Look Who Are Disguising Profits: An Application to Chinese Industrial Firms *

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First Draft: January 2004
This Draft: May 2004

Abstract

This paper develops a fairly general empirical procedure to trace out the extent of profit disguising and examine the motives behind it. Applying the methodology to the National Bureau of Statistics of China (NBS) database which covers more than 20,000 large-and medium-sized industrial firms in China for 1995-2002, we find (i) there is a profit-disguising propensity order by ownership in China (from the weakest to the strongest) — *foreign invested firms* $\prec$ *Hong Kong or Taiwan firms* $\prec$ *state-owned enterprises* $\prec$ *mixed firms* $\prec$ *collective firms* $\prec$ *private firms*. Specifically, we find that, based on a conservative estimation, the private firms in China on average disguise *18.5%* more profits than the state-owned enterprises and *37.4%* more profits than foreign firms; (ii) firms with tighter financing constraints reveal stronger tendency to disguise profit; and (iii) smaller firms tend to disguise more profits. These results suggest that tax evasion, and incentive to overcome financing constraints, together with distorted corporate behavior caused by insecure property rights and weak institutions, account for Chinese firms' profit disguising. We also find that Chinese firms' profit disguising lies principally on *revenue* rather than *cost*.

JEL Classification: G30, G32, H26, M41
Keywords: Profit disguising, tax evasion, ownership, and financing constraints

*Both authors are from the Faculty of Business and Economics, University of Hong Kong. We appreciate comments and suggestions offered by Chong-En Bai, Douglas Arner, James Barth, Hongbin Cai, Qiang Kang, Larry Lang, Alan Siu, Keith Wong, and seminar participants at the University of Hong Kong, and the Chinese University of Hong Kong, and the excellent research assistance by Zhengge Tu. We thank Junling Xing and Xiaoyun Yu at the National Bureau of Statistics of China (NBS) for helping us access the NBS database. We gratefully acknowledge the financial support from the Research Grant Council of Hong Kong (HKU 7167/98H (Xiao) and HKU 7128/01H (Liu)). This research was also substantially supported by a grant from the University Grants Committee of the Hong Kong Special Administrative Region, China (Project No. AOE/H-05/99). The paper reflects the authors' views and does not necessarily reflect the views of the NBS. All errors remain our own responsibility.

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Abstract

This paper develops a fairly general empirical procedure to trace out the extent of profit disguising and examine the motives behind it. Applying the methodology to the National Bureau of Statistics of China (NBS) database which covers more than 20,000 large-and medium-sized industrial firms in China for 1995-2002, we find (i) there is a profit-disguising propensity order by ownership in China (from the weakest to the strongest) — *foreign invested firms* $\prec$ *Hong Kong or Taiwan firms* $\prec$ *state-owned enterprises* $\prec$ *mixed firms* $\prec$ *collective firms* $\prec$ *private firms*. Specifically, based on a conservative estimation, we find that the private firms in China on average disguise *18.5%* more profits than the state-owned enterprises and *37.4%* more profits than foreign firms; (ii) firms with tighter financing constraints reveal stronger tendency to disguise profit; and (iii) smaller firms tend to disguise more profits. These results suggest that tax evasion, and incentive to overcome financing constraints, together with distorted corporate behavior caused by insecure property rights and weak institutions, account for Chinese firms' profit disguising. We also find that Chinese firms' profit disguising lies principally on *revenue* rather than *cost*.

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1 Introduction

Profit disguising has been a common practice for firms around the world.[1] Tracing out the extent of profit disguising and more importantly, understanding the incentives behind is a defining issue in both the areas of academic research and policy-making. To this end, a wide range of explanations have been suggested. Some argue that profit disguising results from a firm's tax evasion incentive and is therefore a firm's natural response to high statutory tax rate.[2] Others suggest that profit disguising is driven by a lack of effective institutional infrastructures.[3] Combating profit disguising requires empirical evidence on whether it exists and where it is more conspicuous. However, due to its very nature (subtle and hard-to-detect), profit disguising has been extremely difficult to observe and quantify. Its motives are rarely empirically explored.

This paper introduces a general empirical procedure to test for the evidence of profit disguising from a cross section of firms and applies it to Chinese industrial firms. China is an important case study of profit disguising for three reasons. First, China is home to a variety of firms with different ownership structures and under the current Chinese tax code, these firms are governed by differential effective income tax rates. A rough calculation shows that foreign and Hong Kong/Taiwan (HK/TW hereafter) invested firms have much lower effective income tax rates than domestic firms.[4] Thus, studying the cross-ownership

[1] De Soto (1989) estimated that the unregistered economic sector operated 56% of Peru's businesses and accounted for about 60-80% of total employment (preface pp. xvii). Based on Johnson et al. (1997), the hidden economy in 1995 was around 15% of GDP in Poland and 50% in Russia and Ukraine. Even in the U.S., the Internal Revenue Service estimated that about 17% of income tax liability is not paid (Slemrod and Yitzhaki, 2000).

[2] Fisman and Wei (2001) find that on average a one percent increase in the tax rate results in a three percent increase in evasion by investigating the export and import data at the individual product level in China. Piggott and Whalley (2001) present a case where broadening VAT base induces self supply and informal sector activities — another form of profit disguising.

[3] Johnson, Kaufmann, McMillan and Woodruff (2000) conduct a cross-country comparison and show that predatory behavior by government, extortion by criminal gangs, and lack of faith in the court system, together with higher effective tax rates, explain the size of hidden 'unofficial' activity. Shleifer and Vishny 1993, 1994, and 1998; Marcouiller and Young (1995); Johnson, Kaufmann, and Shleifer 1997; and Che and Qian (1998) offer a similar argument and empirical evidence. Specifically, Che and Qian (1998) point out that profit disguising could be motivated by the incentive to protect a firm against insecure property rights and government encroachment.

[4] As we will show in Table 2, the average effective income tax rates for foreign and HW/TW firms are

variation in profit disguising propensity would help illuminate the role of tax evasion in profit disguising. This experiment is even more valuable when data on marginal tax rates at firm-level are hard to come by.

Second, while the unprecedented growth of the Chinese economy can be taken as evidence of the success of its economic reforms, many components of the institutional infrastructure are still missing or ineffectively enforced in China. They tend to affect firms' behavior, especially profit reporting behavior, in different ways. For example, managers of state-owned enterprises (SOEs hereafter) are relatively reluctant to disguise profit since they are rewarded for superior performance and punished for failing to meet targets. More importantly, the benefits from profit disguising cannot be solely enjoyed by them but the costs are. The owners of private firms, on the contrary, may display stronger propensity to hide. Examining different firms' profit disguising propensities thus provides us with a unique opportunity to understand and test the conventional wisdom in regard to how firms adjust their behavior to a certain institutional setting.

Third, one foremost puzzle about China's economic growth story — convincingly put forth in Allen, Qian, and Qian (2002) — is why the non-state sector in China can sustain its breathtaking growth with little financing from China's inefficient financial system? It is not clear how firms in China's non-state sector, which have long been financially constrained as a result of the discriminatory lending policy practiced by the Chinese commercial banks, overcome tight financing constraints. One may wonder that some kind of informal financing exists in China and disguised profit probably is one source of it? Evidence relating profit disguising to firms' external financing constraints may shed light on this puzzle.

Combining the conventional theories of profit disguising with the unique institutional setting in the Chinese economy, our analysis will test for the evidence of profit disguising among the Chinese firms. We ask whether their profit-disguising propensities vary

16.14% and 18.74% respectively. They are much lower than the effective income tax rates of the state-owned enterprises (31.22%), private firms (28.90%), collective firms (29.45%), and mixed firms (29.51%).

cross-sectionally? and what factors or considerations are driving those profit-disguising propensities? We will particularly examine the roles of ownership, financing constraints and firm size.

In this paper, we propose a novel empirical approach to overcome the daunting empirical challenge of measuring true profit. Rather than make an effort to directly estimate the gap between true and reported profits, we study how a firm's reported profit responds to its fundamental earnings shocks. We believe that the responsiveness of reported profits to earnings shocks reflects firms' profit-reporting propensity. To start let us assume there is a stable relationship between the reported profits and the simulated fundamental earnings after controlling for industry, time, and geographical difference.[5] As an illustration, assume that a \$100 increase in the fundamental earnings will result in a \$50 increase in the reported profits after we take away the influence of industry, time, and location. Consequently any deviations of reported profits from \$50 signal profit disguising. For example, if a firm disguises its profit, its reported profits will rise by less than \$50 with the shortfall indicating the amount of disguised profit. We develop a general set of tests based on the above intuition and use variation in national accounts corporate profit as a source of earnings shocks.[6]

We apply this procedure to a Chinese industrial firm database maintained by the National Bureau of Statistics of the People's Republic of China (NBS). The NBS database contains firm-level information based on the annual accounting briefing reports filed by all *large-* and *medium-sized* industrial firms in China from 1995 to 2002.[7] Since the NBS database

[5]They do not have to be one-to-one since reported accounting profit by definition may deviate from other profit measures such as corporate profit in national income account — a concept that will be used as the measure of fundamental earnings in our paper. However, in the absence of systematic profit mis-reporting, the relationship between these two profit concepts should be stable.

[6]Other papers have used the design in a related way. Bertrand, Mehta and Mullainathan (2002) trace the propagation of earnings shocks through a business group to test for the evidence of tunnelling in India. Blanchard, Lopez-de-Silanes, and Shleifer (1994) examine how U.S. firms respond to cash windfalls (winning a law suit) to assess agency models. Lamont(1997) uses the oil shocks to assess the effects of cash flow on investment.

[7]The NBS requires all industrial firms and service firms to report their accounting data on an annual basis, with some information (e.g., output) reported on a monthly basis. The data are primarily used for computing the Gross Domestic Product (GDP). The NBS has compiled the information for firms classified as large-and medium-sized ones and constructed the NBS database since 1995.

contains critical and comprehensive information on the compositions of national accounts value added for these industrial firms, we are able to compute corporate profit defined in the *national income account* system by deducting intermediate inputs from the gross output. It is termed PRO and used as a source of earnings shocks in our analysis. We then compute the responsiveness of reported profit ($RPRO$) to PRO. As our methodology indicates, any profit disguising will make the reported profits *insufficiently responsive* to fundamental earnings shocks.[8]

In this paper, we analyze a new and comprehensive database that covers industrial firms representing close to 20% of China's GDP and 10-20% of urban employment in China. Such a sample enables us to conduct broad-based quantitative testing of Chinese firms' profit disguising and generate several findings that are robust to a number of estimation methods, and the inclusion/exclusion of many different controls. We establish the following findings.

- Firms with different ownership types display differential propensities to disguise profits. The propensity order by ownership — from the weakest to the strongest — is: *foreign firms* $\prec$ *HK/TW firms* $\prec$ *SOEs* $\prec$ *mixed firms* $\prec$ *collective firms* $\prec$ *private firms.*

- Firms with tighter financing constraints tend to disguise more profits, *ceteris paribus.*

- Smaller firms reveal stronger tendency to disguise profits than larger firms, *ceteris paribus.*

- Chinese firms' profit disguising lies principally on revenue rather than on cost. That is, at least for Chinese firms, hiding revenue seems to be the primary means of disguising profits.

[8]Note that a simple comparison of $RPRO$ and PRO is flawed since corporate profits in the national income accounting system (PRO) can legitimately deviate from accounting profits ($RPRO$). The difference may reflect the changes in inventory as gross output in the current year does not necessarily convert into revenue in the same year; difference in depreciation treatment, and so on. Desai (2002) presents a compelling case showing that even in the U.S., there is an ever-widening divergence between book income and tax income, an analogy similar to PRO and $RPRO$ in our analysis. Desai attributes this divergence to firms' tax sheltering activities.

The principal finding of the paper — there is a propensity order of profit disguising by ownership — reconciles well with the existing economics theories. The fact that domestic firms in China demonstrate stronger propensity to disguise profits than foreign and HK/TW firms can be largely explained by tax evasion since the domestic firms are facing significantly higher effective tax rates. Thus, our evidence provides support for a widely-held notion — higher tax rates lead to a greater scale of tax evasion.

Evidence that SOEs are more disciplined in their profit reporting than other non-state domestic firms — especially private firms — is new in literature. Several previous theoretical models have suggested this direction though. For example, Gordon et al. (1999) argue that higher tax rates can distort the decisions of private firms such that sometimes state ownership becomes preferable on efficiency grounds. Tao and Zhu (2000) explain that although SOE managers may lack incentives to perform their own task well, their incentive to breach a contract and hold up trading partner would also be small. Based on this line of argument, we expect the profit disguising incentive to be weaker for SOEs. Our analysis supports those lines of argument and calls for a thorough inquiry into the roles of state-ownership in an economy.[9]

The evidence that the severity of profit disguising is positively related to financing constraints contributes to the existing literature as well. In the presence of inefficient financial intermediation, firms — especially those facing tighter financing constraints — may have to resort to disguised profit as one source of capital. The finding thus highlights the importance of improving the effectiveness of financial systems.

