and that the higher the level of state ownership prior to the reforms, the greater the consideration payment is (Li et al., 2011). This is another reason for the surge in value of state held companies: investors regard such consideration shares as critical to help reducing price dilution caused by newly tradable shares during privatization processes. Legal owners, on the other hand, may be tempted to treat their fellow investors, especially small investors, less kindly.

The study therefore hypothesizes that impending privatization changes the perception of investors about the value of companies: during lasting periods of state intervention, companies indirectly held by the state perform significantly better than companies directly held by the state. But as soon as privatization becomes a possibility, directly held companies increase in value while indirectly held companies lose value. In short, a reversal in investor's perception of the worth of directly and indirectly held companies should occur about privatization periods.

Figure 1a graphically depicts one such reversal, namely in Chinese domestic investors' perception of the worth of state versus legal person owned companies. It compares before and after reform average Tobin's Q for 4 classes of companies exhibiting, at the beginning of the period, increasing state and legal person ownership levels. Before the reform, state-controlled companies are the less favored by Chinese investors while, after the reform, they become the most popular. Before the reform, performance increases with the level of legal holdings while after reform it decreases. As results further down in the paper show, the observed reversal becomes more apparent after controlling

³ When the Chinese state re-designates its holding in a company, every holder of tradable shares in the same company is offered new shares in proportion to his holdings. This proportion is known as the consideration ratio.

for size, leverage, industry, the year and other effects.

[Insert Figure 1a]

1.3: Relevance of findings

Results suggest that companies informally favored by the state may end up losing value. The intention behind the enacting of Chinese legal persons, that of providing companies with some type of indirect state control and support, is akin to other mildly “corporatist” 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 paper shows legal person ownership in an entirely new light. Legal entities are by far the biggest shareholders in Chinese markets but, as mentioned in the literature review below, 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). Our results suggest that, in spite of their diversity, legal entities elicit 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 an associated future cost.

Results are interesting also because they seem to suggest that the reform is perceived by Chinese investors as going well beyond a simple reconfiguration of share types into a more streamlined form, not necessarily translated to the state’s acquiescence in the disposal of such shares (McGuinness, 2009). Fear of dilution and other consequences of the share re-designation program may lead to a general devaluation of Chinese domestic shares, as has happened indeed. In our opinion, however, fear alone could hardly explain the observed reversal, namely the relative appreciation of companies

with significant state holdings or with no legal holdings.

Finally, in the face of frequent claims that the relationship between state ownership and performance should be U-shaped, the paper establishes the transient character of such patterns, stressing its dynamic origin.

Figure 1b shows how the observed reversal in Chinese domestic investors' perception unfolds year by year. Similarly to Figure 1a, companies are first grouped into classes of increasing initial state and legal ownership but then average Tobin's Q for such classes are computed year by year, not just at the beginning and at the end of the period. It is clear that U-shaped relationships between ownership and performance observed in Figure 1b are a stage in a reversal process, thus being a non-permanent feature.

[Insert Figure 1b]

The remainder of the paper is organized as follows. Section 2 reviews the literature on privatization. Section 3 describes variables and their evolution during the 2002-2008 period. Section 4 describes the methodology and reports empirical results. Finally Section 5 offers some concluding remarks.

2. 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 would 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 redistribution of property rights 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 and has been promoted and encouraged in countries other than China, evidence on the effect of such a shift in ownership structure on corporate performance is mixed. On one hand, studies such as Boardman and Vining (1989), Vining and Boardman (1992), Megginson et al. (1994), Boycho et al. (1996) and Dewenter and Malatesta (2001) among others, empirically show that government ownership is less efficient than private ownership. On the other hand, studies by Caves and Christensen (1980), Wortzel and Wortzel (1989), Martin and Parker (1995) and Kole and Mulherin (1997) suggest that government ownership is not necessarily less efficient.

2.1 Studies on Chinese privatization

Regarding specifically the case of the Chinese privatization process, Graf et al. (1990) noticed that the management mechanism for state enterprises in China is highly hierarchical: the state-owned Assets Management Bureau is on the top of a structure which spreads down to many local, state-owned Assets Management Bureaus. The

latter are responsible for the appointment of local managers, typically experiencing difficulties in monitoring the performance of thousands of SOEs. Such a top-down bureaucracy is indeed ineffective in recruiting capable managers and monitoring them, having also limited expertise in Marketing, modern Finance as well as in Investment and corporate practice. Moreover, with little or no incentives, those managers have few motives to maximize the value of the firm.

Thus the existing theoretical background strongly suggests that privatization should benefit performance. In spite of this, the literature on the benefits of 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. In the same vein, Zhang (1999), based on what he perceives as serious governance problems in SOEs, concludes that “privatization is the only way out”. Xu and Wang (1997) recall that state ownership gives rise to agency conflicts and should impact firm performance negatively. Empirical findings in Wei and Varela (2003) also confirm that privatization as beneficial. But Chen (1998) and Sun et al. (2002) find a positive relation between state ownership and firm’s performance, thereby casting doubts on the potential benefits of privatization. Qi et al. (2000) find that privatization is effective in improving sales and workers’ productivity but not profit returns. Sun and Tong (2003) find that firms with more than 50% state ownership perform better than firms with less than 50% state ownership. Chen et al. (2009), on the other hand, propose a division of state-related holdings in groups (ownership by Asset Management Boards, by the central government or by local governments), suggesting that such division better captures differences in performance of Chinese companies. Gunasekarage et al. (2007) and Ma et al. (2010) find that ownership concentration, rather than the type of ownership, is the dominant factor in explaining performance of Chinese companies.

The hypothesis that legal person ownership has a specific impact on the performance of companies they own has been discussed in some depth by Xu and Wang (1999), Qi

et al. (2000), Sun et al. (2002), Sun and Tong (2003), Wei and Varela (2003) and by Delios and Wu (2005). Most of these authors find that legal entities benefit performance but Sun et al. (2002) contend that legal person ownership performs a similar role as that of state ownership thus (according to their view) improving performance. The same authors routinely test the significance of squared fractions of state and legal ownership, searching for U-shaped relationships with performance. Ng et al. (2009), Delios and Wu (2005) and others have indeed found that the best performance is observed in both wholly private and wholly intervened companies.

While reinforcing the view that the influence of indirect state ownership on performance is indeed the opposite to that of direct ownership, the paper shows that such influence persists even after a reversal takes place in their respective roles. Moreover, the paper also shows that U-shaped relationships between state ownership and performance, abundantly documented and interpreted by authors as a permanent feature, actually are transient, intermediary stages in pattern reversal processes.

3. Data description

The study uses data from companies listed on both the Shanghai Stock Exchange (SHSE) and the Shenzhen Stock Exchange (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 source⁴ of our data.

Following Sun et al. (2002), both abnormal stocks (ST, ST*, PT)⁵ and companies which

⁴ Other sources are the Shenzhen Stock Exchange Fact Book, the Shanghai Stock Exchange Statistics Annual, the annual financial reports of individual companies and the China Statistical Yearbook (2002-2008).

⁵ According to the Chinese Securities Law and Company Law, companies become ST (special treatment) in the following situations: 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 two-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. ST companies must abide by the following rules: a) their daily price fluctuation cannot exceed $\pm 5\%$; b) "ST" is added in front of the stock name; c) Semi-annual reports must be

issue only B shares, are excluded.⁶ After such exclusion the sample comprises a total of 1602 companies: 466 from the SZSE main board (29.1%), 273 from the SZSE SME board (17%), and 863 from the SHSE (53.9%). Of these 1602 companies, 1060 were already trading during the initial year, 2002, the remaining 542 (33.8%) entering the CSMAR database during the period. The SZSE SME board, for instance, initiated trading in 2004 and in 2008 there were more than 200 SMEs listed there.

Financial services, companies with less than 5 years recorded or those where yearly information is missing, although present in the original sample and in summary statistics displayed in Tables 1 and 2, are afterwards withdrawn from further analyses.⁷ In this way, 419 (26.2%) of the original 1602 firms are excluded from modeling and hypotheses testing. Most of these excluded companies belong to the SZSE SME board. The final sample thus 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.

The exclusion of companies with less than 5 consecutive years recorded stems from the objectives of the study. It is indeed required by design that, at least, years 2004, 2005 and 2006 be available: 2004, because it is the last year before the reform; 2005 to 2006, because cases of reformed firms in 2005 were few and only in 2006 the reform was extended to a greater number of firms. It is most likely that, given the previous attempts to reform the Split Share Structure, until the end of 2006 investors may have remained skeptical about the magnitude and swiftness of the ongoing reform. On the other hand, Chinese domestic investors since long regarded the reform as inevitable.

audited. PT (Particular Transfer) companies are those with three-year losses and thus stop trading in SHSE and SZSE. The PT stocks can only be traded every Friday.

⁶ In China, besides shares held by the state and employee shares tradable one year after their initial offering, there was a clear differentiation between A shares owned by Chinese citizens and B shares owned by foreign investors in the mainland, in Hong Kong (H shares) or in the United States (N shares). The difference between A and B shares lost importance as, from year 2002 on as Chinese citizens are now allowed to trade on B shares.

⁷ The dismissal of financial companies is common practice as the interpretation of variables is not consistent across financial and non financial industries. Other excluded companies are mostly from the SZSE SM board. They are in average more efficient than included firms: Tobin's Q is 30% higher and ROA is almost 10% higher.

Most of the selected companies (967) have full 7 years recorded (2002 to 2008) while 216 have 6 or 5 years; for 1008 firms the recording begins in 2002, for 175 it begins in 2003 or in 2004. Finally, for 1173 firms the recording ends in 2008 but there are 10 firms for which it ends one or two years earlier. A total of 210 of the selected companies were reformed in 2005, 854 in 2006 and further 95 in 2007 and 2008. Our data thus includes 15 companies that were not reformed during the period.

3.1: The evolution of Chinese state and legal holdings during the 2002-2008 period

Table 1 shows the yearly change of average state and legal holdings during the period. Table 2 shows the initial year (for most companies this is 2002) average fractions of state and legal holdings by exchange and by industrial group.

[Insert Table 1]

[Insert Table 2]

A remarkable characteristic of the privatization process in China is that it is strictly irreversible, at least during the examined period. In no instance did the state or legal persons on its behalf create new positions in traded firms nor did it expand existing positions during the period.⁸ Increasing average holdings (as in Table 1) denote the entrance of new cases, not increases in the size of individual holdings.

References to the use by local governments of state or legal ownership privileges in order to build up good positions in stock markets should thus be met with caution. Emphatically, this is not supported by data. The finding is also important as it precludes speculation about endogeneity in models explaining performance in terms of

⁸ In 4 cases (2 in SZSE and 2 in SHSE) the Chinese state or a legal person on its behalf seemed to increase positions during the period by swapping shares between state and legal persons with no increase in the total.

state holdings. In the present case, performance cannot influence ownership in the two possible ways (by boosting attractive positions or by reducing unattractive ones) but just in one way and an unlikely way at that. As the state never increased any of its holdings, it could not boost positions in firms that became attractive during the period. It could indeed sell positions in unattractive firms before 2005. After that, given the sheer dimension and swiftness of the reform, it would be ludicrous to suppose that some selective re-designation had taken place.

3.2: Dependent variables

Table 3 lists variables used in the study. As a measure of market performance Tobin's Q ⁹ is adopted, thus following, amongst others, Sun and Tong (2003), Wei and Varela (2003), Delios and Wu (2005), Wei et al. (2005), Ng et al. (2009), Ma et al. (2010). Underpinning the use of Tobin's 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 statistical effects such as ownership effects are associated with the logarithm of Tobin's Q . Accordingly the study uses the natural logarithm of Tobin's Q in analyses.