Last but not least, the finding that profit disguising in China appears principally on revenue is a new addition to the existing empirical literature on profit disguising. Further research along this line may help carve out more effective policy initiatives to combat profit

[9]The literature on privatization in general supports the view that state ownership is inherently less efficient than private (see Dewenter and Malatesta 2001). However, it is probably a bit premature to view state ownership as an inferior organizational form solely based on performance measures.

disguising.[10]

The rest of the paper proceeds as follows. Section 2 offers a detailed explanation of the invitational background and discusses the implications for different Chinese industrial firms' profit disguising. An innovative empirical procedure of testing for the evidence of profit disguising is also discussed. Section 3 applies the empirical approach to the NBS database and discusses the main results. Section 4 extends our analysis to several related empirical issues. Section 5 concludes the paper. In Appendix I, we introduce a model of profit disguising which highlights the roles of corporate investment, tax evasion and financing constraints in explaining profit disguising propensity and generates empirical implications largely consistent with those derived from Section 2. Appendix II discusses how we clean up the NBS database.

2 Institutional Setting and A Test for Profit Disguising

2.1 Background and Implications for Profit Disguising

China has emerged as one of the largest and fast-growing economies in the world since the late 1970s. As reform has now progressed to the point where it is irreversible, several unique features about the Chinese economy have surfaced and are profoundly impacting on Chinese firms' behavior.

With the launch of reform in the late 1970s, central planning has been gradually rolled back and private and semi-private players now control the bulk of the economy. Meanwhile foreign investment continues to grow and multinational corporations are finding

[10] Also note that this paper is also related to an extensive literature that has evolved to define, document, and understand the motives beneath earnings management (see Dechow and Skinner 2000 and Healy and Wahlen 1999 for recent review articles of this large literature.) However, the major findings from this literature — firms manage earnings to reach certain threshold levels, beat analysts' forecasts, disclose timely information, etc. — are mainly based on the research on listed companies and do not necessarily apply in a more general context such as China's industrial firms. As a matter of fact, publicly listed firms only account for less than 4% of our sample. It has also been pointed out that the listed companies in China follow a different set of motives when it comes to managing earnings. For example, they manage earnings to obtain the rights to issue new equity, or avoid de-listing(Liu and Lu 2003).

unprecedented freedoms in establishing their operations in China. As a result of those profound changes, China is now home to a variety of firms with very different ownership structures. According to the standards adopted by the National Bureau of Statistics of China (NBS), firms operating in China can be classified as one of the following six primary ownership categories: state-owned enterprises (SOEs), collective firms, private firms, mixed firms,[11] foreign firms, and HK/ TW firms. The distribution of China's large-and medium-sized industrial firms by ownership for 1995-2002 is presented in Table 1 to demonstrate the fundamental changes in corporate China. As shown in Table 1, the significance of SOEs in the Chinese economy has decreased dramatically — the SOEs' share of the large-and medium-sized industrial firms has decreased from 68.1% in 1995 to 32.5% in 2002, while the private firms' share has increased from none in 1995 to 5.9% in 2002. Between 1995 and 2002, the foreign firms' share increased to 13.2% and the same trend has also been found in HK/TW firms (from 4.2% to 11.2%) and mixed firms (from 5.5% to 27.6%). The presence of collective firms in the Chinese economy dropped from 17.8% in 1995 to 9.6% in 2002.

While firms with different ownership types co-exist in the Chinese economy, their behavior may vary widely given that many components of the institutional infrastructure of the market economy are still missing or are ineffectively enforced and more importantly, China's corporate sector has long been subject to insecure property rights and a predatory state. Although managers of private, foreign, and HK/TW firms may operate their companies towards the goal of profit maximization, managers of SOEs (including some mixed firms and collective firms) may be subject to a different set of goals (e.g., employment, social stability, etc). Obviously, those differences will eventually be reflected in those firms' profit reporting practice.

China's economy also remains an investment-hungry one. Given that, one wonders how the fast growth in the real sector could go hand-in-hand with extremely inefficient financial

[11] They are mainly joint stock companies, including the publicly listed companies.

intermediation for so long.[12] While the majority of bank loans have been allocated to the state sector in China, the non-state sector accounts for the majority of China's economic growth. How do those firms obtain the necessary capital to sustain such growth? Have the close ties between finance and development, championed by the literature of finance and economic growth, broken down in China?[13]

We can map out different Chinese firms' profit disguising propensities in light of the above features of the Chinese economy. To start, note that a rough calculation of effective income tax rates shows that foreign and HK/TW firms are governed by much lower effective income tax rates than domestic firms. As shown in Table 2, the average effective income tax rates for foreign and HW/TW firms are 16.14% and 18.74% respectively, while the effective income tax rates for the SOEs, private firms, collective firms, and mixed firms are 31.22%, 28.90%, 29.45%, and 29.51% respectively. Firms facing higher tax rates have stronger incentive to disguise profit, which suggests that foreign and HK/TW firms are less likely to disguise profit compared to domestic firms.

Let us switch our attention to domestic firms. Compared to SOEs, private firms may have stronger incentives to hide because (i) the owners of private firms do not need to share the disguised profits with others; (2) in the presence of insecure property rights and potential predations from governments at all levels, they tend to disguise the actual scale of their operations. Managers of SOEs follow a different behavioral pattern due to two reasons. First, the benefits from profit disguising cannot be solely enjoyed by the managers but the costs will have to be fully borne by them. Second, since the SOEs' managers are rewarded for superior performance and punished for failing to meet profit or tax targets, it is not surprising that they have a tendency to modify their accounting numbers upwards instead of downwards. Young (2003) presents convincing evidence showing that the local officials in

[12]See Allen et al. (2002), Park and Sehrt (2001), and Lardy (1998) for documentation and analysis of the inefficiency of China's financial intermediation.

[13]An incomplete list contains Beck et al. 2003; Demirguc-Kunt and Levine 2002; King and Levine 1993; La Porta, Lopez-de-Silanes, Shleifer, and Vishny 1997, 1998; Levine and Zervos 1998; Rajan and Zingales 1998.

China tend to overstate the growth of output. Thus, we expect a weaker profit disguising propensity for the SOEs. Collective and mixed firms fall somewhere between private firms and SOEs. As collective firms retain strong traits of private firms, we hypothesize that their propensity to disguise profits should be stronger than mixed firms but weaker than SOEs.

Financing constraints play a role in explaining firms' profit disguising behavior as well. China's non-state sector, especially in the private and collective firms, has long been discriminated against by the state-owned banks. As a recent survey on private firms in Shangdong Province shows, more than 60% of the respondents claim they have difficulty getting bank loans, regardless of their size and earnings records.[14] SOEs, on the contrary, can somehow rely on the government's helping hands and face smaller financing constraints. Foreign and HK/TW firms do not rely on China's financial system much since they can resort to their overseas parents or foreign banks for new capital. Financing constraints therefore are lesser concerns for them. If overcoming financing constraints is indeed one of the driving forces, we expect private and collective firms to demonstrate stronger propensity to disguise profits. To sum up, we have:

Hypothesis 1: The propensity order of profit disguising by ownership — from the weakest to the strongest — is: foreign firms $\prec$ HK/TW firms $\prec$ SOEs $\prec$ mixed firms $\prec$ collective firms $\prec$ private firms.

Also, as we explained above, when a firm has difficulty getting its investment projects financed, disguising its profit may surface as one possible solution. We suspect such effect exists even after we control for the ownership variable. We hence have:
Hypothesis 2: The severity of profit disguising is positively correlated with the measures of financing constraints in China, ceteris paribus.

Another by-product of the above analysis is that there might be a size effect in profit disguising as larger firms probably have better access to external capital and their operations

[14]Source: The 21st Century Business Herald, Guangzhou, China, December 29 2003.

are generally more transparent, which makes profit disguising more difficult. We expect:

Hypothesis 3: Larger firms display weaker propensity to disguise profits, ceteris paribus.

In Appendix I, we introduce a model of profit disguising where we emphasize the roles of financing constraints, tax evasion and weak institutions in determining a firm's incentive to disguise profit. The empirical implications derived from the model are largely consistent with the above discussion.

2.2 A Test for Profit Disguising

How to test the hypotheses in Section 2.1 poses a daunting empirical task. If we can correctly measure a firm's true profit, PRO, we can readily test for the magnitude of profit disguising simply by computing the gap between PRO and the firm's reported profit, $RPRO$. However, measuring PRO is as difficult, if not completely impossible, as measuring profit disguising directly.

We propose a fairly general procedure in this paper. Using a unique database maintained by the National Bureau of Statistics of China (NBS), we compute a firm's corporate profit in the *national income account system*. It is defined as:

$$PRO = Y - MED - FC - WAGE - CURRD, \tag{1}$$

where Y is the gross industrial output reported by a firm; MED measures the intermediate inputs excluding financial charges; FC is the financial charges (mainly interest payments); $WAGE$ is the size of wage bill that captures labor costs; and $CURRD$ is the amount of current depreciation as a flow to maintain equity value.

Note that profit concept defined in (1) can legitimately deviate from a firm's accounting profit due to several reasons. First, output in the current year does not necessarily convert into revenue in the same year. Similarly, recognized revenue does not have to be produced in the same year. Changes in inventories and the methods of revenue recognition may

account for the difference. Second, the gap between *corporate profit in the national income account*(PRO) and the reported profits ($RPRO$) may also be associated with differential treatments of depreciation, incomes or expenditures from financing/investing activities, and so on. The gap may also reflect the differential effects of industry, location, and time on firms' profit reporting practice as well. Literally interpreting the gap between PRO and $RPRO$ as a measure of the missing profit is flawed and misleading.

Nonetheless, in the absence of systematic profit disguising, we expect the relationship between PRO and $RPRO$ to be stable. There should be a functional form that captures the relationship between a firm's reported profit ($RPRO$) and its corporate profit in the *national income account*(PRO). We suggest the following equation.

$$RPRO_{i,t} = (\beta_0 + \beta_1 * IND_i + \beta_2 * Time_t + \beta_3 * Location_i + \epsilon_{i,t}) * PRO_{i,t}, \tag{2}$$

where β_0 captures the baseline relationship between the reported profit and the computed profit after controlling for industry, time, and location; IND is a set of industry dummies and β_1 captures the difference driven by industrial factors; β_2 measures the time-varying effect; *Location* is a set of province or province-equivalent municipal city dummies and β_3 captures their influence; $\epsilon_{i,t}$ is an i.i.d. with zero mean and a variance of V_ϵ. It captures the firm-specific randomness.

With equation (2) in hand, we can define a firm's sensitivity of reported profit to earnings shocks as follows.

$$b_{i,t} = \frac{\partial RPRO_{i,t}}{\partial PRO_{i,t}} = \beta_0 + \beta_1 * IND_i + \beta_2 * Time_t + \beta_3 * Location_i + \epsilon_{i,t}. \tag{3}$$

When we aggregate b_{it} across the board, the firm-specific shocks in equations (2) and (3), $\epsilon_{i,t}$, can be averaged out. The mean coefficient b thus indicates how sensitive a certain type of firms' reported profits should be to their fundamental earning shocks. *Insufficient*

responsiveness signals profit disguising. As an illustration, let us check firms in the textile industry. Suppose the mean coefficient for the textile industry is 0.5. Without profit disguising, a textile firm should report a 50 yuan increase in profit when the actual earnings (PRO) increase by 100 yuan. However, if a certain textile firm only reports 20 instead of 50 yuan, we immediately infer that 30 yuan worth of profit has been concealed. Thus, by tracing the propagation of earnings shocks across different firm-specific characteristics, we would be able to know who are actually disguising profits.

To transfer the above intuition into testable implications, we propose the following flexible enough specification to test our hypotheses.

$$\begin{aligned} RPRO_{i,t} &= (\alpha + \beta_1 * IND_i + \beta_2 * Time_t + \beta_3 * Location_i + \beta_4 * OWN_{i,t} \\ &\quad + \beta_5 * FINANCE_{i,t} + \epsilon_{i,t}) * PRO_{i,t} + \gamma * (CONTROLs_{i,t}) + FIRM_i, \quad (4) \end{aligned}$$

where OWN is a set of dummy variables that specify a firm's ownership type; $FINANCE$ is a proxy for financing constraints facing a firm; $CONTROLS$ are a set of control variables which we will specify later; and $FIRM$ captures the firm-specific fixed effect. We expect both β_3 and β_4 to be significantly different from zero. Specifically, β_3 of private firms and collective firms should be significantly negative and β_3 of foreign firms and HK/TW firms should be significantly positive if we set β_3 of SOEs to be zero. Also, β_4 should decrease as the severity of financing constraints facing a firm increases.

One may be concerned with measurement error in PRO as it is also computed based on the reported data. In fact, we do not observe PRO, we only observe its noisier measure — PRO^*. Assume that $PRO^* = PRO + error$, where PRO is the actual corporate profit in the *national income account* and $error$ is the measurement error. Without loss of generality, we assume that $error$ is proportional to the actual profit PRO. Specifically, we assume $error = k\omega_{i,t}PRO$, where k is a constant, ω is an independent and identical random variable.