[Insert Table 3]

A benefit stemming from the use of logarithms is the significant increase in normality and homoskedasticity of error terms in models where the dependent variable is market performance. Another advantage is that differences between final and initial values of transformed Tobin's Q are no longer absolute values but relative changes (logarithms of

⁹ 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. It may be argued that Tobin's Q should be corrected for non-tradable shares. Bai et al. (2004), for instance, weight the number of non-tradable shares by a percentage of the market price when calculating equity value. This claim is addressed further down in the paper.

percent changes), which simplifies the interpretation of results.

Another performance measure tested is Return on Assets (ROA), also widely used in the literature (Wang 2005, Chen et al. 2009, Ma et al. 2011 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.

3.3: A difference in methodology

The most significant methodological improvement in the paper consists of never allowing two fractions of the same total number of shares to be together in a model. In the literature it is common to find models where performance is explained in terms of state, legal, private and other ownership fractions.¹⁰ We contend that such practice is likely to lead to misleading results. Where S is the fraction of shares held by the state, L is the fraction of legal person shares and P is the remaining fraction, then the equality $S + L + P = 1$ is an upper boundary imposed upon the variability of S and L , inducing negative correlation between these fractions. Indeed, any increase in the fraction of, say, P , must come from a decrease in the fraction of S or L shares. Only when individual fractions are small in relation to the total can they be safely put together in a regression or other modeling tool where variances and co-variances play a role. This is not the case of Chinese listed companies where typical L and S may amount to two thirds of the total number of shares.

As an example of how misleading such combination of fractions can become, Table 4 compares results of regressions where Tobin's Q is explained by fractions of state and legal shares and by other variables in the usual way. Data refers to 2002. When S and L are present as explanatory variables, both are significant, relating positively to

¹⁰ Examples are Chen et al. (2009), Ma et al. (2010), Wei and Varela (2003), Sun et al. (2002) and others. The paper by Delios and Wu (2005) focus only on Legal ownership thus being an exception to such practice.

performance. But when L is removed from the list of explanatory variables, S becomes non-significant. The fact is that the only truly significant ownership measure here is L. S appears as significant only insofar as L is included in the model as S and L add to an almost constant value of 1 thus reducing unexplained sums of squares.

[Insert Table 4]

Figure 2 graphically illustrates how the boundary causes spurious correlation between S and L. The data is the same as used in the above regression. The scatter-plot of S with L above displays an apparent negative correlation but the 3D scatter-plot below, where S and L are plotted against P, shows that such negative correlation stems from the projection into the horizontal plane (defined by S and L) of cases limited by the boundary $S + L + P = 1$. The boundary is a plane inclined 45 degrees in relation to the three axes of the scatter-plot and intercepting each axis at the value of 1. Thus the observed negative correlation (-0.79) between S and L is not intrinsic to these variables. The literature has mentioned cases where external boundaries condition the distribution of variables (Trigueiros, 1995).

[Insert Figure 2]

No correlation is observed between S and L for cases where these fractions are below 0.25. As mentioned, this is because small S and L are not near the boundary, its constraining effect becoming negligible. In our data, the same lack of correlation persists after controlling for effects such as industry, year, exchange, market and operational performance, size, leverage and others. The paper thus assumes independence between state and legal fractions and, based on such assumption, proposes the testing, wherever required, of two models, one for S and the other for L.

Such separation of S and L into independent models is open to criticism on grounds that

omitted explanatory variables may induce dependence in error terms. Moreover, the existence of two hypotheses to be tested, not just one, leads to the need to interpret significance levels (P values) in a way which is different from the usual way. Both objections are addressed later in the paper.

3.3: Encoding initial ownership into classes

Every company in the database encompasses several records, one for each year of the period 2002-2008. In the study, only initial positions of S and L are considered, referring always to the first year recorded (in most of the companies this year is 2002). Such initial ownership is encoded into 4 ordinal classes: companies where the state initially owned no shares ($S = 0\%$), those where S owned 0% to 25% of shares ($0\% < S < 25\%$), those with 25% to 50% of shares ($25\% < S < 50\%$) and finally the class of companies with over 50% of shares ($S \geq 50\%$). The same encoding is applied to L.

Table 5 shows the number of companies in each class by year, by reform year and by the number of records available. S_OWN and L_OWN are the ordinal classes encoded from S and L and SL_OWN are the 14 classes obtained from cross tabulating S_OWN with L_OWN. Table 5 shows that classes in S_OWN and L_OWN are unbalanced: there is a decrease from 739 to 164 cases in classes of increasing state ownership; there is an increase from 82 to 615 cases in classes of increasing legal ownership.

[Insert Table 5]

This study aims at relating after reform performance to before reform ownership, ordinal classes being better suited to such end. Indeed, some of the analyses in the study would be difficult to perform and interpret if the usual, continuous valued fractions S and L were used directly in models.

Encoding of ownership classes has been used, amongst others, by Ma et al., (2010) but, contrary to other authors, classes of ownership beyond 50% are not considered here. The adopted encoding is an attempt to balance the interest in capturing ownership control possibilities with the interest in capturing relative size. We believe that both relative magnitudes and the associated control possibilities are significant for investors. While $S = 0\%$ and $S \geq 50\%$ unquestionably denote lack of control or full control (two extreme cases), the remaining two encodings are more ambiguous regarding control. Indeed, where $25\% < S < 50\%$, it is likely (but not certain) that S is in full control, either for being the largest shareholder or due to some indirect or pyramid scheme; but then, this may apply to smaller positions too. The same considerations apply to L .

3.4: Variables used to make companies' performance comparable

The “one sample” design adopted in the paper consists of comparing observations taken from the same company before and after an event. Although such design leads to a less critical need to equalize (control for) some effects, it is still required, before the testing of hypotheses, that performance be corrected for known influences such as company size, overall yearly performance and others.

Variables used in the paper for the purpose of making observations comparable include the yearly effect (YEAR), the exchange (EXCH) and industry (INDUSTRY) effects, the logarithm of Total Assets (SIZEN) as a proxy for company size and the ratio of Total Debt to Total Assets (LEVERAGE).¹¹ We have also drawn on other authors' findings and test the equalizing potential of ownership structure variables such as concentration (Wang, 2005; Ma et al., 2011), the type of ownership control (Chen et al., 2009), and variables relating to the board of directors.¹²

¹¹ In calculations leading to these variables, Total Assets, Total Debt, Total Equity and Net Income have been adjusted to reflect inflation with 2002 being the base year.

¹² The number of directors and of independent directors, the ratio of these two, the number of shares held by the board, the ratio of this to the number of outstanding shares and the yearly number of meetings of the board.

Other variables used for the same purpose include a dummy signaling a regulated company (DUM_I, Sun et al. 2002). In China there is no sharp correspondence between regulation and industrial classification. For instance, most but not all of the financial services companies, public utilities and transportation companies are regulated. But regulated firms can be found in almost all other industry groups, though in smaller proportions. Regulated companies are, in average, 2.5 times larger and 5% less leveraged than the non-regulated ones and their market performance pattern, as reflected by the logarithm of Tobin's Q adjusted for industry, year, size, leverage and other variables, is more volatile than that observed for other Chinese companies. State shareholding in regulated firms was, before reform, 24% higher than for non-regulated ones but, as documented in Table 1, the 2005 reform did not follow, for regulated firms, any distinct pattern.

Another dummy also used for equalizing purposes signals companies with only one type of private ownership, namely A shares (DUM_A). Companies that issued only A shares to the public are the majority (90%) and can be found in the three exchanges. All firms traded in the SZSE SME board are of this type. The 10% of companies that issue other types of shares besides A shares are clearly larger, less efficient and more leveraged than the average. Their ownership structure is more concentrated and the number of shares held by the board is much smaller than the average. This finding contrasts with the view that companies with foreign owners (B shares, H shares or N shares) should exhibit better performance due to their access to international capital and to pressure from international investors for performance.

3.5: The reform period in numbers

The section now describes how variables evolve along the 2002-2008 period and how classes of initial ownership (S_OWN and L_OWN), influence them. Comments offered in this section still refer to financial services industries and other companies excluded at a later stage from model building and hypothesis testing.

Average market performance of Chinese companies, as reflected by Tobin's Q, plunged from a value of 2.5 in 2002 to less than 1.5 in 2005. Then it surged to a maximum of 3.5 in 2007 and plunged again in 2008. All initial ownership classes of S_OWN and L_OWN closely follow such common pattern and average values are similar with the exception of class L = 0% where Q is higher.

Average return on Assets (ROA) follows a pattern similar to Q's but with the distinctive feature of initial ownership classes being differentiated until 2005 and only from then on converging to similar values. In the initial year, 2002, companies with S = 0% or with L $\geq$ 50% show average ROA around 3 while other classes have ROA below 2.¹³

Other performance measures such as the market to book ratio (MBR), Operating Profits to Assets (OPP_A) Return on Equity (ROE) and Earnings per share (EPS) follow the same pattern as Q and ROA but show higher differentiation amongst initial ownership classes. Operating Profits to the market value of Equity (OPP_EQ) is different in that its pattern is an inverted "V" with the maximum in 2004 and a subsequent plunge to values below those in 2002.

Average values of leverage (LEVERAGE) of Chinese firms increase slowly over the whole period from values around 0.5 to values near 0.6. A slight contraction was observed from 2006 to 2007 and, in the last year recorded, a robust increase in leverage takes place. The strength of such increase is clearly dependent on initial ownership class. Companies where, in 2002, the state or legal persons had no holdings (classes S = 0% or L = 0%) were, until 2007, the less leveraged of all; but then, in the course of one year, they became the most leveraged of all.

Size (SIZEN) is another variable where initial ownership classes draw distinct patterns.

¹³ The average ROA for the L = 0% is the worst performer in 2002 but, from 2005 on it became the best performer. This, however, is an artifact linked to the beginning of trading in the SZSE SME board.

For all classes but one, assets of Chinese companies increased 1.5 times until 2007 and then suffered a slight contraction in 2008. As expected, companies which, around 2002, were heavily intervened (class $S \geq 50\%$) are, by far, the largest in China (1.6 times bigger) in terms of assets. Stability is of paramount importance in China. Since large firms employ a significant workforce and distribute business amongst smaller companies, the state used to exert a tighter control over them.

Figure 3 offers a graphical description of the evolution of Q, ROA, LEVERAGE and SIZEN along the period. Each line represents an initial ownership class. When possible, classes are explicitly identified.

[Insert Figure 3]

Ownership concentration (TOP10) decreases over the period from values around 60% to below 50% with just a slight increase in 2004. Initial ownership classes follow this pattern but at different levels: Class $S \geq 50\%$ is some 3% to 5% more concentrated than class $L \geq 50\%$, which, in turn, is 5% above class $S = 0\%$. As expected, classes in between are less concentrated.

The number of shares held by the board (N_SHARES_BOARD) is also worth noting as initial ownership classes define in it three distinct patterns. For the three classes $S = 0\%$, $L = 0\%$ and $L < 25\%$, the average number of shares held by the board increases steadily from almost nothing in 2002 to many millions in 2008. Class $S \geq 50\%$ shows no shares in the board until 2006 and then it surges vigorously. The other four classes have, in 2002, a few or no shares in the board, showing afterwards a timid increase. Contrasting with classes where initial legal holdings were modest, boards where initially $L \geq 50\%$ or $L > 25\%$, show little appetite for shares throughout the period.

The number of directors in the board decreased steadily during the period, from values

near 10. Initial ownership classes all converge along the period to 9 directors in average. The number of independent directors in the board jumps from an average near zero in 2002 to more than 3 in 2003, all ownership classes following this pattern.¹⁴ The average yearly number of meetings of the board shows a V shaped pattern along the period, decreasing to less than 8 meetings in 2004 and then increasing again from 2005 on. The ratio of the number of shares distributed to the board by the number of outstanding shares increases from almost zero to 2% in 2004 decreasing afterwards.