Combining it with equation (4), we obtain

$$\begin{aligned} RPRO_{i,t} &= (\alpha + \beta_1 * IND_i + \beta_2 * Time_t + \beta_3 * Location_i + \beta_4 * OWN_{i,t} \\ &\quad + \beta_5 * FINANCE_{i,t} + \epsilon_{i,t}) * PRO_{i,t} + Noise + \gamma * CONTROLs_{i,t} \\ &\quad + FIRM_i, \end{aligned} \tag{5}$$

where

$$\begin{aligned} Noise &= (\alpha + \beta_1 * IND_i + \beta_2 * Time_t + \beta_3 * Location_i + \beta_4 * OWN_{i,t} \\ &\quad + \beta_5 * FINANCE_{i,t} + \epsilon_{i,t}) * k\omega_{i,t} PRO. \end{aligned}$$

We denote the mean of $Noise$ by α_0. Let $e_{i,t} = \epsilon_{i,t} + (NOISE - \alpha_0) \sim Normal(0, \sigma_e^2)$. Plugging them back to equation (5), we obtain

$$\begin{aligned} RPRO_{i,t} &= (\alpha^* + \beta_1 * IND_i + \beta_2 * Time_t + \beta_3 * Location_i + \beta_4 * OWN_{i,t} \\ &\quad + \beta_5 * FINANCE_{i,t} + e_{i,t}) * PRO_{i,t} + \gamma * (CONTROLs_{i,t}) + FIRM_i, \end{aligned} \tag{6}$$

where $\alpha^* = \alpha + \alpha_0$ and e is the (new) firm-specific error term.

Equation (6) will be our baseline regression. Note here the only assumption required is that the firm-specific measurement error coefficient $\omega_{i,t}$ does not correlate with variables such as OWN, $FINANCE$, $Time$, IND, and $Location$.[15] When we estimate, we allow for heteroskedasticity in the error structure and choose to report robust standard errors.

[15]This assumption is not as outrageous as it seems because no evidence so far has found systematic measurement errors in statistical data across those variables. Some suspect that measurement error problem may be more severe for private and collective firms. If it is indeed the case, it will only bias against our story that private and collective firms disguise more profits.

3 Results from Chinese Data

3.1 Data

3.1.1 Data Source

We use a database developed and maintained by the National Bureau of Statistics of China (NBS) to conduct our empirical analysis. The data Appendix discusses in detail how this database was created, structured and cleaned. The NBS database is constructed based on the annual accounting briefing reports filed by all large-and medium-sized industrial firms in China with NBS during the period from 1995 to 2002. It covers more than 20,000 firms in 38 manufacturing industries (according to the 2-digit industry codes defined by the NBS) and from 28 provinces or province-equivalent municipal cities.[16] and represents around 14-20% of China's GDP and 10-20% of China's *urban* employment. The NBS designates every firm in the database a legal identification number and specifies its ownership type. Firms are classified into one of the following six primary categories: SOEs, collective firms, private firms, mixed firms, foreign firms, and HK/TW firms.[17] Table 1 presents the distribution of the large and medium-sized Chinese industrial firms in the NBS database by ownership over 1995-2002. One fact is that the significance of SOEs in the Chinese economy declines over time, while the significance of non-SOEs has increased dramatically, as we have discussed in Section 2.1.

[16]See Table A.1 for the list of industry codes compiled by the NBS and the full industry names. Table A.2 presents the list of provinces and province-equivalent cities. Note that we combine Tibet, QingHai, and NingXia. ChongQing was also classified as part of SiChuan.

[17]Note that the NBS does not treat publicly listed companies in China as a separate group. It is difficult to track them as their legal identification numbers were changed when they went public. By 2002, there were about 1,200 publicly listed companies in China's two stock exchanges. Only about half of them are in manufacturing sectors and they account for around 10% of the mixed firms and less than 4% of the total firms in our sample. Although one can argue the listed firms follow a different behavioral pattern when it comes to profit disguising, their impact on our results is limited.

3.1.2 Variable Definitions

The NBS database allows us to construct variables necessary for our testing. We first construct the variable PRO to measure a firm's fundamental earnings. As we explained earlier, the database contains necessary information for us to apply equation (1) and calculate a firm's corporate profit in the *national income account system*. It is used as a firm's fundamental earnings. The NBS database also contains the pre-tax profit for each firm. It is computed based on the financial statements items and termed $RPRO$. In our analysis, we scale both PRO and $RPRO$ with the total assets (TA).

We construct six dummy variables to capture a firm's ownership status: D_{SOE}, $D_{private}$, $D_{foreign}$, $D_{HK/TW}$, D_{mixed}, and $D_{collective}$. These dummy variables take the value of one if a firm falls into a corresponding ownership category and zero otherwise.

Measuring the degree of financing constraints facing a Chinese firm poses an empirical challenge. China's equity and corporate debt markets are still in their initial development stages and account for a small share of total corporate financing. The main financing source is still banking lending. It is observed that the Chinese banks practice discriminatory lending policies that favor SOEs but exclude private and collective firms.[18] The assessment and approval of loan applications by the Chinese commercial banks are not transparent. In hindsight, we expect firms with tighter financing constraints to have lower debt equity ratio and vice versa. The intuition is simple: financially constrained firms would not be able to obtain much bank loan on their balance sheets. We construct two variables: $FINANCE_1$ — the ratio of long-term liabilities to total assets; and $FINANCE_2$ — the ratio of total finance charges in a given year to total assets.[19] The larger these two variables, the tighter are the financing constraints.

[18]See for example, Allen et al. 2002 and Lardy 1998. Numerous anecdotes, on the basis of press reports, also suggest widespread financing constraints facing China's non-state firms (see for example, Renmin Ribao, 7 March, 1998; *The Asian Wall Street Journal*, 13 January 2004; and *Caijing*, 5 December 2003.

[19]The NBS requires Chinese firms to report their total finance charges in a given year as one intermediate input.

We also construct several control variables. The logarithm of the number of employees, $LNLABOR$, and the logarithm of the total assets, $LNTA$ are used to control for the firm size. In addition, we create 38 industry dummy variables, 28 location dummies, and 8 year dummies to capture the influence of industry, location and time. Chinese firms' marginal tax rate data are not readily available. Tax rates vary a lot by ownership and they even vary across the firms within the same ownership.[20] In our empirical study, we calculate the ratio of actual income tax paid by a firm to its reported pre-tax profits. We apply this definition to profit-making firms only and name the variable TAX. For loss-making firms, we simply assume their TAX is zero.

Some wonder that the gap between PRO and $RPRO$, to a certain extent, might be due to firms' differential capabilities of converting final product into revenue (e.g., some firms are good at marketing their products and have more effective sales teams.) To control for this effect, we take advantage of the information provided in the NBS database and create a variable $RSALE$, which is defined as the ratio between revenue and total final output (Y).

3.2 A First Look at the Data

Table 2 reports summary statistics for each ownership and the full sample. We start with the reported profits — $RPRO$. As shown in Table 2, private firms have the highest mean $RPRO$ (2.31%) among all firms. Foreign companies, HK/TW companies and mixed companies come next (their mean $RPRO$ are 2.18%, 1.67%, and 1.52% respectively). Collective firms and SOEs are obvious performance laggards with their mean $RPRO$ equal to 0.9% and -1.48% respectively. The mean level of $RPRO$ across all firms is an unimpressive 0.02%. The statistics of PRO — the *national accounts corporate profit* computed based on statistical

[20] Although the nominal income tax rates for all firms are 33% in China, tax breaks and tax credits have been frequently used as an inducement to attract foreign investment or even domestic investment. It is believed that the effective income tax rates are much lower for foreign and HK/TW firms, which triggered the Chinese government to overhaul its tax code in the early 2004, as an *Asian Wall Street Journal* article vividly put it, " China evokes Reaganomics in tax-code overhaul plan by reducing taxes for domestic companies and by simplifying the tax code." (A1, 6-8 February 2004).

data — disclose a quite different set of messages. Private firms remain the best performers with mean PRO as high as 11.93%. Foreign, HK/TW, and mixed firms fall into the second tier but their mean PRO are much higher and they are 8.44%, 7.73% and 6.86% respectively. The mean PRO for collective firms surprisingly is as high as 7.95%. The mean PRO for SOEs remains the lowest but it is in the positive territory (0.73%).

We define GAP as $PRO - RPRO$. It demonstrates an interesting pattern. The mean GAP for private firms is 9.36%, which tops SOEs (2.20%), collective firms (7.00%), foreign firms (5.60%), mixed firms (5.21%), and HK/TW firms (5.96%). Figure 1 plots the changes of GAP across time by ownership. A first look at GAP seems to suggest that *all firms in China disguise their profits and such practice has been the most conspicuous among private firms and collective firms, and least conspicuous among SOEs.* However, it has to be pointed out that GAP is a very crude measure of disguised profit as $RPRO$ could legitimately deviate from PRO. It is absolutely necessary to conduct a more rigorous analysis of the gap between PRO and $RPRO$ and we will do it in a later part of the paper.

Another variable of interest is the effective income tax rate — TAX. We confine our calculation of the summary statistics to the profit-making firms. Not surprisingly, SOEs are subject to the highest tax rate with the mean equal to 31.22%. The mean tax rates for private, collective and mixed firms are 28.90%, 29.45%, and 29.51% respectively. Thanks to all kinds of incentive tax schemes adopted in China, both foreign firms and HK/TW firms enjoy significantly lower tax rates — the mean tax rate for foreign firms is just 16.14% and it is 18.74% for HK/TW firms. Figure 2 plots the dynamics of TAX across time by ownership. Obviously, domestic firms are on average subject to higher effective tax rates than foreign firms over 1995-2002. This evidence suggests that, if tax evasion is the main driver of profit disguising, domestic firms tend to demonstrate stronger propensity than foreign and HK/TW firms.

Table 2 also presents summary statistics of our variables measuring financing constraints: $FINANCE_1$ and $FINANCE_2$. Comparing the mean levels of $FINANCE_1$ and

$FINANCE_2$ by ownership shows: (i) the SOEs, not surprisingly, are the most levered firms among all, indicating that in China SOEs are relatively less financially constrained. Collective and private firms, on the contrary, face significantly tighter financing constraints and therefore have lower values in both $FINANCE_1$ and $FINANCE_2$; (ii) both $FINANCE_1$ and $FINANCE_2$ are significantly lower for foreign and HK/TW firms, which might be due to the fact that they have access to a different capital pool (e.g., foreign banks, overseas parents' lending, etc)— $FINANCE_1$ and $FINANCE_2$ thus may fail to fully capture the degree of financing constraints facing foreign and HK/TW firms. Figure 3 plots $FINANCE_1$ across ownership over 1995-2002. We did not plot $FINANCE_2$ since the two capture the same thing. Clearly, SOEs top all other firms in both financing constraints measures.

The ratio between revenue and final output, $RSALE$, discloses several interesting findings too. The mean $RSALE$ for SOEs is 98.8%, compared to 93.7% for private firms and 92.4% for collective firms. The mean levels of $RSALE$ for mixed firms, foreign, and HK/TW firms fall somewhere in between and are 96.4%, 97.8%, and 96.7% respectively. One may wonder if the difference in $RSALE$ may drive the difference in reported profits across ownership. As we will show later it is *not* the case. On the contrary, a low level of $RSALE$ for firms where profit disguising activities have been rampant may suggest that those firms mainly disguise profits through concealing revenue. We will show that it is exactly the case in Section 4.2 of the paper. Figure 4 plots $RSALE$ by ownership across time. A rough comparison of TA and $LABOR$ shows that SOEs and mixed firms are on average larger than other firms.

We now turn to exploring the determinants of GAP. Although GAP — the difference between PRO and $RPRO$ — is not a good measure of disguised profit, the regression results

may still be indicative.[21] We run several versions of the following model in Table 3.

$$\begin{aligned} GAP_{i,t} &= \gamma_0 + \gamma_1 * IND_i + \gamma_2 * Time_t + \gamma_3 * Location_i + \gamma_4 * OWN_{i,t} \\ &\quad + \gamma_5 * FINANCE_{i,t} + \gamma * (CONTROLs_{i,t}) + FIRM_i \end{aligned} \tag{7}$$

Note that the logarithms of TA and $LABOR$ are used to proxy for firm size in Table 3. The three regressions in Table 3 reveal several findings: (i) the coefficients of private and collective firm dummies are significantly larger than others, which may suggest that they tend to hide more profits; (ii) financing constraints measures in all of the regressions are significantly negative, implying that tighter financing constraints (lower $FINANCE_1$ or $FINANCE_2$) lead to a larger discrepancy between reported profits and corporate profits based on national income accounts data; (iii) both size variables — $LNTA$ and $LNLABOR$ — are significantly negative, suggesting that larger firms have smaller GAP. Of course, these results have to be taken with a great deal of reservation as GAP may not be a good measure of the amount of disguised profit. The finding that foreign and HK/TW firms are more likely to hide profit is clearly a counterexample of our hypothesis since we have argued earlier that they have weaker incentives to disguise profits as they are in general facing lower effective tax rates. Our analysis in a later part of the paper will reconcile the finding with our theory.

[21] Note that GAP by definition, tends to be affected by the levels of PRO and $RPRO$. However, in our empirical design, the responsiveness of $RPRO$ in relation to PRO is a more appropriate measure of the profit disguising propensity.

3.3 Main Empirical Results

We begin by testing in Table 4 our main hypotheses. Our baseline model, which was discussed in great detail in Section 2.2, is as follows.

$$\begin{aligned} RPRO_{i,t} &= (\alpha^* + \beta_1 * IND_i + \beta_2 * Time_t + \beta_3 * Location_i + \beta_4^{SOE} * D_{SOE} \\ &\quad + \beta_4^{private} * D_{private} + \beta_4^{collective} * D_{collective} + \beta_4^{foreign} * D_{foreign} \\ &\quad + \beta_4^{HK/TW} * D_{HK/TW} + \beta_3^{mixed} * D_{mixed} + \beta_5 * FINANCE_{i,t} \\ &\quad + e_{i,t}) * PRO_{i,t} + \gamma * (CONTROLs_{i,t}) + FIRM_i. \end{aligned} \tag{8}$$

Recall that $\beta_4 s$ and $\beta_5 s$ will be the key coefficients of interest. Columns (1)-(8) in Table 4 display the results for our entire sample from 1995 to 2002. In all regressions, we include the interactive terms between industry dummies and PRO, year dummies and PRO, and location dummies and PRO. For the expositional reason, we choose not to report the estimated coefficients of those variables. Note that the firm size variable, $LNTA$ or $LNLABOR$, does not enter the regressions as an interactive term with PRO for the time being. It appears in all eight regressions as a control variable. The impact on firm size on profit disguising propensity will be discussed in Section 3.3.4.

3.3.1 Is there a profit-disguising propensity order by ownership?

Model 1 is a reference model where no ownership variables and financing constraints variables are added on the right-hand side. The estimated coefficient for PRO is 0.325, which implies that a one-yuan increase in PRO will lead to a 0.325 yuan increase in reported profit after we control for the impact of industry, time, location.

In Model 2, we add six interaction variables of ownership dummies and PRO. All of them except $D_{HK/TW} * PRO$ have estimates significant at the 1% level.[22] The estimates of the

[22]Note that in our regressions, $D_{SOE} * PRO$ is treated as the benchmark variable and its estimated coefficient is set to be zero.

six interactions follow the following order (the estimates in parentheses): $\beta_4^{private}(-0.061) \prec \beta_4^{collective}(-0.042) \prec \beta_4^{mixed}(-0.029) \prec \beta_4^{SOE}(0.000) \prec \beta_4^{HK/TW}(0.007) \prec \beta_4^{foreign}(0.062)$. The results clearly suggest the following: relative to SOEs, a one-yuan shock in a private firm's fundamental earnings will lead to a 0.061 yuan smaller increase in its reported profit; a one-yuan shock in a collective firm's fundamental earnings leads to a 0.042 yuan smaller increase in its reported profit; a one-yuan increase in a mixed firm's fundamental earnings leads to a 0.029 yuan smaller increase in reported profit; and strikingly, a one-yuan increase in a foreign firm's fundamental earnings leads to a 0.062 yuan larger increase in its reported profits; and a one-yuan increase in an HK/TW firm's fundamental earnings leads to a 0.007 yuan larger increase in its reported earnings. Compared with SOEs, private, collective and mixed firms' reported profits are *insufficiently responsive* to shocks to their fundamental earnings; foreign and HW/TW firms' reported profits, in a stark contrast, are more responsive. There is a clear profit-disguising propensity order by ownership, which supports hypothesis 1.

If we compare the two extremes — private firms and foreign firms — we immediately find that there is a 0.123 yuan larger increase in foreign firms' reported profit than private firms for a one-yuan increase in PRO. 0.123 accounts for 37.4% of 0.329 — the level of the coefficient of PRO which captures the baseline relationship between PRO and $RPRO$. That is, private firms tend to disguise 37.4% more profits than foreign firms in China. Also note that 0.061 (the coefficient of $D^{private} * PRO$) is about 18.5% of the coefficient of PRO, 0.329, which suggest that private firms on average disguise 18.5% more profits than the SOEs. Obviously, the economic significance here is huge.

3.3.2 Do financing constraints matter?

In Model 3, we add the interaction of $FINANCE_1$ (the total long-term liabilities over total assets) and PRO on the right-hand side. Its coefficient is significantly positive with a value of 0.036. Thus, *firms' reported profits tend to be more responsive to fundamental*

earnings shocks when they face lesser financing constraints. The evidence provides support for hypothesis 2. Note that ownership variables may also partially capture differential levels of financing constraints since SOEs tend to be less financially constrained compared to private and collective firms. The results in Model 3 however show that, after controlling for the effects captured by ownership variables, financing constraints variables still matter. Chinese firms' profit disguising propensity, to a certain extent, is driven by their incentive to overcome financing constraints.

In Model 4, where $LNLABOR$ is employed to control for size, we replace $FINANCE_1$ with another financing constraint variable — $FINANCE_2$ (ratio of financial charges to total assets). Column 4 of Table 4 shows that the estimate of $FINANCE_2 * PRO$ is significantly positive with a value of 0.615. If we compare a firm with mean $FINANCE_2$ to a firm with no bank loan ($FINANCE_2 = 0$) at all, the latter tends to disguise a $0.244 * 0.615 = 0.016$ yuan larger profit for a one-yuan increase in its fundamental earnings (note that the mean and standard deviation for $FINANCE_2$ are 0.0244 and 0.0224 respectively) after we control for the ownership effect, which is about 5.3% of the baseline effect of PRO on $RPRO$ ($0.016/0.301 = 0.053$). The economic magnitude of financing constraints on profit disguising is by all means significant.

3.3.3 Some Robustness Checks

In Models 5 and 6, we add two more control variables - the effective income tax rates (TAX) and the ratio of revenue to final output — RSALE).[23] The inclusion of the two variables does not change the sign and significance of ownership variables and financing constraints variables at all. However, counter-intuitively, the sign of TAX turns out to be positive. The result, literally interpreted, implies that higher income tax rate leads to smaller propensity

[23] Adding TAX is potentially problematic due to two reasons: (i) the impact of tax rate on profit disguising has been partially captured by ownership; (ii) TAX is calculated as the average effective income tax rate (for profit-making firms only, the effective tax rate for loss-making firms is set to be zero). However, it should be the marginal tax rate that captures firms' profit disguising incentive.

to disguise profit after controlling for the ownership effect. However, the result does not distract us much because of three reasons. First, TAX, by definition, measures the ratio of the actual amount of tax paid over pre-tax profit rather than tax incentive. Therefore, TAX tend to be larger when firms disguise less. Second, in our empirical design, ownership variables should have captured the cross-ownership variation in tax incentive. Third, TAX for loss-making firms is set to be zero, which may be troublesome when including TAX in the regressions.

Note that adding $RSALE$ on the right-hand side does not change our results qualitatively, which implies that our results are not driven by $RSALE$. The estimated coefficient of $RSALE$, as shown in Columns 5 and 6, is significantly positive, suggesting that a higher revenue conversion rate corresponds to a smaller disguised profit. The evidence may also suggest that a firm disguises profit through concealing revenue, which results in smaller $RSALE$. We will explore this possibility in Section 4.2.

One wonders that ownership not only influences the responsiveness of $RPRO$ to PRO, but also affects the levels of both $RPRO$ and PRO. However, up to now, our empirical evidence and corresponding interpretations have all hinged on the sensitivity of $RPRO$ to PRO. One may suggest that ownership dummies, not just their interactions with PRO, should also be included to control for their effects on the levels of $RPRO$ and PRO. We do this in Models 7 and 8. As shown in Columns 7 and 8 in Table 4, adding them as control variables does not change our results qualitatively. Interestingly, the propensity order of profit disguising by ownership becomes even more obvious. For example, Column 7 shows that every else equal, private firms's reported profits will be 0.107 yuan smaller than SOEs for a one-yuan increase in national accounts corporate profit. The same pattern has also been found for collective and mixed firms. Clearly, our estimation of the extent of profit disguising for private firms based on results from Model 2 is too conservative.

3.3.4 Is there a 'size effect' in profit disguising?

Up to now, we only use firm size variables — $LNTA$ and $LNLABOR$ — as control variables. A deeper examination of size variables may reveal more information. First, it is widely believed that firm size is a good proxy for the severity of financing constraints. Larger firms in general have better access to external financing; we therefore expect the estimates of the interactive terms of size variables to PRO be positive, if the financing constraints hypothesis is correct. Second, it is also possible that larger firms' operations are more transparent and their managers are subject to stricter scrutiny, thus they may display weaker incentive to disguise profit. Again, we expect a positive sign for the interactive terms of size to PRO.

Table 5 reports the regression results. In Models 1-6, we place either $LNTA * PRO$ or $LNLABOR * PRO$ on the right-hand side.[24] We find several interesting results: (i) the estimates of the interactive variables of $LNTA$ and $LNLABOR$ to PRO are significantly positive in all specifications, suggesting that larger firms demonstrate weaker propensity to disguise profits; (ii) the evidence we identified before — there is a profit disguising propensity order by ownership, and financing constraints help explain profit disguising in Chinese firms — does not change after adding the two interactive variables of size. This result suggests that size variables probably capture aspects beyond financing constraints.

Note that the 'size effect' in profit disguising is also economically significant. Take the estimates from Model 4 as an example. The estimate of $LNLABOR * PRO$ is 0.021 and the mean and standard deviation for $LNLABOR$ are 6.58 and 1.07 respectively. A one-standard deviation decrease in firm size will increase its propensity to underreport profit by 2.25 percentage points ($0.021 * 1.07 = 0.02247$) of PRO. Considering that the baseline coefficient of this model — the coefficient of PRO which captures the average sensitivity of $RPRO$ to PRO after controlling for all relevant effects — is only 0.138, the size effect is by no means minimal.

[24] Interestingly, whether to include $LNTA$ or $LNLABOR$ alone on the right-hand side does not change results much.

4 Extension and Further Discussion

4.1 Does Chinese Firms' Profit Disguising Pattern Change over Time?

Chinese firms' behavior is likely to have undergone changes as those firms proceeded through the transition and reform process. Given that, one may question whether the empirical evidence we have identified so far are also due to those changes. The database we have is not long enough for us to carry out a complete dynamic analysis of a firm's profit disguising behavior over the whole reform period. Still, estimating the profit reporting equations for different time periods may help relieve the concern.

Table 6 presents the regression results for the following three time periods separately: 1995-1998; 1999-2000; and 2001-2002.[25] For each time period, we report results from two regressions — one includes ownership dummies as *control variables* (Model 2) and the other does not (Model 1). Also note that although we only report the results of using $FINANCE_2$, using $FINANCE_1$ generates almost the same results. A rough look at Table 6 shows that our main results — private, collective, and mixed firms demonstrate stronger propensity to disguise profits compared to SOEs while foreign and HK/TW firms show weaker incentive; and financially constrained firms tend to disguise profits — appear in every time period.

A closer look at Table 6 reveals several interesting findings. First, private firms' propensity to disguise profits increases over time, especially according to the results from Model 2. This probably is due to the fact that we only have a sizeable sample of private firms after 1999, therefore data after 1999 would more precisely reveal private firms' incentive. Another interesting finding is that collective firms' profit disguising behavior becomes inconspicuous over time. One possible explanation is that the reform and economic transition may have blurred the line between collective firms and SOEs. It is also possible that collective

[25] We admit that our split of time period is a bit ad hoc. Trying other methods of splitting the time period yields the same qualitative results.

firms have become more disciplined as they continue to increase their size and obtain better access to bank loans.

We have to admit that our interpretations of the results in Table 6 are tentative and suggestive since we do not have a long enough time series to fully understand the dynamics of corporate profit reporting behavior in China. However, obtaining similar findings using data from different time periods greatly improves our confidence level.

4.2 How Do Chinese Firms Disguise Their Profits? Concealing Revenues versus Inflating Costs

If Chinese firms are indeed disguising their profits, as the evidence we have built so far strongly suggests, how are they doing it? Do they manipulate profits through concealing their revenues or mainly through inflating their costs?

We examine this in Table 7, where we repeat the previous analysis but replace the profit measures with either revenue or cost measures. We decompose profit into two components:

$$Profit = Revenue - Cost \tag{9}$$

We then define *two* revenue variables - reported revenue and simulated revenue (SR); and *two* cost variables - reported cost and simulated cost (SC). Reported revenue is given in the NBS database and we divide it by total assets. Simulated revenue (SR) is defined as the industrial output reported by the firm (again scaled by total assets). Reported costs, based on (9), is the difference between reported revenue and reported profit (RPRO), while simulated cost (SC) is defined as the difference between simulated revenue and the national accounts corporate profit, PRO.

In the left half of Table 7, we report the results of the revenue regressions. We choose to report the results from two model specifications that are similar to Models 2 and 4 in Table

4.[26] As shown in Columns 1 and 2, all previous results, based on profit regressions, remain and become even stronger. We find that private, collective, and mixed firms tend to under-report more revenue than SOEs do, while foreign and HK/TW firms are more honest in their revenue recognition. We also find that the financing constraints variable — $FINANCE_2$ — is significantly positive, which suggests that firms with tighter financing constraints have stronger incentive to conceal their revenues.