3.6: Typifying initial ownership classes

The $L = 0\%$ class (no legal person ownership) mostly contains companies belonging to the SZSE SME board and have less than 5 years recorded (they begun trading from 2005 on) being thus excluded from further modeling and hypotheses testing. Unusual patterns found in connection to this class stem from the influence brought about by some 200 new companies from the SME board later in the period (2006-2008).

Classes $S = 0\%$ and $L \geq 50\%$ contain almost half of the companies in the sample and they share several characteristics. To begin with, these two classes largely include the same companies: most of the $L \geq 50\%$ companies are also $S = 0\%$ companies.¹⁵ They belong to all industries, being significantly smaller and less leveraged than the average. But while leverage in $L \geq 50\%$ companies converges to the average along the period, in $S = 0\%$ companies it does not converge being below average for the whole period. We believe that these two classes represent medium sized companies, the “rank and file” amongst listed Chinese corporations; and, as explained later on, they are the less loved by investors, probably also the most exposed to hazardous effects brought about by the reform program. Indeed, their market performance, after accounting for size, industry, yearly and other effects, decreases steadily during the

¹⁴ It is stipulated in CSRS Guiding Opinion on Establishing Independent Director System in Listed Companies) that at least two independent directors shall exist in the Board before June 30, 2002 and three before June 30 2003.

¹⁵ $L \geq 50\%$ companies are, to a large proportion, also $S = 0\%$ companies but the reverse does not hold: $S = 0\%$ companies can be anything regarding legal ownership.

whole period. ROA is also below average, decreasing during the initial year and then remaining stable.

Classes $S \geq 50\%$ or $L = 0\%$ are the reform net winners. They encompass some 190 companies, larger but not more leveraged than the average. They issue a higher than average proportion of shares in non-domestic markets. From 2004 on, Tobin's Q detaches itself from average. ROA is below average at the beginning of the period but a surge in 2003 leads to a higher than average change in ROA during the period.

4. Methodology and results

Table 6 shows changes in Tobin's Q and other variables, observed in the final year recorded in relation to the initial year, averaged by class of initial ownership S_OWN and L_OWN . Changes are negative, denoting an overall decrease in performance; but the larger the initial state ownership, the smaller such negative change is; in the case of legal ownership the opposite is verified. Apparently, therefore, state ownership has favored 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 between ownership and performance. Indeed, market performance at the end of the period is, in average, directly proportional to the size of initial state holdings and indirectly proportional to the size of initial legal holdings, the opposite of that observed at the beginning of the period.

[Insert Table 6]

It is worth asking whether such reversal is significant and, if so, whether it bears some relation with the concomitant reform. Thus the first hypothesis to be tested here is that the effect of state and legal person ownership on performance of Chinese companies suffers a reversal during the period. The second hypothesis of the study is that the

Split Share Structure reform has had a role to play in such reversal.

4.1 Making company performance comparable

In order to test the above hypotheses, the first step consists of removing from observed performance all effects known to influence it: yearly effects, size, industry, leverage, exchange and other effects. To this end, a general linear modeling tool (GLM)¹⁶ is employed, the result being effect-free performance in the form of residuals. Residual performance allows the direct comparison between different companies or between years for the same company. GLM modeling is applied to the logarithm of Tobin's Q (LOG_Q) and to Return on Assets (ROA), two performance measures. Leverage (LEVERAGE) is also modeled for contrasting purposes.

In order to search for the most economical model in terms of degrees of freedom engaged yet capable of explaining the highest possible proportion of variability, a series of trials are carried out using potentially relevant factors and covariates mentioned in the extant literature and in Table 3. Effects are removed from the model when they do not apportion any increase in explained variability.¹⁷ Variables *a priori* excluded are ownership fractions (A, B, H, S, L), initial ownership classes (S_OWN, L_OWN, TOP, S_TYPE, L_TYPE) plus performance values other than the dependent variable (ROE, MBR, EPS and others). Some of these are used at a later stage.

When LOG_Q is the dependent variable, the best model obtained includes the following effects besides the constant term effect:

$$\text{LOG_Q} = \text{INDUSTRY} + \text{YEAR} * \text{EXCH} + \text{YEAR} * \text{DUM_I} + \text{YEAR} * \text{DUM_A} \\ + \text{N_SHARES_BOARD} + \text{TOP10} + \text{YEAR} * \text{SIZEN} + \text{YEAR} * \text{LEVERAGE}$$

¹⁶ Throughout the paper, GLM is used both to obtain residuals and to test hypotheses. GLM is a well known algorithm and it is embedded in most statistical packages.

¹⁷ This was the case of board characteristics other than N_SHARES_BOARD. Several interactions were also excluded. Main effects YEAR and EXCHANGE were similarly excluded but these factors appear as part of interaction effects.

The plus sign indicates independence whereas an asterisk indicates interaction between two effects. The first line of the model contains factors (effects partitioning the sample into cells) whereas the second line shows covariates. The effect of each of the 21 industrial classes (as depicted in Table 2 but with Financial Services excluded) is thus accounted for in an overall basis but the effect of each of the 3 exchange boards is accounted for on an yearly basis. Only year-specific interactions are significant and only 4 amongst all potential covariates are significant, the effects of concentration and number of shares in the board being overall whereas size and leverage are yearly. All effects are modeled here as fixed effects. The proportion of variability explained is high (56%). Table 7 (I) completes the description of the model.

[Insert Table 7]

Effects interacting with YEAR, such as SIZE, are thus accounted for independently year by year. Once such interactions enter the model, the main effect YEAR apportions no extra variability, being thus excluded. But it is verified that, indeed, all yearly residual averages equal zero.

It should be noted that the YEAR effect is not treated as a sequence nor is the model intended to recognize serial correlation or trends. Residuals thus preserve time-related information, namely any reversal that may occur during the period in the way initial state and legal ownership may affect performance.

It may be argued that serial correlation and correlation in error terms are likely to be significant and that they may distort results. It should be stressed therefore that the objective here is not to test hypotheses but to perform an experiment whereby observations are made comparable. Disturbances leading to the distortion of model parameters (such as the existence of influential cases) are indeed worth examining but

disturbances mostly affecting significance tests are less important in this case. Moreover, effects apportioning most of the variability are cross-section effects namely interactions between YEAR and other factors or covariates.

Residuals are logarithms of Tobin's Q where the influence of the year, size, industry and others, are no longer present, thus making it possible to compare observations taken from companies of different sizes, exchanges, leverages, years and so on. In case the reversal mentioned above is a true effect of its own, not the result of spurious influences, it should show up in residuals. Indeed, its significance should increase.

Using a similar methodology, effect-free residuals were also obtained for ROA and LEVERAGE, the respective models taking the following form:

$$\begin{aligned} \text{ROA} = & \text{INDUSTRY} + \text{EXCH} + \text{YEAR} * \text{DUM_A} \\ & + \text{N_SHARES_BOARD} + \text{TOP10} + \text{YEAR} * \text{SIZEN} + \text{YEAR} * \text{LEVERAGE} \end{aligned}$$

$$\begin{aligned} \text{LEVERAGE} = & \text{INDUSTRY} + \text{YEAR} * \text{EXCH} + \text{YEAR} * \text{DUM_I} + \text{YEAR} * \text{DUM_A} \\ & + \text{N_SHARES_BOARD} + \text{TOP10} + \text{YEAR} * \text{SIZEN} \end{aligned}$$

The ROA model explains 28% of variability whereas the LEVERAGE model explains 12%. Details are also available in Table 7 (II and III).

4.2: Graphical description of the reversal

Figure 4 is a graphical description of the "Change" columns in Table 6, showing changes in residuals observed between final and initial values in series, averaged by S_OWN or L_OWN. A reversal is clearly observed in Tobin's Q residuals and also in ROA residuals. Figure 5 then shows how such reversal takes place steadily year by year. The Y-axis measures yearly averages of differences between the initial residual in a series and each year's residual. Companies where initially $S \geq 50\%$ or $L = 0\%$,

afterwards show upward trends; other classes, namely $L \geq 50\%$ or $S = 0\%$, show downward trends. It is this divergence in trends that causes the observed reversal at the end of the period.

[Insert Figure 4]

[Insert Figure 5]

Given that S_OWN and L_OWN classes are unbalanced,¹⁸ it may be argued that the observed reversal might be the consequence of differences in the number of cases or differences in volatility amongst classes. If that were the case, then the same reversal should be observed, in one way or the other, in all variables. Leverage is thus examined as a contrasting variable. Leverage and its residuals are clearly affected by ownership classes but not in the way Tobin's Q or ROA are. The bigger legal ownership is, the higher residual leverage is in average (the opposite of that expected for performance variables). As for state ownership, the relationship is complex: it is indifferent to leverage except for class $25\% < S < 50\%$ where companies are less leveraged in average. Moreover, gradual increases in residual leverage along the period are observed for $L > 50\%$ and $S = 0\%$, these being the classes where average performance decreases along the period. Therefore, patterns of ownership observed for performance do not replicate themselves in the case of leverage.

4.3: Significance of the reversal

The likelihood of observing a reversal of such magnitude when in the population it does not occur is now tested using three equivalent "one sample" designs. S_OWN and L_OWN , the ordinal classes of increasing S and L ownership, are separately used to

¹⁸ In Table 5 it has been shown that, while two initial ownership classes have around or more than 500 cases each (these are the $S=0\%$ and the $L \geq 50\%$ classes), other classes have around or less than 100 cases.

explain final performance in terms of initial performance and other controlling variables: the number of years in each series (N_YEARS) and the type of initial ownership (S_TYPE for state shares and L_TYPE for legal shares).¹⁹

The first of such “one sample” designs simply consists of observing partial correlations of S_OWN and L_OWN with the final performance in a series, using the initial performance as controlling variable together with N_YEARS, S_TYPE or L_TYPE. The null hypothesis is rejected if the two partial correlations are of different signs and both significant at a required level.

An identical design consists of observing the significance levels of two regressions:

$$V_FINAL = a + b_1 * S_OWN + b_2 * V_INITIAL + b_3 * N_YEARS + b_4 * S_TYPE$$

$$V_FINAL = a + b_1 * L_OWN + b_2 * V_INITIAL + b_3 * N_YEARS + b_4 * L_TYPE$$

For the null hypothesis to be rejected it is required that the two slope coefficients associated with S_OWN and L_OWN (b_1) be of different signs and both significant at a required level.

Finally, S_OWN and L_OWN may be used as covariates in two repeated measures tests where the initial and final performances in series are the repeated measures and N_YEARS, S_TYPE or L_TYPE are also included. For the null hypothesis to be rejected, within subjects factors should be significant (at a required level) when interacting with S_OWN or L_OWN respectively. Moreover, estimated slope coefficients of the initial and final values should have opposite signs.

¹⁹ Differences between initial and final performance are positively correlated to initial performance. Initial performance, therefore, must be included in tests. Simplicity thus suggests the use of designs explaining final performance in terms of initial performance (and other variables) rather than the use of designs explaining differences in terms of initial performance (and other variables).

Two P-values, one for each model, are thus obtained from the above tests. The null hypothesis is rejected when those two P-values are below an appropriate level (typically 0.05) while their product is also below the square of that level. For instance, where a significance level of $P < 0.05$ is deemed as appropriate, then if $P < 0.0025$ (squared 0.05) is observed in each of the two P-values it may be concluded that the null hypothesis is indeed rejected in one model “and” in the other. In the paper, pairs of significance levels obeying $P < 0.0025$ are referred to as being “at the required level”. The reasoning pre-supposes independence between the effects of S_OWN and L_OWN on performance. Earlier in the paper it was mentioned that independence was indeed verified for small values of S and L.

Table 8 summarizes results when V_INITIAL and V_FINAL refer, in succession, to LOG_Q, the residuals of LOG_Q, the residuals of ROA and the residuals of LEVERAGE. The number of cases is 1183, each company contributing one case.