In the right half of Table 7, we run the cost regressions. Intriguingly, we find all previous results, based on profit and revenue regressions, namely, the findings that there is an ownership order in profit (revenue) disguising and that financially constrained firms disguise more profit (revenue), become less significant or even disappear. The evidence, together with the evidence from revenue regressions, suggests that Chinese firms might disguise profits mainly through under-reporting revenues. That is, profit disguising lies principally on revenue rather than cost.

4.3 It is not just about tax evasion!

Our results so far clearly show that 'tax evasion' incentive is one of the most important driving forces behind Chinese firms' profit disguising activities. The two types of the most "honest" firms — foreign and HK/TW firms — are all non-domestic firms and have been enjoying significantly lower effective income tax rates. However, our findings also imply that tax evasion is not the sole driving force. Recall that the SOEs are subject to the highest tax rates among all firms, however, they demonstrate significantly weaker incentive than other domestic firms, especially private firms, to disguise profit. There are two potential explanations. First, managers of SOEs may be more resistant to profit disguising behavior as they figure the costs of doing so may outweigh benefits. Second, SOEs may be facing smaller financing constraints, therefore, they demonstrate a weaker incentive to disguise profit. No matter which one is more likely to be the case, our findings and corresponding

[26]The model specifications have little impact on the results.

explanations have clearly moved beyond the point shown in the traditional literature that tax evasion is a fundamental driver of profit disguising and suggested something new.

5 Summary and Conclusion

Due to its very nature (subtle and hard-to-detect), profit disguising has been extremely difficult to observe and quantify. Its very motives also remain rarely empirically explored. In this paper, we develop a fairly general empirical procedure to test for the evidence of profit disguising and apply it to the Chinese industrial firms. By examining how different firms respond to shocks to their fundamental earnings, we are able to trace out the extent of profit disguising and relate it to different firm-specific characteristics.

We find that private and collective firms in China demonstrate the strongest incentive to disguise profits, while foreign and HK/TW firms remain the most honest in their profit reporting practice. We also find that firms with tighter financing constraints are more likely to disguise their profits. Besides these two findings, we identify a 'size effect' in Chinese firms' profit disguising practice. That is, we find larger firms in China tend to be more disciplined while smaller firms display a stronger propensity to cheat, *ceteris paribus.*

Our empirical evidence can be reconciled with the existing theories. The ownership order in profit disguising shows that unequal tax treatment, to a greater extent, explains Chinese firms' profit disguising incentive. The fact that private firms demonstrate stronger incentive to disguise profit than SOEs do suggests that weak institutions, especially insecure property rights and a predatory state, may distort private firms' behavior even more. It thus echoes De Soto (1989), Marcouiller and Young (1995), Johnson et al. (1997), and Che and Qian (1998) in pointing out that a lack of institutional infrastructure and adequate legal systems leads to greater distortion of private behavior and a rampant unofficial economy (e.g., disguised profit). The fact that financing constraints help explain firms' profit disguising is new in literature and it highlights the importance of improving financial intermediation.

Appendix I: A Simple Model of Profit Disguising

In this appendix, we introduce a model of profit disguising, which highlights the roles of financing constraints, tax evasion, and weak institutions in explaining firms' profit disguising incentives. The empirical implications derived from the model are largely consistent with those discussed in Section 2.2.

We consider a risk-neutral firm in a two-period setting. The firm has two activities. The first activity is "profit reporting activity" in period 1, which requires the firm to decide on the size of profit it will disguise, H. The second activity concerns an "operation decision" about a business project in period 2. The firm needs to decide how much investment to make and what technology to use.

After H is chosen and dividends are distributed to shareholders, the firm is left with W worth of internal funds at the end of period 1. Should the firm need external funds, it might borrow from a risk-neutral bank. We assume that the bank practices a discriminatory lending policy, that is, only a fraction μ of projects will be financed by the bank. We assume that μ is exogenously given.

In the basic version of our model, we assume the firm has one economically viable, constant-returns-to-scale project in period 2. It costs $I > 0$ to undertake the project. The project could be executed using two technologies - safe or risky ones. If the firm chooses the safe technology, the project generates a certain gross rate of return, R, *for every dollar invested*. However, in the absence of proper incentives or outside monitoring, the manager may deliberately choose a risky technology to carry out the project so as to enjoy a private benefit. If the risky technology is chosen, the project yields a gross rate of return, R, with probability p $(0 < p < 1)$. It generates nothing when the project fails (with probability, $1 - p$). Note that the risky technology provides a private benefit of B for *every dollar invested* as long as the firm is solvent (this moral hazard problem has been introduced in the spirit of Holmstrom and Tirole, 1997). We assume the riskless rate of interest is zero. To make the moral hazard problem and monitoring by the bank non-trivial, we impose the following assumptions:

$$R > 1 > p(R + B) \tag{A. 1}$$

The first inequality in (A. 1) stipulates that the project has positive net present value if the firm chooses the safe technology. The second inequality in (A. 1) ensures that given the risky approach, the project generates negative expected net present value, even after taking into account the private benefit. We also assume:

$$R - 1 < p(R - 1 + B) \tag{A. 2}$$

Assumption 2 implies that if a firm borrows the entire amount of its investment, I, the firm would optimally choose the risky technology. Note that assumptions (A. 1) and (A. 2) imply that the firm would choose the safe technology if the project is solely financed by internal sources.

If the bank decides to give the firm a loan, it signs a loan contract (D, F) with the firm, where D is the amount of money the bank lends to the firm and F is the repayment. Given

the sequential nature of the game, we use a backward induction approach and analyze the firm's behavior in period 2 first.

In Period 2

The firm approaches the bank in the beginning of period 2. There are two possible outcomes: with probability μ, its loan application is approved and it signs a loan contract (D, F) with the bank; with probability $1-\mu$, the bank rejects the firm's application. If the bank decides to lend, the firm's problem could be characterized as:

$$\max_{I,D,F} \quad RI + \tau H - F - \theta\frac{H^2}{2} \tag{A. 3}$$

$$\text{s.t.} \quad RI + \tau H - F - \theta\frac{H^2}{2} \geq p(RI + \tau H - F + BI - \theta\frac{H^2}{2}) \tag{A. 4}$$

$$D = I - W - H. \tag{A. 5}$$

$$F \geq D \tag{A. 6}$$

Note that τ denotes the firm's tax rate. The term $\theta\frac{H^2}{2}$ in (A. 3) and (A. 4) deserves a careful explanation. θ is defined as the dis-utility parameter of profit disguising in our model. The term $\theta\frac{H^2}{2}$ therefore captures the downside of disguising profits and is convex in H. Lower θ corresponds to higher incentive to disguise profit.

In the above firm problem, the decision variables (I, D, F) maximize the firm's total payoff subject to the following constraints: (a) the firm chooses the safe technology rather than the risky one, that is, incentive compatibility condition as expressed in (A. 4) is satisfied; (b) the bank's participation constraints as specified in (A. 5) and (A. 6) are satisfied. To solve the firm problem, we first have:

Lemma 1 *Given H and W, the optimal bank loan contract in the presence of the moral hazard problem as characterized in assumptions (1) and (2) is given by ($I^* - W - H$, $I^* - W - H$), where*

$$I^* = [1 - R + \frac{p}{1-p}B]^{-1}(W + (\tau+1)H - \theta\frac{H^2}{2}). \tag{A. 7}$$

Proof. The bank's participation constraints, as characterized in (A. 5) and (A. 6), could be simplified as

$$F \geq I - W - H. \tag{A. 8}$$

Given the firm's objective function (A. 3), it is obvious that the bank's participation constraint, inequality (A. 8) should be binding. Therefore, we have $F = I - W - H$. Substituting $F = I - W - H$ into inequality (A. 4) yields the firm's incentive compatibility constraint:

$$(1-p)(W + (\tau+1)H - \theta\frac{H^2}{2}) \geq [pB - (1-p)(R-1)]I. \tag{A. 9}$$

Based on inequality (A. 2), the item inside the squared bracket on the right-hand side of (A.

9) is positive. Rearranging terms, inequality (A. 9) becomes

$$I \leq [1 - R + \frac{p}{1-p}B]^{-1}(W + (\tau + 1)H - \theta\frac{H^2}{2}). \tag{A. 10}$$

Since the firm's total payoff, as specified in equation (A. 3), is strictly increasing in I, inequality (A. 10) must be binding in equilibrium. We therefore have equation (A. 7). **Q.E.D.** ■

If the firm fails to obtain a bank loan (with probability $1 - \mu$), then the internal fund and disguised profit are the only financing sources. Considering the fact that the investment project has a positive net present value ($R > 1$), the firm will invest all of its own capital ($W + H$). The total firm payoff is given by $R(W + H) + \tau H - \theta\frac{H^2}{2}$.

In Period 1

We now analyze firm behavior in period 1. To simplify exposition, we denote

$$M = [1 - R + \frac{p}{1-p}B]^{-1}. \tag{A. 11}$$

It is not hard to prove that $M > 1$ given that assumptions (A. 1) and (A. 2) hold. From Lemma 1, we know the firm's optimal investment in period 2 given that it obtains a bank loan is $I^* = M(W + (\tau + 1)H - \theta\frac{H^2}{2})$ and its payoff is $RI^* + \tau H - F - \theta\frac{H^2}{2}$. This payoff function could be further stated as $(R-1)M(W+(\tau+1)H-\theta\frac{H^2}{2})+W+(\tau+1)H-\theta\frac{H^2}{2})$. The optimal investment when the firm fails to obtain a bank loan is $W+H$ and the corresponding payoff is $R(W + H) + \tau H - \theta\frac{H^2}{2}$. Therefore, the firm's problem in this period is:

$$\max_H \mu \underbrace{[(R-1)M(W + (\tau + 1)H - \theta\frac{H^2}{2}) + W + (\tau + 1)H - \theta\frac{H^2}{2}]}_{payoff\ with\ bank\ loan} + (1-\mu) \underbrace{[R(W + H) + \tau H - \theta\frac{H^2}{2}]}_{payoff\ without\ bank\ loan} \tag{A. 12}$$

Solving (A. 12) for H, we have

Proposition 1 *The total amount of profit the firm decides to disguise in period 1 is given by:*

$$H = \frac{\mu(R-1)(M-1)(1+\tau) + (1+\tau) + (1-\mu)(R-1)}{\theta[1 + \mu(R-1)M]}. \tag{A. 13}$$

where M is specified in (A. 11).

We now check the comparative static results to study how the disguised profit, H, changes with respect to various model parameters. We have:

Proposition 2 *The total amount of disguised profit, H, has the following properties in equilibrium: (1) it increases with tax rate τ since $\frac{\partial H}{\partial \tau} > 0$; (2) it decreases with μ ($\frac{\partial H}{\partial \mu} < 0$). That is, a firm tends to disguise more profit as its perceived difficulty of obtaining a bank loan*

increases; (3) H decreases as the disutility parameter of disguising profit increases ($\frac{\partial H}{\partial \theta} < 0$); (4) if the condition

$$\mu < [1 - \frac{\frac{pB}{1-p}}{R-1}]^2 \tag{A. 14}$$

is satisfied, the disguised profit increases with the profitability of the investment project, R, ($\frac{\partial H}{\partial R} < 0$).

Proof. Differentiating H with respect to τ, μ, θ, and R respectively leads to the results. **Q.E.D.** ■

Proposition 2 immediately generates the following empirical implications.

- Firms facing higher tax rates display stronger profit disguising propensity.
- Firms facing tighter financing constraints display stronger profit disguising propensity.
- Firms with a higher dis-utility level of disguising (higher θ) display weaker profit disguising propensity.
- When the financing constraints facing a firm are sufficiently large, it has stronger incentive to disguise profit as the investment profitability increases.

Appendix II: Data

II.1 Data Source

This study relies primarily on the annual accounting briefing reports filed by all industrial and service firms with the National Bureau of Statistics of China (NBS) during 1995 - 2002. Before 1995, firm-level information collected by NBS was fragmented and sometimes inconsistent due to changes in accounting rules and collection methods. In 1995, China conducted its third nation wide industrial census. A more rigorous and internally consistent statistical reporting system was introduced in preparation for the 1995 industrial census. The quality of data collection and database management has been significantly improved since then thanks to the resources committed and efforts made by the NBS.

The NBS compiles the information on the *large-and medium-sized industrial firms* and constructs the NBS database to track their performance. Since the NBS uses these firm-level annual data primarily for the purpose of calculating components of the Gross Domestic Product (GDP), this database contains not only the basic financial statements information but also the critical and comprehensive information necessary for the calculation of value added. Each firm covered by this database was assigned a unique legal identification number by the NBS. The database covers annually more than 20,000 firms in 38 two-digit industries and 28 provinces or province-equivalent municipal cities (see Table A1 for the list of two-digit industries and their full names; see Table A2 for the list of provinces or their equivalents). A firm may leave, enter, or re-enter the database when its operation scale has been reclassified by the NBS. It may enter the database when it is regarded as a large-or medium-sized one

and it may quit the database when it is no longer treated as a large-or medium sized firm. The changing composition of the firms covered by this database thus reflects the dynamics of the Chinese industries.