[Insert Table 8]

For LOG_Q, partial correlations and regression coefficients (b_1) are significant, but not at the required level, exhibiting opposite signs in S_OWN and L_OWN as hypothesized. Repeated measures’ within subject interactions with S_OWN or L_OWN are significant at the required level. During the period, therefore, changes verified in Tobin’s Q denote a reversal in the roles of initial state and legal ownership on performance. The examination of parameters provided by the repeated measures test also show that, at the beginning of the period, an increasing state ownership is detrimental to LOG_Q while for legal ownership the opposite is verified. Indeed, slope coefficients at the beginning of the period have opposite signs for S_OWN and for L_OWN. However, at the end of the period no significant slope (correlation) remains between initial levels of state or legal ownership and LOG_Q. The other controlling variables are non-significant, no influential cases or heteroskedastic error terms are observed and Durbin-Watson

statistics are both above 2.

The finding of significant differences in LOG_Q is expected as tests are performed in the same company at the beginning and at the end of the period. In such “one sample” designs, effects that did not change such as the exchange, the industrial group or, importantly, the overall change in performance observed in Chinese markets over the period, are indeed accounted for.

On the other hand it is worth equalizing LOG_Q into residuals because effects such as changes in size or in leverage observed over the period are thus made comparable. Residuals of LOG_Q exhibit the same reversal as LOG_Q in the roles of state and legal holdings on performance. Partial correlations, regression coefficients (b_1) and within subjects interactions in repeated measures tests are now all significant at the required level and parameters exhibit signs predicted by hypothesis. At the end of the period, slopes associated with repeated measures tests are of opposite signs but at the beginning of the period slopes are not significant. Therefore, while non-residuals (LOG_Q) suggest that before reform state ownership was significantly detrimental to performance while the opposite was verified in the case of legal ownership, residuals show no evidence of such initial distinction, suggesting instead that companies where, at the beginning of the period, the state held large positions, were afterwards favored by investors whereas companies where legal entities held, before reform, large positions, were afterwards avoided by investors. Again, controlling variables are non-significant, no heteroskedasticity or influential cases are found in error terms and Durbin-Watson statistics are also above 2.

For ROA and LEVERAGE residuals, reversal conditions are non-significant. Residuals of ROA are, at the beginning of the period, significantly influenced by state and legal ownership. Moreover, such influence runs in opposite directions as hypothesized: state holdings are detrimental to ROA while legal ones are beneficial. But such initial pattern (similar to the initial pattern in Tobin's Q) does not translate into

any significant reversal of roles at the end of the period. As for leverage, initial values are higher for state owners and lower for legal owners and such pattern does not change along the period: leverage keeps on being favored by state owners and otherwise by legal owners, the opposite of that observed for performance.

Results thus suggest that a reversal in the role of state and legal person ownership on market performance has taken place between 2002 and 2008 as hypothesized. Coefficients and their signs, significance levels and R squared values are similar when, instead of S_OWN and L_OWN, continuous fractions S and L are used. Incidentally, results also indicate significant persistence of market performance as well as leverage.²⁰

Any alternative explanation for the reversal must be capable of treating differently the effects of state and legal holdings on performance, even where such holdings are similar in size. Adjustments to Tobin's Q to accommodate for non-tradable shares (Bai et al., 2004) fail to explain the reversal and are useless in this case. Classes S = 50% and L = 50% are indeed similar in terms of the proportion of non-tradable shares and yet they suffer a divergent fate under the reversal: shares of state controlled firms increase in relative value while shares of legally controlled firms decrease in value.

4.4: Linking the reversal with the reform

The documented reversal can hardly be attributed to the 2005 reform. Indeed, as far as our data can tell, such reversal may have begun unfolding in 2002 or even earlier. But although the reform cannot explain the verified reversal in investors' preferences, it may have fostered it, restrained it or in some other way interacted with it. More importantly, given previous attempts to sort out the Split Share Structure, investors may have anticipated the 2005 reform or they may have seen it as inevitable thus assuming a perception bordering on privatization well in advance of 2005. It is thus interesting to

²⁰ Regressions indicate a six years ahead predictive power. For LOG_Q residuals such predictive power explains around 7% of variability, being higher (17%) for LOG_Q. 13% of variability of LEVERAGE is predictable.

investigate whether the 2005 reform has left its mark on companies' performance and it is even more interesting to see whether such mark, if present, interacts with initial ownership `S_OWN` and `L_OWN` or not. Hitherto the paper has not apportioned any significant fact linking the reform to the reversal.

The relative diversity of years where reform takes place may be used to investigate links between the reform and the reversal. Since 219 companies were reformed in 2005, other 854 in 2006, 77 in 2007 and 18 in 2008,²¹ a factor reflecting the number of years to or from reform (`NY_REFORM`) may be able to capture some of the variability associated with the reform. Thus each record in the series is now identified, not just by its year but also by the number of years before or after reform: $\{-3, -2, -1, 0, 1, 2, 3\}$. `NY_REFORM` can then be used to search for significant deviations from zero in residual performance or as a random effect in a linear model where the same residuals are separated by ownership classes.

Residuals have mean values of zero for all years, exchanges, industries, sizes and other variables used to obtain them. If, say, in year -1 before reform a significant deviation from zero is observed in average residuals and if such significant deviation is absent from earlier `NY_REFORM`, then it may be concluded that the reform left its mark on companies' performance.²² The difficulty here is that 854 out of 1183 companies were reformed in the same year, 2006, making it hard to separate the effects of `YEAR` and `NY_REFORM`. Indeed, differences from zero that may remain in residuals averaged by `NY_REFORM` are necessarily small, not because the effect of reform is itself small but because most of it was removed together with the `YEAR=2006` effect.

Table 9 shows mean values and standard deviations of residuals of `LOG_Q`, `ROA` and `LEVERAGE` for each of the `NY_REFORM` classes. In the case of mean values, an

²¹ Presumably, the remaining 15 companies in the sample would be reformed in 2009.

²² Or otherwise. However, it is somehow difficult to sustain that Tobin's Q residuals, controlled as they are for yearly performance, are capable of explaining the reform.

asterisk indicates significant difference from zero.²³ In the year previous to reform (NY_REFORM = -1), a significant increase is observed in the average of Tobin's Q residuals; and the same is observed for ROA at the reform year (NY_REFORM = 0). It is not clear whether such significance levels should be adjusted to reflect multiple comparisons (as in Dunn, 1961 or using other methods) because here it is not expected that significant differences should be found for all possible NY_REFORM. Anyway, if corrected, levels remain significant or not, depending on the type of adjustment used.

[Insert Table 9]

Given this, the testing of a closer relationship between reform and performance reversal is attempted using a linear model where the residuals of the logarithms of Tobin's Q for the period 2005-2008 are explained by the effect of the initial ownership class (S_OWN or L_OWN separately), by a dummy effect (DUM_BR) assuming the value of 1 one year before the reform and zero otherwise, by the interaction (DUM_BR * S_OWN or DUM_BR * L_OWN) between the dummy and the initial ownership class and by the initial residual value in each series (V_INITIAL). DUM_BR is modeled as a random effect while S_OWN, L_OWN and V_INITIAL are covariates. The two models, one for each ownership class, may be depicted as follows:

$$V = \text{DUM_BR} + \text{DUM_BR} * \text{S_OWN} + \text{S_OWN} + \text{V_INITIAL}$$

$$V = \text{DUM_BR} + \text{DUM_BR} * \text{L_OWN} + \text{L_OWN} + \text{V_INITIAL}$$

where V denotes the dependent variable. Besides testing the residuals of LOG_Q, tests were conducted where V and V_INITIAL are residuals of ROA and LEVERAGE.

²³ A one sample t-test was used.

In such cases, however, the dummy NUM_BR reflected the year of the reform (NUM_BR = 0), not the year before. Table 10 shows effects and coefficients' significance. Both the reform effect and the reversal effect are found to be significant at the required level for residuals of LOG_Q and LEVERAGE but not for ROA. Interaction effects, however, are far from significance.

[Insert Table 10]

Results thus suggest that changes in market performance one year before the reform significantly explain final performance. ROA, a less elastic and clearly more volatile measure of performance, probably could not mirror the reform effect significantly. It is thus likely that investors' perception of the relative value of state and legally owned companies (as documented earlier in the paper) is affected by the ongoing reform. However, such effect is purely linear, ownership classes not being treated in different ways by the reform effect. All classes experience a relative increase in market performance one year before the reform, followed by two years of decrease. Therefore it may be concluded that the reform left its mark in performance of Chinese companies but such mark did not add in any significant way to the reversal.

An interesting result is the newly found significant relationship between leverage and legal ownership. L_OWN was shown to be non-significant in "one sample" designs explaining leverage. Thus the presently observed significance may indeed be attributed to the reform effect. It seems as though companies made an effort to rely less on external resources, such effort being relaxed after the reform year. It may be speculated that such effort was seen by managers as a pre-condition to being granted the access to the reform program. It is worthwhile recalling that only after 2006 it became clear that such access was neither to be selective nor hard to attain.

The above findings are trustworthy so long as they refer to residuals, that is, to

variables that are strictly free from yearly influences. The apparent surge in volatility during the reform years (documented in Table 9), would indeed be interesting but for the fact that it is present also from 2005 on in non-residuals.

4.5 A note on the use of instruments

The “ripple” produced on residuals of ROA and LEVERAGE around the reform year may be translated into instrumental variables potentially able to explain ownership classes. Above, we noticed that the residuals LEVERAGE suffer a decrease at the reform year and then bounce back. For ROA the effect is the opposite.

Two variables are thus built using the values of residual ROA and LEVERAGE at the reform year. These variables are then used to separately predict S_OWN and L_OWN, each company apportioning one case. No significance is observed in models or in coefficients, the explained variability being below 1% in both cases.

The S_OWN and L_OWN thus predicted are then included in “one sample designs” aimed at assessing the significance of the reversal as described earlier in the paper. Observed partial correlations are indeed of different signs but only the L_OWN correlation is significant, not at the required level. The two slope coefficients (b_1) in regressions are also of different signs as hypothesized but, again, only the L_OWN coefficient is significant. Within subjects factors of repeated measures tests show similar results.

As mentioned earlier, the use of two separate models may be criticized on grounds that, if S_OWN and L_OWN are indeed significant in explaining performance, then there are variables which have been omitted from the test, leading to non-independent error terms. It is worth noting that the diagnostic is correct, of course, but the usual remedy, the use of instruments, is not effective in this case because any two fractions of the same total, no matter if they are predicted or observed, will exhibit a spurious negative

correlation thus invalidating models. This is indeed the case of S_OWN and L_OWN predicted by the above instruments, such negative correlation now being -0.31, clearly below that amongst observed classes (-0.79) but spurious as well.

When predicted S_OWN and L_OWN are included in the same regression, coefficients have different signs but none is significant. This may be the consequence of weakness of instruments or it may be caused by the misleading boundary influence.

5. Concluding remarks

The reversal in investors' perception of the roles of state- and legal person-owned companies is a major finding hitherto unnoticed. It begun unfolding gradually, at least three years before the event that might have explained it, the Split Share Structure reform. And the effect of such reform, as far as our limited means can tell, is purely additive, not contributing to the reversal but only to overall performance.

Being a noteworthy event, the reversal documented here will surely attract the attention of other authors interested in privatization processes. This paper endeavors to convey a simple conviction, that for privatization purposes, direct and indirect state ownership are distinct realities leading to distinct outcomes in terms of market performance.

The relevance attributed to legal ownership in the paper 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. Indeed, legal persons exert authority over companies in ways that may be compared to the influence of the state in Southern Europe or in Latin America. Legally intervened companies are protected against hostile bids and, to a large extent, have easier access to financing as banks and other lenders regard this type of companies

as covered by some warranty granted by the state.²⁴ After privatization, however, a legally intervened company is striped from their former privileges and it is then where weaknesses tend to show up. Such company is left in the hands of its owners, which may drop it or not, always acting to the disadvantage of smaller 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 protectionism.

The paper first describes the data and methodology adopted, namely the decision never to include in models more than one fraction of the same total. Results illustrate the potential of such methodology in circumventing one major pitfall often found in this type of studies. The paper has focus on the case of state and legal holdings where the pitfall is most likely to be damaging.

After setting out the methodology, the paper describes the period 2002-2008 in terms of yearly performance, size, leverage, concentration and other variables. Performance is then modeled in order to obtain residuals, that is, comparable values. Such residuals are tested for significant differences in ownership patterns, leading to conclusions about pattern reversal during the period. Next, the paper tries to link such reversal to the reform program ongoing in China from 2005 on. Results suggest that the effect of the reform on performance is purely linear.

Tobin's Q, a measure of market performance, seems to consistently reflect facts which occurred during the period. Overall, companies decreased in value, probably reflecting fears of dilution and also, in 2008, the economic crisis. Residuals of Tobin's Q, equalized as they are for yearly and other effects, clearly show how the reversal in the perception of investors took place gradually while the reform program was first hinted at, then confirmed and finally took strength.

²⁴ Figure 4 documents a direct relationship between leverage and increasing levels of legal person ownership.

Our methodology avoided complex models. Most of our results could have been brought about using more complex models but it is doubtful whether there would be much to gain, while the danger of misrepresentation would be higher. Since our goal here is the understanding of new facts, dynamic and complex in nature, it is easier and wiser to use smaller, robust instruments, on a step by step basis.

Privatization in China is a patient, well planned process, whereby state ownership is first reduced from full control (SOEs) into *inter alia* ownership, then from direct ownership into indirect ownership and finally into full privatization with a heavy set of regulatory limitations attached (lock up periods and other limitations). The paper has highlighted a crucial characteristic of its final steps whereby the shift from direct into indirect state ownership, which, at the time seemed capable of reconciling state control with the quest for corporate efficiency, may after all lead to lesser value.

Most domestic Chinese investors apparently believe that the reform will lead to full privatization. Time, however, may be running short to achieve this goal, the danger being that China may follow the path of other economies into disguised protectionism. Indeed, through the reform, institutional control is withdrawing but any delay in selling state and legal holdings may give way to informal control.

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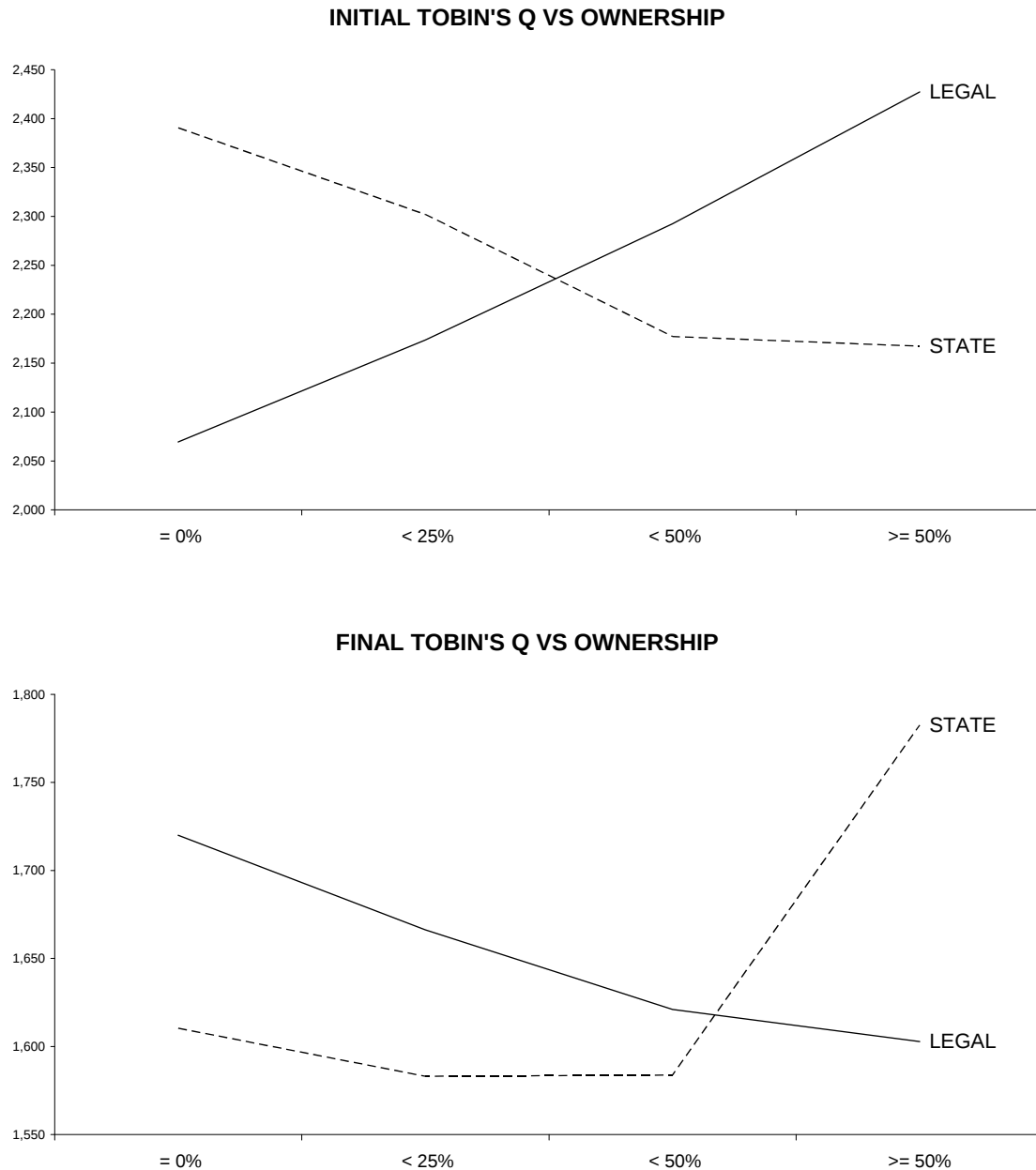
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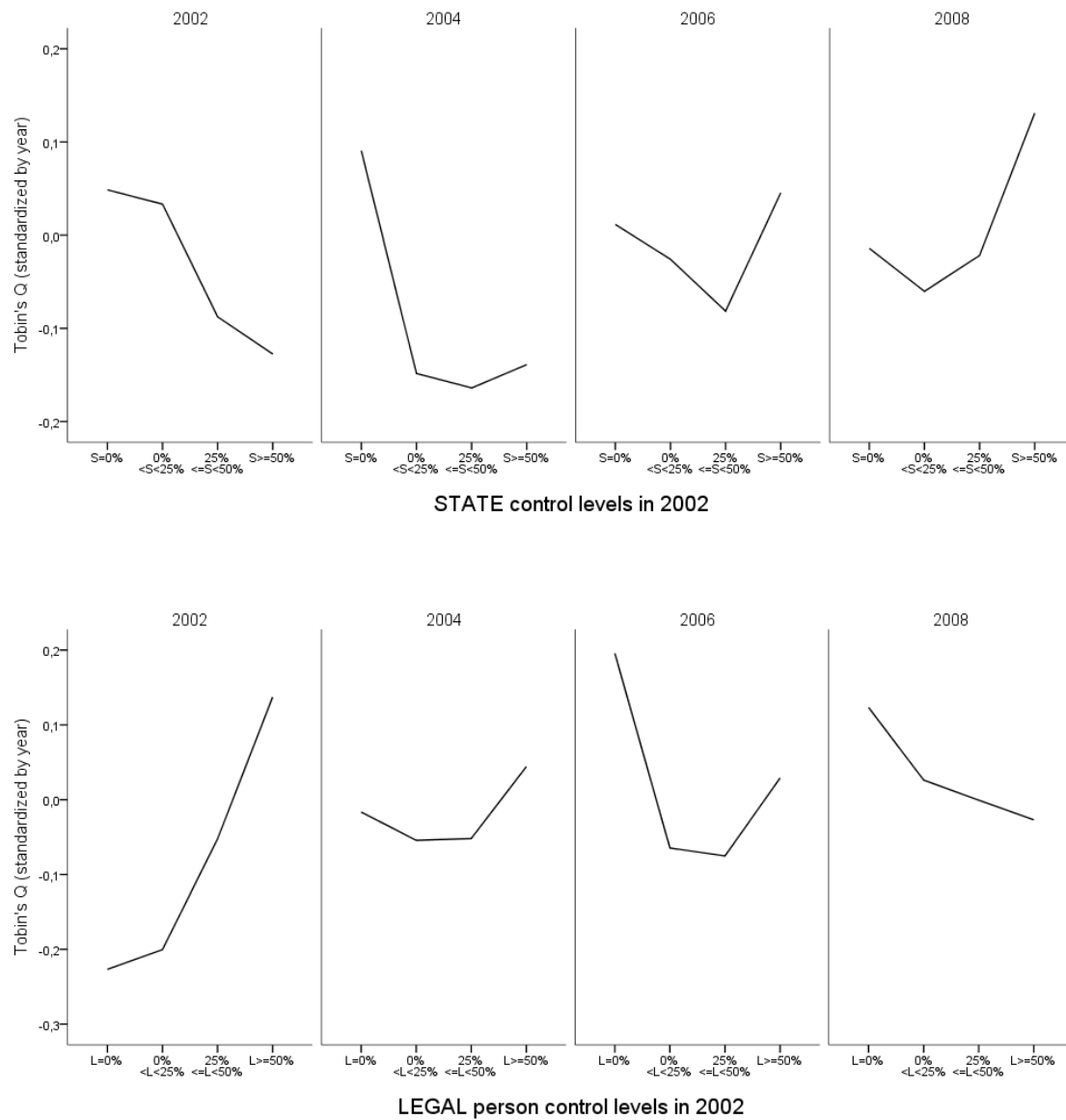
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Figure 1a: X-axes show classes of increasing state or legal person ownership at the beginning of the period; Y-axes show Tobin's Q averaged by the same classes. Dashed lines refer to state directly held companies; solid lines refer to legal person held companies. Above: values observed in the initial recorded year (mostly 2002). Below: for the same companies, values observed in the final recorded year (mostly 2008).



Caption: for initial records (mostly 2002 but also a few 2003 and 2004 records) performance increases with the size of legal person ownership and decreases with the size of state ownership; the opposite is verified for final values in series (mostly 2008): performance now remains stable or increase with former state ownership and decreases with former legal ownership. A reversal has thus taken place in Chinese domestic investors' perception of the worth of the same groups of companies.

Figure 1b: how averages of Tobin's Q for groups of Chinese companies evolve along the period 2002-2008. X-axes represent increasing state ownership (above) and legal person ownership (below). Y-axes show average Tobin's Q. U-shaped patterns can be observed in years 2004 and 2006 but it is clear that they are part of a reversal process.



Caption: in 2002 performance increases with legal ownership and decreases with state ownership. In 2008, for the same companies, a reverse in the relationship between ownership and performance has taken place: performance now remains stable or increases with state ownership and decreases with legal ownership. Before displaying, Tobin's Q values are standardized separately by year so that graphics may share the same Y-axis.

Table 1: The Split Share Structure reform in numbers: the table shows, by year and for regulated and non-regulated groups, the number of companies listed, the number of companies reformed and the average fraction of shares held by the state and by legal persons. In reformed companies such fractions are set to zero as former state and legal shares are indeed re-designated as tradable shares.