One caveat of the database is that it does not provide adequate information for us to track a certain firm. For example, if a firm covered in 1995 did not appear in 1996, we would not be able to know what exactly had happened to the firm. Had the firm gone bankrupt? Had it been acquired by another firm? Had it been reclassified as a small firm by the NBS? Or had its legal identification number been changed due to certain reasons (e.g., change in company name, privatization, etc.)? As a result, we are not able to investigate a set of very interesting questions — the birth and death of industrial firms in an emerging market and a transition economy.

II.2 Data Cleaning

The original firm-level data obtained from the NBS is understandably very noisy. According to the Statistical Law of China, firms are obliged to file their briefing reports with the NBS once such reports are solicited. These data are then passed up through the bureaucracy and aggregated to produce national figures. It is noted that the penalty for "mis-reporting" is quite light in China — firms are only subject to fines, but not criminal charges. Thus, it is expected that various internal inconsistencies such as those powerfully documented in Young (2003), may exist in the data.

To ensure the reliability of our analysis, we screened the original firm-level data and deleted problematic observations. Observations satisfying one of the following criteria are counted as unusable ones and deleted from our sample.

1. the value of fixed assets is less than RMB 100,000;
2. the total value of intermediate inputs is less than RMB 100,000;
3. the firm has fewer than 30 employees;
4. a firm's total industrial output is valued at less than RMB 100,000;
5. the total sales is less than RMB 100,000;
6. the total assets is less than RMB 100,000;
7. the total assets minus liquid assets is negative;
8. the total assets minus total fixed assets is negative;
9. total assets minus net value of fixed assets is negative;
10. accumulated depreciation minus current depreciation is negative;
11. one of the following variables — total assets, the number of employees, gross value of industrial output, net value of fixed assets, or sales — is missing.

Most observations were deleted either because certain information was missing or because the firms had been mis-classified as large-and medium-sized although their operation scales were fairly small. The latter could happen due to some historical reasons. The

classification standards for industrial firms were first issued in April 1988 by a number of government agencies including the State Planning Commission (SPC), the National Bureau of Statistics (NBS), the Ministry of Finance (MOF), the Ministry of Labor (MOL), and the State Economic Commission (SEC). They included detailed specifications based on the measurement of quantity rather than value. These standards were clearly a legacy of the centrally planned economy and have been phasing out in recent years. Now they only apply to the state-owned industrial enterprises (SOEs). For the private firms and other firms, the NBS currently uses total sales as the single variable to determine a firm's size. However, the co-existence of different selection criteria may lead to a number of misclassifications.

Based on the above selection criteria, we deleted 2.0% - 4.8% of observations from the original data. We did not observe any significant cross-ownership, cross-industry, or geographical patterns in the percentage points of bad observations, which implies that the "bad data" problem has been quite random.

II.3 The Significance of Our Sample Firms in the Chinese Economy

After the screening, we are left with more than 20,000 firms each year from 1995 to 2002. As shown in Table A3, the reported value added for all of our sample firms range from RMB 958 billion to RMB 2013 billion and they account for 33.3% - 43.3% of the total industrial value added in China and 14.4% - 19.2% of China's GDP. Our sample firms hired 26 - 38 million employees during 1998-2002 and they accounted for about 60% of total industrial employment in China and 10-20% of total urban employment.

References

[1] Allen, Franklin, Jun Qian, and Meijun Qian, 2002, Law, finance, and economic Ggrowth in China, Working paper, Wharton School.

[2] Beck, Thorsten, Asli Demirguc-Kunt, and Ross Levine, 2003, Law, endownments, and finance, *Journal of Financial Economics*, 70(2):137-181.

[3] Bertrand, Marianne, Paras Mehta, and Sendhil Mullainathan, 2002, Ferreting out tunneling: an application to India business groups, *Quarterly Journal of Economics*, 117(1), 121-148.

[4] Blanchard, Olivier, Florencio Lopez-de-Salines, and Andrei Shleifer, 1994, What do firms do with cash windfalls, *Journal of Financial Economics*, 36, 337-360.

[5] Che, Jiahua, and Yingyi Qiang, 1998, Insecure property rights and government ownerhip of firms, *Quarterly Journal of Economics*, Vol. 113, 467-496.

[6] De Soto, Hernando, The other path, New York, Harper and Row, 1989.

[7] Dechow, P., and D. Skinner, 2000, Earnins management: Reconciling the views of accounting academics, practitioners, and regulators, *Accounting Horizons*, 14(2), 235-250.

[8] Demirguc-Kunt, Asli, and Ross Levine, 2002, Financial structure and economic growth: cross-country comparisons of banks, markets, and development, MIT Press, Cambridge, Massachusetts.

[9] Desai, Mihir, A., 2002, The corporate profit base, tax sheltering activity and the changing nature of employee compensation, *NBER Working Paper 8866*.

[10] Dewenter, Kathryn L., and Paul H. Malatesta, 2001, State-owned and privately owned firms: an empirical analysis of profitability, leverage, and labor intensity, *American Economic Review*, Vol. 91, No.1: 320-334.

[11] Fisman, Raymond, and Shang-Jin Wei, 2001, Tax rates and tax evasion: evidence from "missing imports" in China, *Journal of Political Economy*, forthcoming.

[12] Gordon, Roger H., Chong-En Bai, and David D. Li, 1999, Efficiency losses from tax distortions vs. government control, *European Economic Review* 43: 1095-1103.

[13] Healy, P., and J. Wahlen, 1999, A review of the earnings managment literature and its implications for standard setting, *Accounting Horizons*, 13(4), 365-383.

[14] Holmstrom, Bengt, and Jean Tirole, 1997, Financial intermediation, loanable funds, and the real sector, *Quarterly Journal of Economics*, Vol. 112,663-691.

[15] Johnson, Simon, Daniel Kaufmann, and Andrei Shleifer, 1997, The unofficial economy in transition, *Brookings Papers on Economic Activity*, Fall (2), 159-239.

[16] Johnson, Simon, Daniel Kaufmann, John McMillan, and Christopher Woodruff, 2000, Why do firms hide? bribes and unofficial activity after communism, *Journal of Public Economics*, 76:495-520.

[17] King, Robert, and Ross Levine, 1993, Finance and Growth: Schumpeter might be right, *Quarterly Journal of Economics*, Vol. 108, 713-737.

[18] Lamont, Owen, 1997, Capital flows and investment: evidence from the internal capital markets, *Journal of Finance*, LII, 83-109.

[19] La Porta, Rafael, Florencio Lopez-de-Silanes, Andrei Shleifer and Robert Vishny, 1997, Legal determinants of external finance, *Journal of Finance*, 52(3), 1131-50.

[20] La Porta, Rafael, Flowrencio Lopez-de-Silanes, Andrei Shleifer, and Robert Vishny, 1998, Law and Finance, *Journal of Political Economy*, 106, 6, 1113–1155.

[21] Lardy, Nicholas, 1998, China's unfinished economic revolution, *Washington DC: Brookings Institution Press*.

[22] Levine, Ross, and Sara Zervos, 1998, Stock market, banks, and economic growth, *American Economic Review*, Vol.88(3), 537-558.

[23] Liu, Qiao, and Joe Lu, 2003, Earnings managment to tunnel: evidence from China's listed companies, *mimeo*.

[24] Marcouiller, Douglas, and Leslie Young, 1995, The black hole of graft: the predatory state and the informal economy, *American Economic Review*, 1995, 630-646.

[25] Park, Albert, and Kaja Sehrt, 2001, Tests of financial intermediation and banking reform in China, *Journal of Comparative Economics*, 29, 608-644.

[26] Rajan, R., and Luigi Zingales, 1998, Financial dependence and growth, *American Economic Review*, 88, 559-586.

[27] Shleifer, Andrei, and Robert Vishny, 1993, Corruption, *Quarterly Journal of Economics*, 108 (3), 599-617.

[28] Shleifer, Andrei, and Robert Vishny, 1998, The grabbing hand: government pathologies and their cures, *Harvard University Press*, Cambridge.

[29] Slemrod, Joel, and Shlomo Yitzhaki, 2000, Tax avoidance, evasion, and adminstration, NBER Working Paper No. W7473.

[30] Tao, Zhigang, and Tian Zhu, 2000, Agency and self-enforcing contracts, *Journal of Comparative Economics*, 28: 80-94.

[31] Young, Alwyn, 2003, Gold into base metals: productivity growth in the People's Republic of China during the reform period, *Journal of Political Economy*, 111 (6): 1220 - 1261.

Figure 1: National accounts profit – reported profit (GAP) by ownership over 1995-2002

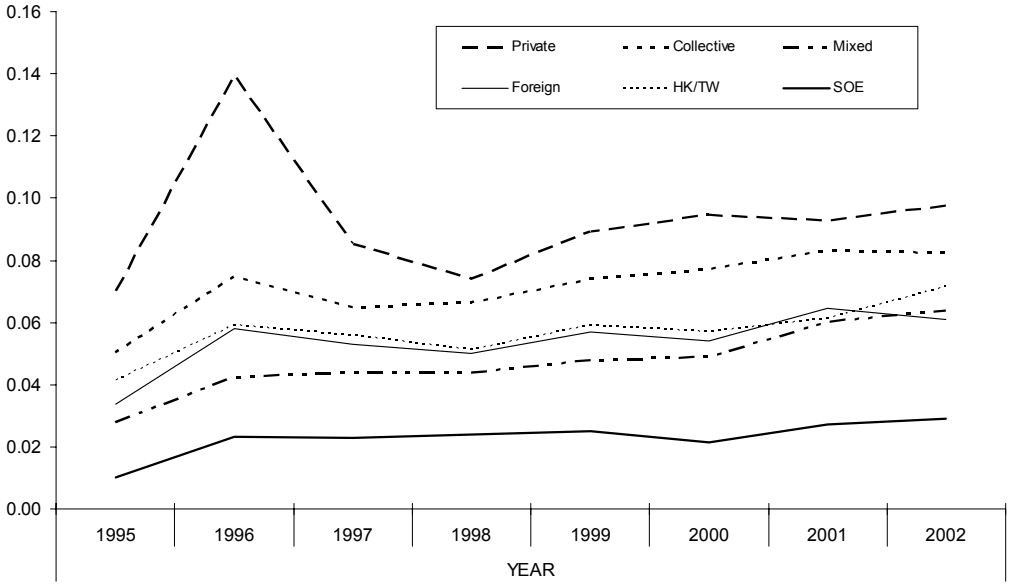

Figure 2: Tax paid / pre-tax profit (TAX) by ownership over 1995-2002

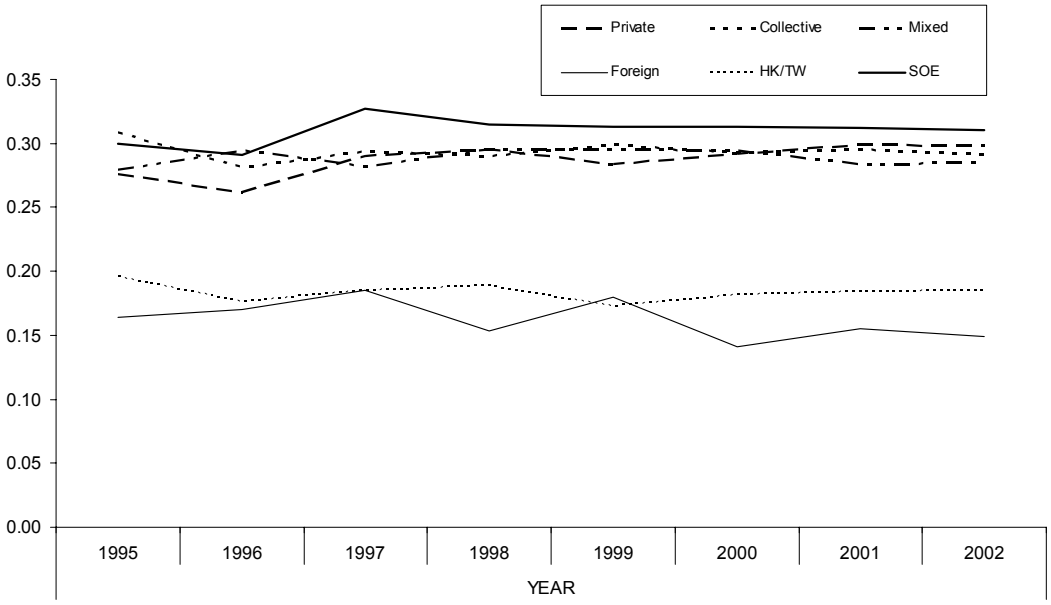

Figure 3: Long term liabilities / total assets ($FINANCE_1$) by ownership over 1995-2002