Industry	measurement / year	2002	2003	2004	2005	2006	2007	2008
Non-regulated companies	number of listed companies	945	1012	1081	1079	1129	1221	1393
	number of reformed companies	0	0	0	199	1023	1194	1356
	fraction of shares held by the state	0.150	0.128	0.113	0.097	0.011	0.004	0.002
	fraction of shares held by legal persons	0.434	0.449	0.455	0.368	0.038	0.007	0.007
Regulated companies	number of listed companies	115	124	136	146	162	175	180
	number of reformed companies	0	0	0	36	146	171	177
	fraction of shares held by the state	0.224	0.223	0.210	0.146	0.021	0.002	0.000
	fraction of shares held by legal persons	0.403	0.403	0.403	0.318	0.036	0.006	0.007
Total	number of listed companies	1060	1136	1217	1225	1291	1396	1573
	number of reformed companies	0	0	0	235	1169	1365	1533
	fraction of shares held by the state	0.158	0.138	0.124	0.102	0.013	0.003	0.002
	fraction of shares held by legal persons	0.431	0.444	0.449	0.362	0.038	0.007	0.007

Caption: 15 of the companies in the database were not reformed during the period. Average fractions of state and legal person shares drop to insignificant values from 2006 on denoting their re-designation into tradable shares; but the fact that such fractions became tradable does not imply that they were actually sold.

Table 2: The table refers to the beginning of the studied period (in most of the companies it is year 2002). It shows the fraction of state- and legal person- held shares and the number of companies listed in Chinese exchanges by industrial group and by exchange.

Industry / Exchange	SZSE			SHSE			SZSE SME			Total		
	state	legal	N	state	legal	N	state	legal	N	state	legal	N
Agriculture	0.094	0.410	7	0.110	0.503	22			5	0.090	0.410	34
Mining	0.086	0.467	9	0.072	0.268	27			3	0.070	0.293	39
Food &	0.319	0.297	21	0.141	0.415	35			7	0.185	0.330	63
Textiles &	0.161	0.398	16	0.076	0.474	35		0.112	15	0.079	0.373	66
Timber &	0.089	0.462	1		0.432	2			3	0.015	0.221	6
Paper & Printing	0.212	0.313	6	0.163	0.432	15		0.050	10	0.120	0.286	31
Petrochemicals	0.168	0.419	53	0.123	0.450	79		0.081	39	0.109	0.356	171
Electronics	0.095	0.478	15	0.121	0.417	27		0.041	29	0.066	0.276	71
Metals &	0.121	0.445	42	0.170	0.408	74		0.063	28	0.123	0.352	144
Machinery	0.120	0.411	74	0.155	0.412	122		0.059	52	0.112	0.338	248
Pharmaceuticals	0.103	0.418	30	0.155	0.401	55		0.168	13	0.118	0.375	98
Other		0.303	2	0.118	0.455	9		0.115	10	0.050	0.279	21
Utilities	0.276	0.339	23	0.208	0.444	41			2	0.225	0.394	66
Construction	0.194	0.460	6	0.137	0.317	21			5	0.127	0.294	32
Transportation	0.156	0.459	15	0.158	0.339	46			3	0.150	0.352	64
Information	0.083	0.447	24	0.044	0.496	53		0.007	22	0.044	0.376	99
Wholesale &	0.212	0.339	31	0.220	0.347	62		0.023	8	0.200	0.319	101
Financials	0.120	0.472	7	0.083	0.219	21			1	0.089	0.273	29
Real Estate	0.114	0.410	41	0.150	0.388	44		0.094	5	0.125	0.382	90
Social Service	0.092	0.466	17	0.095	0.487	22		0.075	10	0.075	0.396	49
Media		0.570	3	0.009	0.563	8			2	0.005	0.478	13
Conglomerates	0.054	0.400	23	0.056	0.445	43			1	0.054	0.423	67
Total	0.142	0.410	466	0.135	0.411	863	0.000	0.060	273	0.114	0.351	1602

Caption: “state” is the average fraction of state shares in that specific exchange and industry at the beginning of the period; “legal” is the average fraction of legal person shares in that specific exchange and industry at the beginning of the period; N is the number of companies in that specific exchange and industry at the beginning of the period.

Table 3: List of variables and the corresponding symbols used in the text.

Symbol	Description
COMPANY	Identification of each of the companies in the sample. Each company comprises 5 to 7 records, one for each year.*
YEAR	Year corresponding to the present record {2002, 2003, ... 2008}
N_YEARS	The number of years (records) in each series {5, 6 or 7}.*
EXCH	Stock Exchange where the company's shares are traded {SZSE, SHSE, SZSME}.*
INDUSTRY	Industry group (22 classes described in Table 2).*
DUM_I	Variable signaling a regulated company (Table 1).*
DUM_A	Variable signaling a company which issued domestic (A) shares only.*
YEAR_R	The year of the reform for that specific company {2005, 2006, 2007, 2008}.*
NY_REFORM	The number of years elapsed from the current year (YEAR) to the reform year: {-6, -5, -4, -3, -2, -1, 0, +1, +2, +3}.
NUM_BR	Dummy with the value of 1 one year before the reform and 0 otherwise.
A	Fraction of Chinese domestic privately held shares.
B	Fraction of B shares formerly held by foreigners in Chinese domestic markets.
H	Fraction of H shares offered in the Hong Kong exchange by mainland companies.
S	Fraction of shares directly held by the state (central and local governments).
S_OWN	Encoding of S at the first year recorded into 4 ordinal classes.*
L	Fraction of shares held by legal persons (all kinds of legal representatives).
L_OWN	Encoding of L at the first year recorded into 4 ordinal classes.*
SL_OWN	Cross tabulation of S_OWN and L_OWN into 15 classes.*
Q	Tobin's Q.
LOG_Q	Natural logarithm of Tobin's Q.
MBR	Ratio of Market to Book value of Equity.
EPSN	Earnings per share, inflation adjusted.
ROA	Return on Assets.
ROE	Return on Equity.
SIZEN	Natural log of Assets, inflation adjusted.
LEVERAGE	Debt to Assets ratio.
OPP_EQ	Ratio of Operating Profits to market value of Equity.
TOP10	Ownership concentration: fraction of shares owned by the largest 10 shareholders.
TOP	Identification of the largest owner at the first year recorded for each company.*
S_TYPE	Central versus local government state owner {C, L, X} at the first year recorded.*
L_TYPE	State Legal versus social legal owner {CL, SL, XX} at the first year recorded.*
N_DIRECT	Number of directors in the board.
N_I_DIRECT	Number of independent directors in the board.
DIR_IDIR	Ratio of the number of directors to the number of independent directors.
N_SHARES_BOARD	Number of shares held by the board.
BOARD_OUTSTAND	Ratio of the number of shares held by the board to the number of outstanding shares.
N_MEETING	Annual number of meetings of the board.

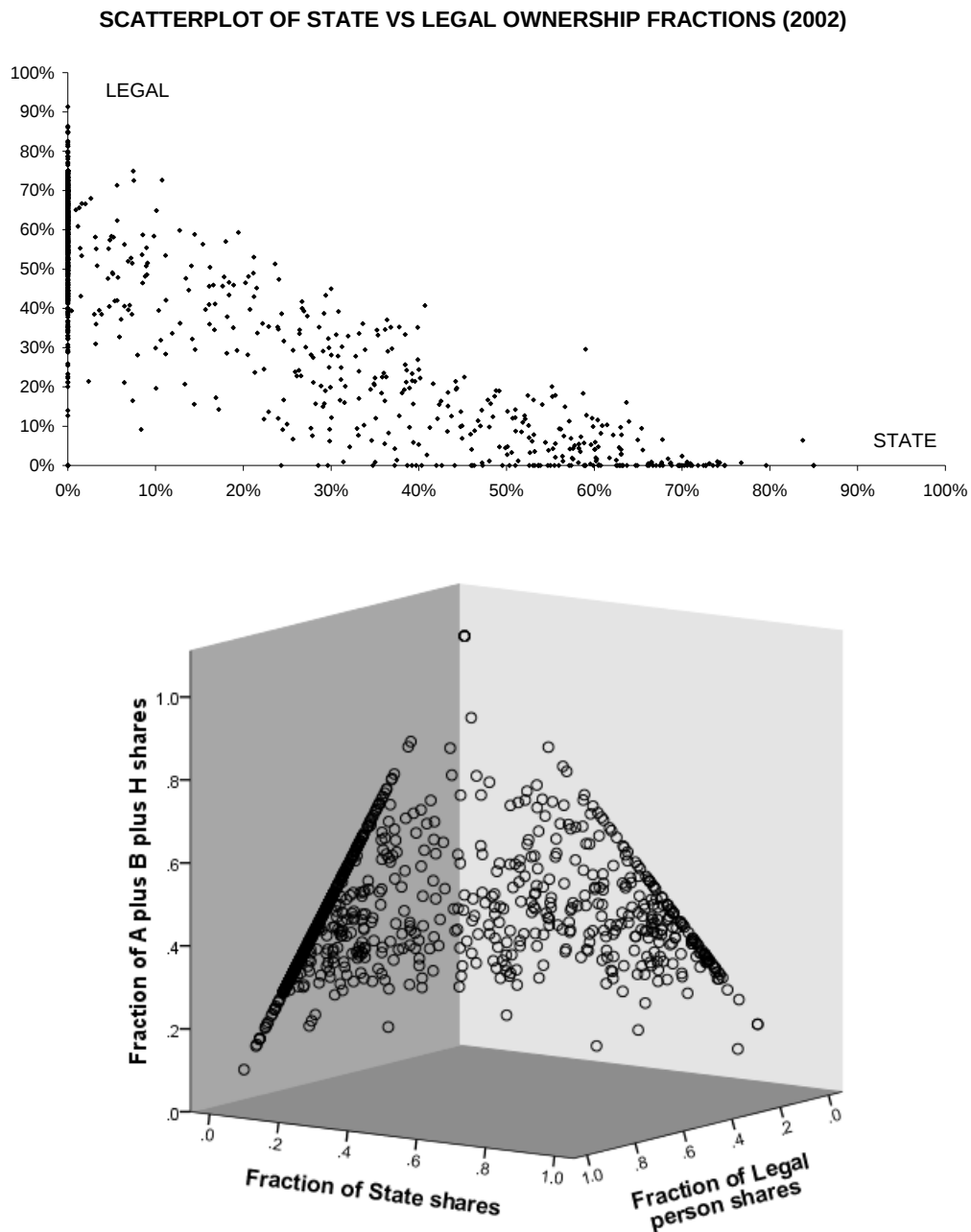
Caption: an asterisk indicates that all records in a company's series have the same value for this variable.

Table 4: Results from removing the fraction of legal person shares or the fraction of state shares from regressions where Tobin's Q is the dependent variable (year 2002).

	all variables		no legal		no state		no legal, state	
	Slope	Signif.	Slope	Signif.	Slope	Signif.	Slope	Signif.
constant	19.092	0.000	19.911	0.000	19.637	0.000	19.917	0.000
fraction of state shares	1.440	0.000	-0.045	0.698				
fraction of legal person shares	1.628	0.000			0.446	0.001		
LOG of Assets	-1.896	0.000	-1.898	0.000	-1.887	0.000	-1.899	0.000
Debt to Assets ratio	0.023	0.878	-0.021	0.888	0.052	0.731	-0.029	0.847
strategic industry dummy	0.205	0.020	0.268	0.003	0.279	0.002	0.264	0.003
domestic (A) shares only dummy	-0.417	0.000	-0.249	0.007	-0.318	0.001	-0.246	0.008
Adjusted R ²	0.45		0.42		0.43		0.42	
F statistics	137.2		144.5		150.3		180.7	
ANOVA P value	0.000		0.000		0.000		0.000	

Caption: Regression using all the 1008 companies with records in year 2002. Financial services and companies with less than five years recorded are excluded from this test.

Figure 2: The first scatter-plot shows the apparent correlation between fractions of state-held and legal person-held shares. The next scatter-plot, a 3D plot, adds to the first plot a new axis reflecting the remaining fraction of shares.



Caption: The 3D scatter-plot below graphically shows how the negative correlation observed in the scatter-plot above is the result of a constraining effect. Companies with records in year 2002 except Financial Services and companies with less than five years recorded are included in the plots.

Table 5: for each of the S_OWN, L_OWN and SL_OWN ownership classes, the table shows the number of companies in the first and last years recorded; by the number of companies with 5, 6 and 7 years recorded and the number of companies reformed by year of reform.

Encoded ownership fractions of state and legal persons		Number of companies for which													
		the first year recorded is			the last year recorded is			the number of years recorded is			Total				
		2002	2003	2004	2006	2007	2008	5	6	7		2005	2006	2007	2008
encoding for state only (S_OWN)	S=0%	594	57	88	5	2	732	100	71	568	739	165	516	39	9
	0%<S<25%	113	5	6	1	0	123	8	6	110	124	8	101	10	3
	25%<S<50%	148	5	3	0	0	156	4	8	144	156	20	115	17	4
	S>50%	153	9	2	0	2	162	4	15	145	164	26	122	11	2
encoding for legal only (L_OWN)	L=0%	75	4	3	0	0	82	3	6	73	82	15	52	9	2
	0%<L<25%	214	15	19	0	2	246	22	23	203	248	49	177	15	4
	25%<L<50%	204	10	24	2	0	236	27	14	197	238	32	180	19	4
	L>50%	515	47	53	4	2	609	64	57	494	615	123	445	34	8
encoding for both state and legal persons (SL_OWN)	S=0% L=0%	5	2	3	0	0	10	3	2	5	10	4	2	0	0
	S=0% L<25%	7	5	15	0	0	27	15	6	6	27	16	11	0	0
	S=0% L<50%	107	7	17	1	0	130	19	9	103	131	25	97	7	1
	S=0% L>=50%	475	43	53	4	2	565	63	54	454	571	120	406	32	8
	S<25% L=0%	1	0	0	0	0	1	0	0	1	1	1	0	0	0
	S<25% L<25%	15	0	0	0	0	15	0	1	14	15	1	13	0	1
	S<25% L<50%	57	1	6	1	0	63	7	2	55	64	3	49	8	2
	S<25% L>=50%	40	4	0	0	0	44	1	3	40	44	3	39	2	0
	S<50% L=0%	15	0	0	0	0	15	0	0	15	15	1	11	2	1
	S<50% L<25%	94	3	2	0	0	99	3	5	91	99	15	71	11	2
	S<50% L>=50%	39	2	1	0	0	42	1	3	38	42	4	33	4	1
	S>=50% L=0%	54	2	0	0	0	56	0	4	52	56	9	39	7	1
	S>=50% L<25%	98	7	2	0	2	105	4	11	92	107	17	82	4	1
	S>=50% L<50%	1	0	0	0	0	1	0	0	1	1	0	1	0	0
Total		1008	76	99	6	4	1173	116	100	967	1183	219	854	77	18

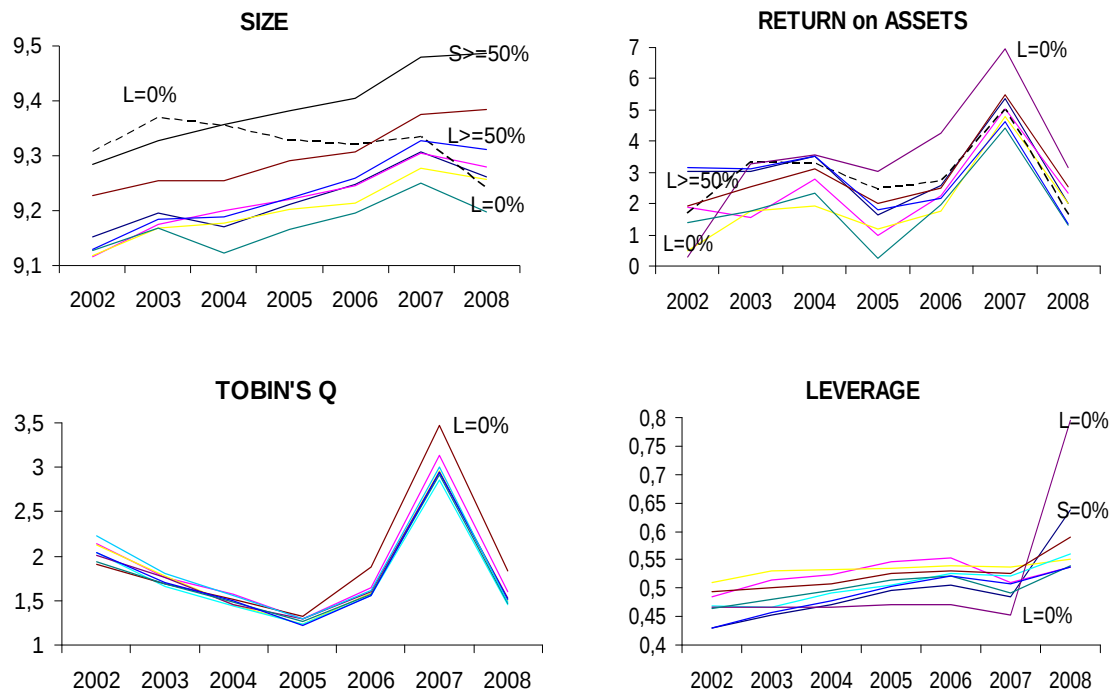
Caption: financial services and those with less than 5 years recorded were excluded from this counting.

Table 6: Initial and final values averaged by initial class of state and legal person ownership. Variables displayed here are those used in modeling and hypothesis testing (Logarithm of Tobin's Q, ROA and LEVERAGE). Residuals, that is, the same variables after adjusted for yearly effects, industry and exchange effects, size and other effects, are also displayed.

Encoded ownership fractions of state and legal persons		Average values for																	
		Tobin's Q			Log of Tobin's Q Residuals			Return on Assets			Residuals of Return on Assets			Leverage			Residuals of Leverage		
		Initial	Final	Change	Initial	Final	Change	Initial	Final	Change	Initial	Final	Change	Initial	Final	Change	Initial	Final	Change
Initial level state ownership (S_OWN)	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%<=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>=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
Initial level legal ownership (L_OWN)	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%<=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>=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
Total average		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

Caption: financial services and companies with less than 5 years recorded were excluded from this averaging. Initial values or initial classes refer to the first year recorded in a company's series (for most companies this is the 2002 record but for a few it is the 2003 or 2004 record as described in Table 5). Final values refer to the last year recorded; for almost all companies this means the 2008 record.

Figure 3: How average values of Tobin's Q, Return on Assets, Leverage and Size evolve during the 2002-2008 period. Each line represents a class of initial ownership (S_OWN and L_OWN).



Caption: all cases, including financial services and companies with less than five years recorded, are averaged here by year and by L_OWN , S_OWN .

Table 7: General linear model, tests of between subjects effects for three dependent variables:

I: Dependent variable: natural logarithm of Tobin's Q (LOG_Q).

Source of variability	Sum of Squares	D.F.	Mean Square	F ratio	Significance
Corrected Model	1007.889	68	14.822	152.346	.000
Intercept	250.919	1	250.919	2579.051	.000
INDUSTRY	44.851	20	2.243	23.050	.000
EXCH * YEAR	12.866	12	1.072	11.021	.000
N SHARES BOARD	2.644	1	2.644	27.178	.000
TOP10	72.704	1	72.704	747.286	.000
YEAR * SIZEN	243.380	7	34.769	357.367	.000
YEAR * LEVERAGE	14.499	7	2.071	21.289	.000
YEAR * DUM_I	4.409	7	0.630	6.473	.000
YEAR * DUM_A	2.952	7	0.422	4.334	.000
Error	766.361	7877	0.097		
Corrected Total	1774.250	7945			

R Squared = 0.57, adjusted R Squared = 0.564.

II: Dependent variable: Return on Assets (ROA)

Source of variability	Sum of Squares	D.F.	Mean Square	F ratio	Significance
Corrected Model	117771.034	51	2309.236	60.691	.000
Intercept	9591.052	1	9591.052	252.071	.000
INDUSTRY	5960.944	20	298.047	7.833	.000
EXCH	2251.441	2	1125.721	29.586	.000
YEAR * DUM_A	1318.978	13	101.460	2.667	.001
TOP10	3433.225	1	3433.225	90.232	.000
N_SHARES_BOARD	271.329	1	271.329	7.131	.008
YEAR * SIZEN	17989.198	7	2569.885	67.541	.000
YEAR * LEVERAGE	79587.096	7	11369.585	298.814	.000
Error	300473.326	7897	38.049		
Corrected Total	481497.874	7949			

R Squared = 0.28, adjusted R Squared = 0.28.

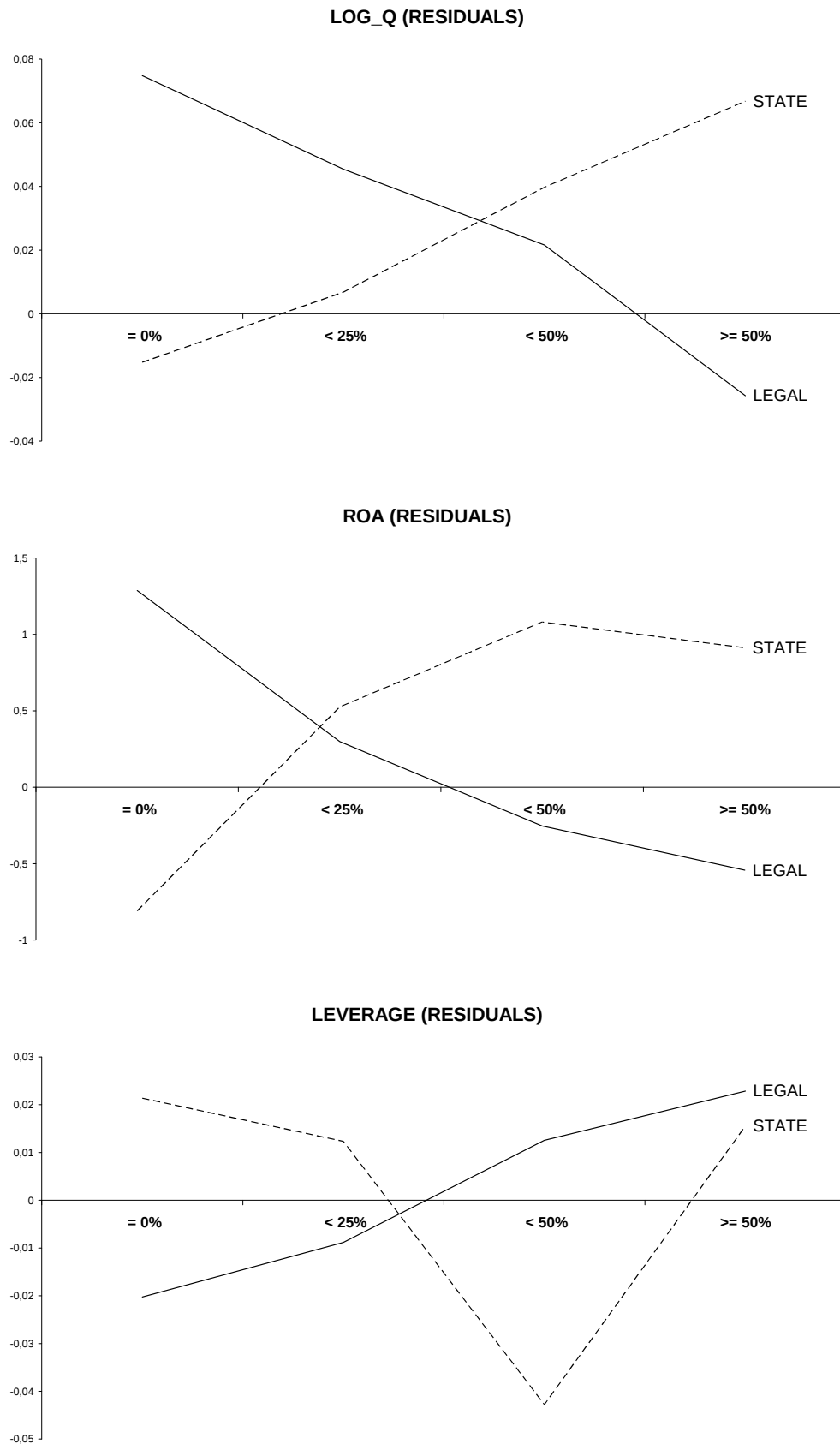
III: Dependent variable: Debt to Assets ratio LEVERAGE)