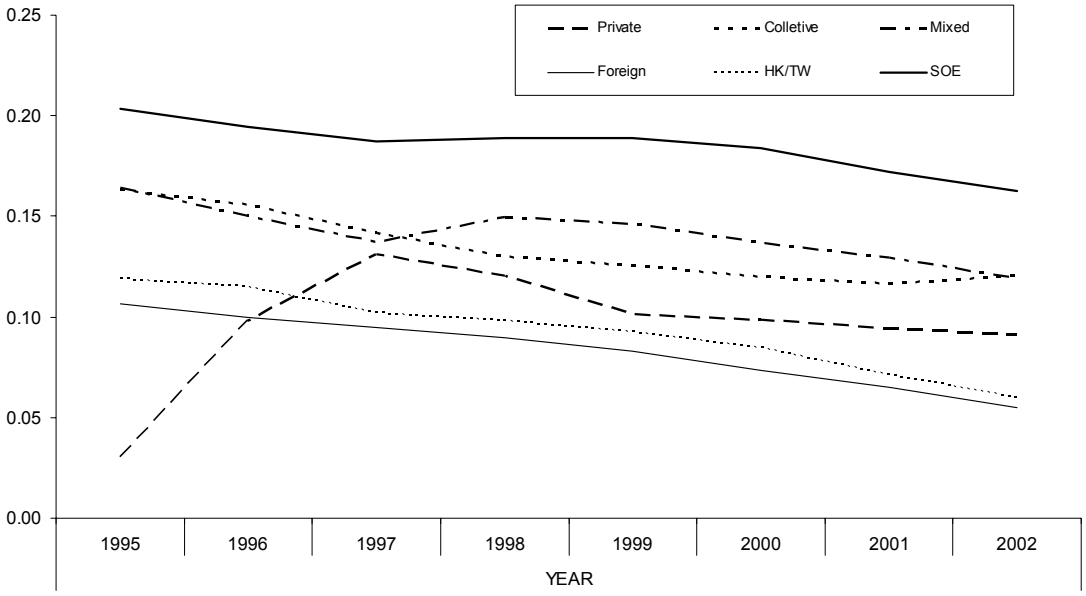

Figure 4: Sale / total output (RSALE) by ownership over 1995-2002

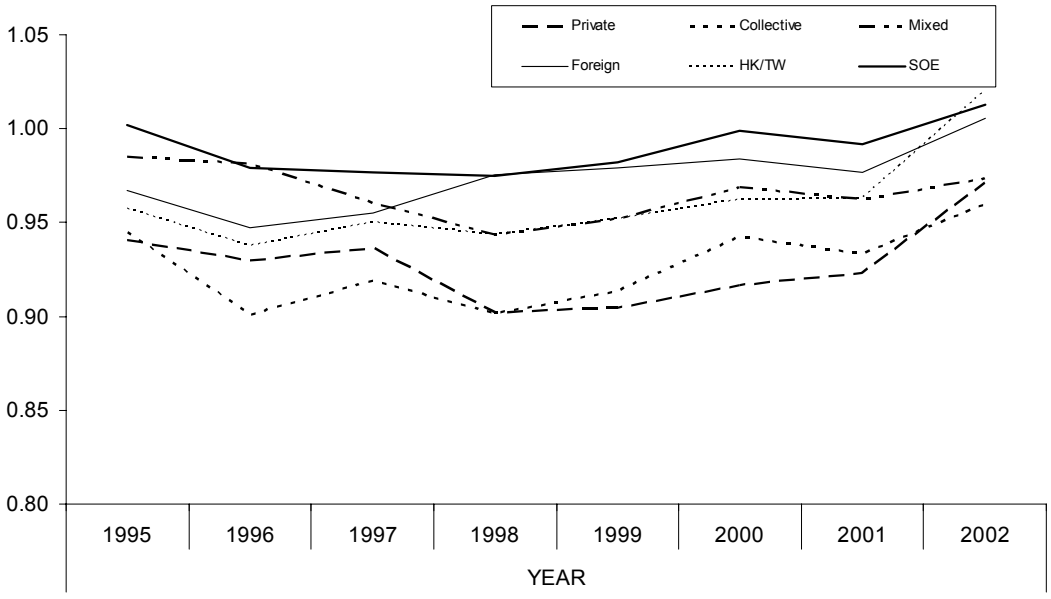

Table 1- The Number of Firm-Level Observations by Ownership for 1995-2002[a, b]

	Ownership Type						
Year	SOE	Private	Collective	Foreign	HK/TW	Mixed	Total
1995	15,361 (68.1%)	5 (0.0%)	4,008 (17.8%)	1,000 (4.4%)	936 (4.2%)	1,233 (5.5%)	22,543 (100%)
1996	14,935 (65%)	14 (0.1%)	4,199 (18.3%)	1,305 (5.7%)	1,115 (4.9%)	1,406 (6.1%)	22,974 (100%)
1997	14,097 (61.4%)	34 (0.1%)	4,074 (17.7%)	1,505 (6.6%)	1,203 (5.2%)	2,044 (8.9%)	22,957 (100%)
1998	12,573 (56.4%)	176 (0.8%)	3,577 (16.0%)	1,579 (7.1%)	1,454 (6.5%)	2,934 (13.2%)	22,293 (100%)
1999	10,766 (50.2%)	307 (1.4%)	3,350 (15.6%)	1,942 (9.0%)	1,524 (7.1%)	3,592 (16.7%)	21,463 (100%)
2000	9,360 (45.1%)	498 (2.4%)	2,899 (14.0%)	2,048 (9.9%)	1,552 (7.5%)	4,381 (21.1%)	20,738 (100%)
2001	8,106 (37.0%)	958 (4.4%)	2,394 (10.9%)	2,610 (11.9%)	2,211 (10.1%)	5,619 (25.7%)	21,898 (100%)
2002	7,215 (32.5%)	1,302 (5.9%)	2,138 (9.6%)	2,935 (13.2%)	2,495 (11.2%)	6,135 (27.6%)	22,220 (100%)

Notes:

a. Data source: NBS database
b. percent as a proportion of total firms in a given year in parentheses

Table 2 - Means, Standard Deviations and Numbers of Observations of the Principal Variables across the Ownership Type[a]

	Ownership Type						
Variables[c]	SOE	Private	Collective	Foreign	HK/TW	Mixed	Total
PRO	0.0073	0.1193	0.0795	0.0844	0.0773	0.0686	0.0409
	(0.1043)	(0.1625)	(0.1482)	(0.1541)	(0.1451)	(0.1287)	(0.1295)
	[91138]	[3112]	[25885]	[14491]	[12092]	[26825]	[173543]
RPRO	-0.0147	0.0231	0.0880	0.0218	0.0167	0.0152	0.0002
	(0.0574)	(0.0623)	(0.0645)	(0.0853)	(0.0730)	(0.0590)	(0.0645)
	[90955]	[3211]	[26089]	[14146]	[12165]	[26977]	[173543]
GAP	0.0220	0.0936	0.0700	0.0560	0.0590	0.0521	0.0404
	(0.0872)	(0.1443)	(0.1255)	(0.1214)	(0.1228)	(0.1111)	(0.1064)
	[90065]	[3049]	[25515]	[13860]	[11827]	[26540]	[170856]
$FINANCE_1$	0.1880	0.0966	0.1364	0.0780	0.0869	0.1367	0.1539
	(0.1701)	(0.1443)	(0.1565)	(0.1415)	(0.1486)	(0.1514)	(0.1658)
	[89759]	[3265]	[26242]	[14831]	[12406]	[27040]	[173543]
$FINANCE_2$	0.0254	0.0206	0.0307	0.0182	0.0200	0.0207	0.0244
	(0.0230)	(0.0178)	(0.0246)	(0.0199)	(0.0213)	(0.0183)	(0.0224)
	[90789]	[3269]	[26083]	[14149]	[12219]	[27034]	[173543]
TAX[b]	0.3122	0.2890	0.2945	0.1614	0.1874	0.2951	0.2832
	(0.2227)	(0.2062)	(0.2211)	(0.1312)	(0.1541)	(0.2277)	(0.2211)
	[55233]	[24800]	[18763]	[10030]	[8564]	[20672]	[115742]
RSALE	0.9881	0.9370	0.9241	0.9781	0.9668	0.9644	0.9714
	(0.3634)	(0.3131)	(0.2663)	(0.2532)	(0.2909)	(0.3008)	(0.3272)
	[89,851]	[3,255]	[26,278]	[14,768]	[12,343]	[27,048]	[173543]
TA	395.35	106.00	116.83	363.71	294.9	409.98	340.59
(RMB, million)	(185.9)	(163.99)	(322.41)	(104.7)	(103.55)	(170.19)	(156.05)
	[92,413]	[3294]	[26639]	[14906]	[12,490]	[25,635]	[177086]
LABOR	1960	584	784	655	697	1305	1458
	(5780.6)	(653)	(1140)	(1047)	(1125)	(2859)	(4404)
	[92413]	[3294]	[26639]	[14906]	[12490]	[27344]	[177086]

Notes: a. Standard deviations in parentheses; number of observations in brackets.
b. Exclude the loss-making firms when computing the average tax rate.
c. Variable definitions:
PRO = the national accounts corporate profit based on the NBS data (equation 1) scaled by total assets
RPRO = the profit reported by the firm scaled by total assets
GAP = PRO - RPRO
FINANCE1 = long-term liabilities divided by total assets
FINANCE2 = the amount of finance charges divided by total assets
TAX = income tax paid / firm reported pre-tax profit
RSALE = total sales as a proportion of total output, defined as total revenues / total output
TA = total assets in million RMB (LNTA --- logarithm of TA)
LABOR = the number of employees (LNLABOR --- logarithm of LABOR)

Table 3 – Estimates of *GAP* Equations for 1995-2002[a]

	Dependent Variable = GAP[b]		
	(1)	(2)	(3)
$D_{private}$	0.058***	0.056***	0.058***
	(0.002)	(0.002)	(0.002)
$D_{collective}$	0.039***	0.038***	0.040***
	(0.001)	(0.001)	(0.001)
D_{mixed}	0.021***	0.019***	0.020***
	(0.001)	(0.001)	(0.001)
$D_{foreign}$	0.034***	0.033***	0.030***
	(0.001)	(0.001)	(0.001)
$D_{HK/TW}$	0.032**	0.031**	0.029**
	(0.001)	(0.001)	(0.001)
D_{SOE}[c]			
LNTA		-0.007***	
		(0.000)	
LNLABOR			-0.008***
			(0.000)
$FINANCE_1$			-0.020***
			(0.002)
$FINANCE_2$	-0.439***	-0.439***	
	(0.012)	(0.012)	
Constant	-0.015***	0.066***	-0.011***
	(0.004)	(0.005)	(0.004)
Adj. R-square	0.091	0.098	0.097
# of Obs.	168,128	168,128	167,588

*, **, *** - significant at the 10%, 5% and 1% levels.
Robust standard errors in parentheses.

Notes:
a. See Table 2 for variable definitions.
b. All regressions include industry dummies, location dummies and year dummies.
c. The coefficient of D_{soe} is set to be zero.

Table 4 – Estimates of Profit Reporting Equations for 1995-2002[a]

	Dependent Variable = RPRO[c]							
Independent Variables[c]	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
PRO	0.325***	0.329***	0.328***	0.301***	0.301***	0.278***	0.3040***	0.279***
	(0.053)	(0.023)	(0.023)	(0.023)	(0.023)	(0.023)	(0.023)	(0.023)
$D_{private}$*PRO		-0.061***	-0.058***	-0.064***	-0.061***	-0.066***	-0.107***	-0.101***
		(0.005)	(0.005)	(0.005)	(0.003)	(0.005)	(0.006)	(0.006)
$D_{collective}$*PRO		-0.042***	-0.04***	-0.046***	-0.039***	-0.045***	-0.055***	-0.054***
		(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
D_{mixed}*PRO		-0.029***	-0.029***	-0.024***	-0.034***	-0.029***	-0.056***	-0.053***
		(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
$D_{foreign}$*PRO		0.062***	0.068***	0.077***	0.080***	0.090***	0.059***	0.064***
		(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.004)	(0.004)
$D_{HK/TW}$*PRO		0.007*	0.008**	0.015**	0.018***	0.024**	-0.013***	-0.010***
		(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
D_{SOE}*PRO [b]								
$FINANCE_1$* PRO			0.036**		0.015***		0.018***	
			(0.002)		(0.007)		(0.007)	
$FINANCE_2$* PRO				0.615***		0.588***		0.510***
				(0.043)		(0.043)		(0.042)
TAX					0.064***	0.062***	0.064***	0.065***
					(0.001)	(0.001)	(0.001)	(0.001)
RSALE					0.016***	0.018***	0.017***	0.018***
					(0.001)	(0.001)	(0.000)	(0.000)
LNTA	0.008***	0.008***	0.008***		0.007***			
	(0.000)	(0.000)	(0.000)		(0.000)			
LNLABOR				0.004***		0.003***		0.004***
				(0.000)		(0.000)		(0.000)

$D_{private}$							0.021***	0.018***
							(0.001)	(0.001)
$D_{collective}$							0.01***	0.007***
							(0.000)	(0.000)
D_{mixed}							0.012***	0.012***
							(0.000)	(0.000)
$D_{foreign}$							0.120***	0.150***
							(0.001)	(0.001)
$D_{HK/TW}$							0.016***	0.017***
							(0.001)	(0.001)
D_{SOE} [b]								
Constant	-0.114***	-0.111***	-0.111***	-0.420***	-0.115***	-0.057***	-0.125***	-0.066***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Adj. R-square	0.341	0.345	0.344	0.327	0.398	0.386	0.405	0.393
# of Obs.	169,009	169,009	165,777	166,322	159,448	159,912	159,488	159,912

*, **, *** - significant at the 10%, 5% and 1% levels.
Robust standard errors in parentheses.
Notes:
a. All regressions include industry dummies*PRO, year dummies*PRO, and location dummies*PRO. To save space, we choose not to report these estimates. They are available from the authors upon request.
b. The coefficients of D_{SOE}*PRO and D_{soe} are set to be zero.
c. For variable definitions, see Table 2.

Table 5 – Estimates of Profit Reporting Equations for 1995-2002 – Alternative Model Specifications[a]

	Dependent Variable = RPRO[c]					
	(1)	(2)	(3)	(4)	(5)	(6)
PRO	-0.309***	-0.250***	0.183***	0.138***	-0.237***	0.148***
	(0.025)	(0.025)	(0.024)	(0.024)	(0.025)	(0.024)
$D_{private}$*PRO		-0.022***		-0.029***	-0.061***	-0.070***
		(0.005)		(0.005)	(0.006)	(0.006)
$D_{collective}$*PRO		-0.037***		-0.040***	-0.038***	-0.042***
		(0.003)		(0.003)	(0.003)	(0.003)
D_{mixed}*PRO		-0.013***		-0.006***	-0.041***	-0.036***
		(0.003)		(0.003)	(0.003)	(0.003)
$D_{foreign}$*PRO		0.080***		0.112***	0.055***	0.086***
		(0.003)		(0.004)	(0.004)	(0.004)
$D_{HK/TW}$*PRO		0.024***		0.046***	-0.006	0.016***
		(0.004)		(0.004)	(0.004)	(0.004)
D_{SOE}*PRO[b]						
				.	.	.
LNTA*PRO	0.049***	0.044***			0.043***	
	(0.001)	(0.001)			(0.001)	
LNLABOR*PRO			0.015***	0.021***		0.019***
			(0.001)	(0.001)		(0.001)
$D_{private}$					0.017***	0.017***
					(0.001)	(0.001)
$D_{collective}$					0.004***	0.005***
					(0.000)	(0.000)
D_{mixed}					0.012***	0.012***
					(0.000)	(0.000)
$D_{foreign}$					0.013***	0.013***

					(0.001)	(0.001)
$D_{HK/TW}$					0.015***	0.015***
					(0.001)	(0.001)
D_{SOE}						
TAX	0.064***	0.066***	0.065***	0.067***	0.066***	0.067***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
RSALE	0.019***	0.019***	0.019***	0.019***	0.019***	0.019***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Constant	-0.039***	-0.038***	-0.039***	-0.038***	-0.041***	-0.041***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Adj. R-square	0.386	0.391	0.376	0.384	0.397	0.390
# of Obs.	162496	162496	162496	162496	162496	162496

*, **, *** - significant at 10%, 5% and 1% level respectively;
Robust standard errors in parentheses.
Notes:
a. All regressions include industry dummies*PRO, location dummies, year dummies*PRO.
b. The coefficient of D_{soe}*PRO is set to be zero.
c. See Table 2 for variable definitions.

Table 6– Estimates of Profit Reporting Equations for Different Time Periods[a]

Dependent Variable = RPRO[c]

	1995-1998		1999-2000		2001-2002	
	(1)	(2)	(1)	(2)	(1)	(2)
PRO	0.324***	0.327***	0.213***	0.210***	0.260 ***	0.263***
	(0.033)	(.033)	(0.045)	(0.045)	(0.045)	(0.045)
$D_{private}$*PRO	-0.020	-0.038*	-0.022***	-0.043***	-0.020 ***	-0.063***
	(0.020)	(.022)	(0.011)	(0.012)	(0.008)	(0.009)
$D_{collective}$*PRO	-0.064***	-.074***	-0.012***	-0.019***	0.002	-0.011
	(0.004)	(.004)	(0.006)	(0.006)	(0.007)	(0.007)
D_{mixed}*PRO	-0.000	-.027***	0.006	-0.022***	0.001	-0.023***
	(0.005)	(.006)	(0.006)	(0.006)	(0.006)	(0.006)
$D_{foreign}$*PRO	0.075***	.062***	0.144***	0.116***	0.118***	0.071***
	(0.006)	(.006)	(0.007)	(0.007)	(0.007)	(0.007)
$D_{HK/TW}$*PRO	0.030***	.001	0.066***	0.030***	0.045***	0.003
	(0.006)	(.006)	(0.007)	(0.008)	(0.007)	(0.007)
D_{SOE}*PRO[b]						
$FINANCE_2$* PRO	0.545***	.554***	0.161***	0.180***	0.718***	0.751***
	(0.056)	(.056)	(0.100)	(0.100)	(0.110)	(0.109)
TAX	0.065***	.065***	0.063***	0.062***	0.067***	0.066***
	(0.001)	(.001)	(0.001)	(0.001)	(0.001)	(0.001)
RSALE	0.019***	.019***	0.018***	0.018***	0.017***	0.018***
	(0.001)	(.001)	(0.001)	(0.001)	(0.001)	(0.001)
LNLABOR	0.004***	.005***	0.004***	0.005***	0.004 ***	0.005***
	(0.000)	(.000)	(0.000)	(0.000)	(0.000)	(0.000)
$D_{private}$		.010**		0.011***		0.019***
		(0.004)		(0.002)		(0.002)

$D_{collective}$		0.007***		0.006***		0.009***
		(.001)		(0.001)		(0.001)
D_{mixed}		0.011***		0.011***		0.011***
		(0.001)		(0.001)		(0.001)
$D_{foreign}$		0.009***		0.013***		0.021***
		(0.001)		(0.001)		(0.001)
$D_{HK/TW}$		0.014***		0.016***		0.020***
		(0.001)		(0.001)		(0.001)
D_{SOE}						
Constant	-0.064***	-0.072***	-0.065***	-0.074***	-0.052 ***	-0.066 ***
	(0.002)	(0.002)	(0.003)	(0.003)	(0.003)	(0.004)
Adj. R-square	0.408	0.404	0.383	0.376	0.354	0.343
# of Obs.	82,067	82,067	38,111	38,111	39,732	39,732

*, **, *** - significant at the 10%, 5% and 1% level.
Robust standard errors in parentheses.
Notes:

a. All regressions include industry dummies*PRO, year dummies*PRO, and location dummies*PRO. To save space, we choose not to report the estimates of those variables. They are available from the authors upon request.
b. The coefficients of D_{SOE}*PRO and D_{soe} are set to be zero.
c. For variable definitions, see Table 2.

Table 7 - A Decomposition Analysis: Revenue vs Cost[a]

Revenue Reporting Equation: Dependant Variable = Reported Revenue /Total Assets[b]			Cost Reporting Equation: Dependant Variable = Reported Cost /Total Assets[d]		
	(1)[f]	(2)[f]		(3)[f]	(4)[f]
SR[c]	0.652***	0.630***	SC[e]	0.688***	0.678***
	(12.424)	(12.293)		(12.871)	(13.066)
$D_{private}$*SR	-0.085***	-0.070***	$D_{private}$*SC	-0.010	-0.005
	(-11.184)	(-9.289)		(-1.242)	(-0.604)
$D_{collective}$*SR	-0.039***	-0.029***	$D_{collective}$*SC	-0.004	0.000
	(-8.928)	(-6.548)		(-0.898)	(0.027)
D_{mixed}*SR	-0.017***	-0.008	D_{mixed}*SC	0.021***	0.026***
	(-3.670)	(-1.613)		(4.230)	(5.173)
$D_{foreign}$*SR	0.010*	0.024***	$D_{foreign}$*SC	0.006	0.032***
	(1.775)	(4.248)		(0.915)	(5.230)
$D_{HK/TW}$*SR	0.012*	0.029***	$D_{HK/TW}$*SC	0.039***	0.050***
	(1.908)	(4.719)		(5.995)	(7.715)
D_{SOE}*SR			D_{SOE}*SC		
$FINANCE_2$*PRO		0.421***	$FINANCE_2$*PRO		-0.015
		(7.048)			(-0.235)
LNLABOR	0.013**	0.013**	LNLABOR	0.003**	0.003*
	(9.295)	(9.311)		(2.208)	(1.826)
Constant	0.041*	-0.003	Constant	-0.084*	-0.002*
	(1.739)	(-0.171)		(-3.695)	(-0.129)
Adj. R-square	0.490	0.496	Adj. R-square	0.434	0.441
# of Obs.	173,542	173,542	# of Obs.	173,542	173,542

Note:

a. *, **, *** - significant at 10%, 5%, and 1% respectively; t-statistics based on robust standard errors in parentheses.
b. reported revenue = total sales reported to NBS
c. SR (simulated revenue) = the total output reported to NBS scaled by total assets
d. reported cost = reported sales – reported profits
e. SC (simulated cost) = simulated revenue – simulated profit = SR – PRO
f. See Table 2 for the definitions of other variables

Table A1 - List of industry code and the full industry name

06 Coal Mining and Dressing	07 Petroleum and Natural Gas Extraction
08 Ferrous Metals Mining and Dressing	09 Nonferrous Metals Mining and Dressing
10 Nonmetal Minerals Mining and Dressing	12 Logging and Transport of Timber & Bamboo
13 Food Processing	14 Food Production
15 Beverage Production	16 Tobacco Processing
17 Textile Industry	18 Garments and Other Fiber Products
19 Leather, Furs, Down and Related Products	20 Timber, Bamboo, Cane, Palm Fiber & Straw
21 Furniture Manufacturing	22 Papermaking and Paper Products
23 Printing and Record Medium Reproduction	24 Cultural, Educational and Sports Goods
25 Petroleum Processing and Coking	26 Raw Chemical Materials and Chemical
27 Medical and Pharmaceutical Products	28 Chemical Fiber
29 Rubber Products	30 Plastic Products
31 Nonmetal Mineral Products	32 Smelting & Pressing of Ferrous Metals
33 Smelting & Pressing of Nonferrous Metals	34 Metal Products
35 Ordinary Machinery Manufacturing	36 Special Purposes Equipment Manufacturing
37 Transport Equipment Manufacturing	40 Electric Equipment and Machinery
41 Electronic and Telecom Equipment	42 Instruments, Cultural & Office Machinery
43 Other Manufacturing	44 Electric Power, Steam and Hot Water
45 Gas Production and Supply	46 Tap Water Production and Supply

Table A2 - List of province code and full province name

[11] BeiJing	[12] TianJin
[13] HeBei	[14] ShanXi
[15] Inner Mongolia	[21] LiaoNing
[22] JiLin	[23] HeLongJiang
[31] ShangHai	[32] JiangSu
[33] ZheJiang	[34] AnHui
[11] FuJian	[36] JiangXi
[37] ShangDong	[41] HeNan
[42] HuBei	[43] HuNan
[44] GuangDong	[45] GuangXi
[46] HaiNan	[50] SiChuan+ChongQing
[52] GuiZhou	[53] YunNan
[54] Tibet+Qinghai+Ningxia	[61] ShaanXi
[62] GanSu	[65] XinJiang

Table A3 - The Significance of the Sample Firms in the Chinese Economy

	1995	1996	1997	1998	1999	2000	2001	2002
(1) Number of firms in the sample	22,543	22,974	23,311	22,293	21,463	20,738	21,898	22,220
(2) Number of all industrial firms in China with annual sales above RMB 5 million	N.A.	N.A.	N.A.	165,080	162,033	162,885	171,256	181,557
(3) Reported value added for all firms in the sample (RMB Billion)	958	1,017	1,080	1,131	1,289	1,521	1,742	2,013
(4) Total industrial value added in China (RMB Billion)	2,472	2,908	3,241	3,339	3,509	3,905	4,238	4,654
(3)/(4) = Sample firms' Value Added / China Industrial Value Added	38.8%	35.0%	33.3%	33.9%	36.7%	39.0%	41.1%	43.3%
(5) GDP (RMB Billion)	5,848	6,789	7,446	7,835	8,207	8,947	9,731	10,479
(3)/(5) = Sample firms' Value Added / China GDP	16.4%	15.0%	14.5%	14.4%	15.7%	17.0%	17.9%	19.2%
(6) Number of employees for all enterprises in the sample (in million)	38	38	37	34	31	28	27	26
(7) Number of employees in all industrial enterprises (in million)	66	65	62	48	44	41	38	37
(6)/(7) = Sample Employment / China Industrial Employment	57.8%	58.1%	58.8%	70.5%	69.3%	68.7%	70.6%	70.8%
(8) Urban employment in China (in million)	191	198	202	216	224	232	239	248
(6)/(8) = Sample Employment / China Urban Employment	20.0%	18.9%	18.1%	15.5%	13.7%	12.2%	11.3%	10.7%

Sources: NBS database; China Statistical Yearbook 1995-2002