Source of variability	Sum of Squares	D.F.	Mean Square	F ratio	Significance
Corrected Model	38.677	43	.899	24.784	.000
Intercept	1.134	1	1.134	31.238	.000
INDUSTRY	13.499	20	.675	18.597	.000
EXCH	1.403	2	.702	19.331	.000
YEAR * DUM_I	.830	13	.064	1.759	.044
TOP10	1.118	1	1.118	30.808	.000
YEAR * SIZEN	9.719	7	1.388	38.259	.000
Error	286.889	7905	.036		
Corrected Total	325.566	7948			

a. R Squared = 0.12, adjusted R Squared = 0.11

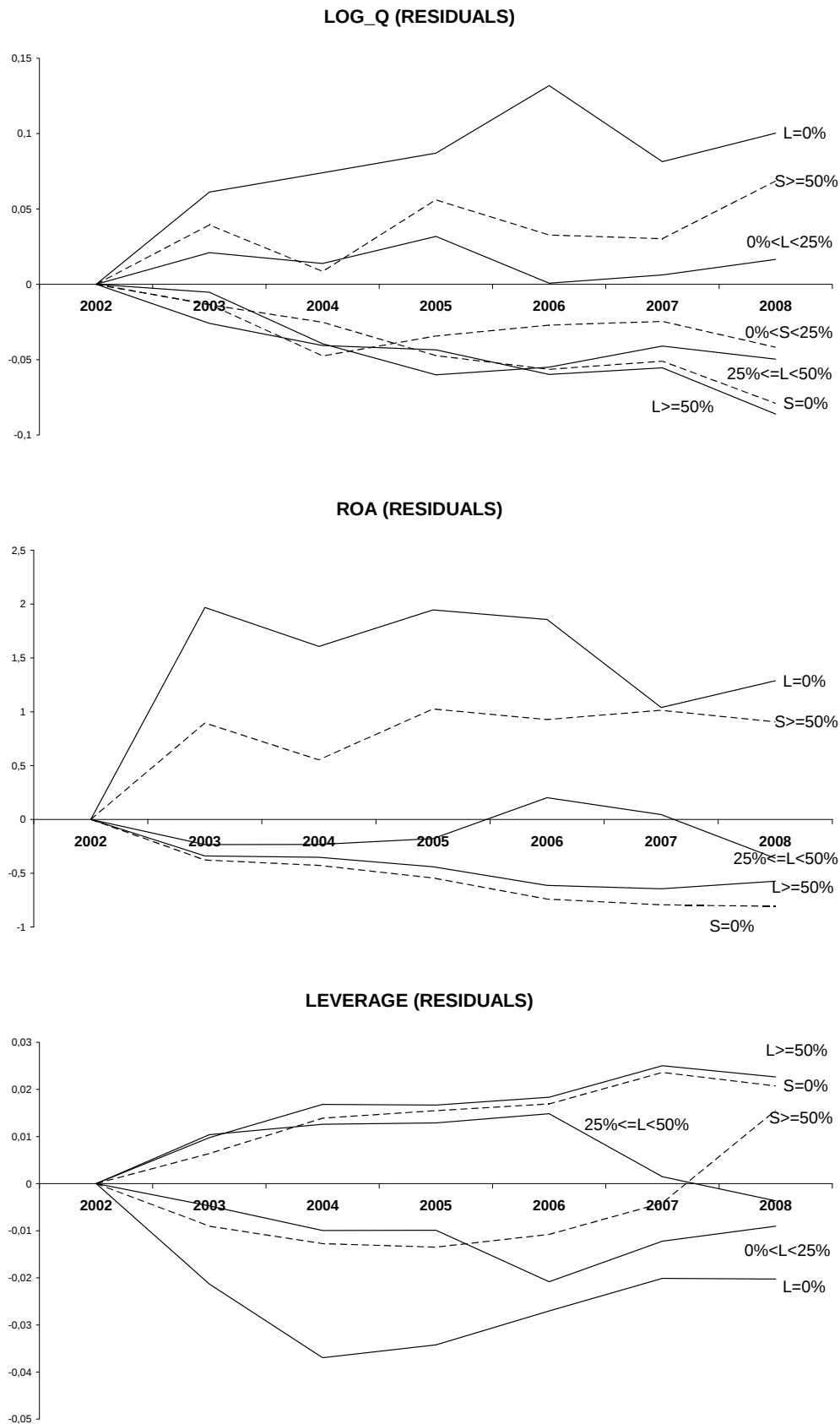
No effects are random. Type 3 sums of squares are used in computations (the adequate with unbalanced cells).

Figure 4: changes observed in the residuals of LOG_Q, ROA and LEVERAGE between initial and final values in series, averaged for each of the S_OWN (STATE) and L_OWN (LEGAL) initial ownership classes.



Caption: X axis: initial ownership classes; Y axis: changes in residuals from the initial to the final value in series.

Figure 5: evolution over the 2002-2008 period, of changes in residuals of LOG_Q, ROA and LEVERAGE, from the first value in series to the value corresponding to each year, averaged by year.



Caption: X axis, years of the period; Y axis, changes from the first value in series to that year's value.

Table 8: Significance tests using partial correlations, regressions and repeated measures where initial and final values in series interact with S_OWN and L_OWN separately. Each firm is a case and its total number is 1183.

Model used	Initial state ownership classes (S_OWN)		Initial legal person ownership classes (L_OWN)		Other information
	Parameter and its significance	Model's overall significance	Parameter and its significance	Model's overall significance	
Natural logarithm of Tobin's Q (LOG_Q)					
Partial correlation	r = 0.073*		r = -0.078*		
Regression	b ₁ = 0.024*	F = 124.7***	b ₁ = -0.029*	F = 126.7***	R Sq ≈ 0.17 both
Repeated measures	Init b = -0.083**	F = 13.24***	Init b = 0.12***	F = 17.63***	
	Final b = 0.038		Final b = -0.035		
Residuals of the natural logarithm of Tobin's Q					
Partial correlation	r = 0.094**		r = -0.108***		
Regression	b ₁ = 0.028**	F = 46.6***	b ₁ = -0.036***	F = 48.4***	R Sq ≈ 0.073 both
Repeated measures	Init b = 0.001	F = 8.02**	Init b = -0.001	F = 10.26**	
	Final b = 0.028**		Final b = -0.03***		
Residuals of Return on Assets					
Partial correlation	r = 0.026		r = -0.018		
Regression	b ₁ = 0.186	F = 0.56	b ₁ = -0.145	F = 0.34	R Sq ≈ 0.00 both
Repeated measures	Initial b = -0.51*	F = 7.19**	Initial b = 0.37*	F = 3.03*	
	Final b = 0.17		Final b = -0.136		
Residuals of Leverage					
Partial correlation	r = -0.007		r = 0.039		
Regression	b ₁ = -0.001	F = 91.5***	b ₁ = 0.009	F = 92.5***	R Sq ≈ 0.13 both
Repeated measures	Init b = 0.017***	F = 2.42	Init b = -0.013*	F = 4.45*	
	Final b = 0.007		Final b = 0.002		

Caption: * denotes significance at the 0.05 level; ** denotes significance at the “required level” ($P < 0.0025$); *** denotes significance at the 0.0001 level. “r” is a partial correlation coefficient, “ b_1 ” is the slope coefficient in regressions and “b” is a initial or final slope coefficients in repeated measures tests. In regressions, overall significance refers to F and the ANOVA test comparing explained and unexplained variability; in the case of repeated measures, overall significance refers to F of within subject interactions between S_OWN or L_OWN and the repeated measures variable. R Sq refers to adjusted R Square values. The table displays average R Squares of the two regressions performed.

Table 9: mean values and standard deviations of residuals of LOG_Q, ROA and LEVERAGE, for each of the cells defined by the number of years to or from the reform year.

Mean values and standard deviations for each of the following variables:	Number of years to / from the reform year (NY_REFORM)														Total	
	-4		-3		-2		-1		0		+1		+2			
	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
Residual of LOG_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
Residual of 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
Residual of LEVERAGE	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	

Caption: one way t-tests found only two cases significantly different from zero: for year previous to reform (NY_REFORM = -1), residuals of LOG_Q are significantly higher than zero (P=0.04); for the year after the reform year (+1), the same residuals are clearly below zero but they do not attain significance (P=0.1) as standard deviation increased; finally, for the reform year (NY_REFORM = 0), residuals of ROA are significantly higher than zero (P=0.01). Asterisks highlight such statistical significance.

Table 10: Significance tests and estimated parameters for two linear models where residuals of Tobin's Q (LOG_Q), Return on Assets (ROA) and leverage (LEVERAGE) are explained by a random effect (DUM_BR signalling one year prior to the reform or the year of the reform) and a fixed effect (S_OWN or L_OWN) and the corresponding interaction between them. A total of 1183 companies are examined during the period 2005-2008, providing a total of 4697 pooled cases.

Tests of Between-Subjects Effects							
Model:	Effect:	LOG_Q residual		ROA residual		LEVERAGE residual	
		F	Sig.	F	Sig.	F	Sig.
Initial state ownership class	DUM_BR	6,21	0,002	0,39	0,532	6,04	0,014
	S_OWN	8,10	0,004	1,74	0,175	7,83	0,000
	V_INITIAL	2624,56	0,000	539,66	0,000	5337,60	0,000
	DUM_BR * S_OWN	0,01	0,928	0,06	0,807	0,09	0,763
Initial legal ownership class	DUM_BR	16,91	0,000	0,91	0,339	18,65	0,000
	L_OWN	16,93	0,000	0,96	0,383	10,05	0,000
	V_INITIAL	2635,01	0,000	541,27	0,000	5399,88	0,000
	DUM_BR * L_OWN	0,20	0,657	0,00	0,944	0,38	0,538
Coefficient estimates							
Model:	Dependent Variable:	LOG_Q residuals		ROA residuals		LEVERAGE residuals	
		B	Sig.	B	Sig.	B	Sig.
Initial state ownership class	[DUM_BR=0]	-0,022	0,000	0,032	0,836	-0,006	0,133
	[DUM_BR=1]	-0,002	0,876	-0,218	0,114	0,012	0,000
	S_OWN	0,011	0,111	0,318	0,321	0,012	0,126
	V_INITIAL	0,595	0,000	0,270	0,000	0,702	0,000
	DUM_BR * S_OWN	-0,001	0,928	0,040	0,807	0,001	0,763
Initial legal ownership class	[DUM_BR=0]	0,058	0,000	-0,097	0,577	0,011	0,007
	[DUM_BR=1]	0,067	0,010	0,178	0,468	-0,023	0,000
	L_OWN	-0,016	0,046	0,682	0,238	-0,034	0,016
	V_INITIAL	0,595	0,000	0,269	0,000	0,702	0,000
	DUM_BR * L_OWN	-0,004	0,657	0,013	0,944	-0,003	0,538

Caption: F is the F statistic and Sig denotes the P value or exact significance. B is the slope coefficient estimated by the model. V_INITIAL is a control variable expected to be highly significant. Apart from this case, ROA residuals do not recognize any significant effect while LOG_Q residuals are significantly modelled by both the reform effect and by the reversal effect. DUM_BR * S_OWN or DUM_BR * L_OWN are interaction effects. They are in no case near significance denoting a linear, purely additive relationship between the reform effect and the reversal effect.