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Accruals: An overview

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ABSTRACT

The paper provides a broad discussion of the topic "accruals". Though much of what is said is familiar from the literature on accruals, the paper tries to develop concepts and show how theses forge tight links across a variety of themes. The starting point of the analysis concerns the construct of an accrual. The case is made that it should rest solely on consecutive balance sheets and the splitting of assets/liabilities into (i) cash and approximate cash, assets/liabilities and (ii) all other kinds of assets/liabilities. Given this divide of assets/liabilities one can measure the components in the foundation equation: cash earnings + net accrual = comprehensive earnings. The paper then proceeds to discuss how the net accrual relates to growth in a firm's operating activities and the extent to which it can be informative or misleading. This topic in turn integrates with the issue of a firm's quality of earnings and the role of accounting conservatism. Among the remaining topics, the paper discusses how one conceptualizes diagnostics to assess whether or not a period's accrual is likely to be biased upwards or downwards. It gives rise to a consideration of how one constructs accruals that may be more informative than GAAP accruals and the role of value-relevance studies to assess the information content of accrual constructs. The paper ends with a list of suggestions how future research may be modified in light of the discussions in this paper.

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1. Introduction

Research on "accruals" has grown significantly over the past 15 years, the most well-known papers being due to Jones (1991) and Sloan (1996). While this extensive literature deals with a variety of questions, most of the papers in one way or another consider the statistical properties of accruals – or the properties of cash flows vs. earnings. These flow variables prompt the issue of how one converts financial data into a period's cash flows or accruals. A review of the literature bears out that there are numerous approaches to the measurement of accruals. Some of these depend on changes in balance sheet accounts; other studies start from statements of cash flows and adjust key numbers using information extracted from income statements. Specific details in individual studies can also vary, so readers may be left with an uneasy feeling that research executions allow for too many degrees of freedom.[1] One can safely assert that the literature offers no "standardized" way of putting the 3 components – cash flows, earnings and accruals – together. Nevertheless, the various efforts at measuring accruals would seem to be based on a common understanding as to the nature of accruals; when studies discuss the measurement of accruals they do move (broadly speaking) in a similar direction.[2]

Missing in all of this empirical research is an analysis of the *concept* or *construct* of an accrual and its implications.[3] Such absence makes it hard to assess whether there are other workable (perhaps better) alternatives to the accrual measurements found in specific studies. These hypothetical alternatives could lead to different (or less robust) empirical findings, suggesting the need for an accrual concept. In the background lurks a more fundamental issue, however. Only after a construct is in place can one examine the circumstances under which accruals have a practical role in valuation because they beneficially complement cash earnings. This sets the stage for an analysis of when accruals tend to misinform rather than inform investors.

This paper develops and evaluates an accrual construct which I view as particularly useful. It is not new. Textbooks, like Penman (2009), refer to it as "change in net operating assets." Much of what is discussed in this regard reaffirms what many readers have seen elsewhere. Yet in key respects the analysis here diverges from what the literature puts forward. This paper places the emphasis on ideas and how theses forge links as opposed to a critical evaluation of the work that has been done (and how it perhaps could be improved). It applies to any accounting that satisfies the basic stocks-flows reconciliation built into accounting. Thus the paper tries to deal with questions of broad interest which hopefully should supply a conceptual foundation for those individuals who try to familiarize themselves with the literature, or who aspire to a better sense of what one may call the "big picture." Following that, the paper discusses empirical questions related

[1] As an illustration of implementation "details", in many studies earnings serve as an ingredient to measure either cash flows or accruals. The researcher must then decide on the earnings number to use: which, if any, special items should be excluded?

[2] This paper does not compile extensive references to the large literature, empirical and conceptual, that deals with accruals and linked topics. I should further underscore that there are really few new ideas in this paper and yet I have not tried to attribute various insights to originators as is commonly done. It would have been too difficult and thorny to develop the relevant citations. The topics covered – like the general idea of an accrual – have long histories with non-standardized terminology and an enormous number of applications in research. To get started on navigating the literature, the following papers should prove useful. Jones (1991) and Sloan (1996) have been mentioned in the main text's first paragraph and thus they have a significant status as "classics". With respect to textbooks, Penman (2009) provides an introductory discussion of the quality of earnings issue as it relates to accruals. See also the textbook by Easton et al. (2009). For a very broad perspective on the quality of earnings topic, see Dechow et al. (2009). Melumad and Nissim (2009) discuss quality of earnings specifics for numerous line items such as the accounting for pensions, inventories, deferred revenues, etc. Quality of earnings evaluations as it relates to changes in balance sheet conservatism can be found in Penman and Zhang (2002). Ohlson and Aier (2009) discuss what they refer to as modified cash accounting ("MCA") earnings – a measure of cash earnings – as opposed to accrual earnings and they explain how MCA fits into the quality of earnings literature. The paper particularizes the cash assets/liabilities vs. other assets/liabilities dichotomy and it discusses the full range of judgment issues, including the use of footnote disclosures to measure cash earnings. Empirical work related to GAAP accruals – their reversal properties as well as trading strategy opportunities – Allen et al. (2009) summarizes what one may refer to as the most recent state-of-the-art of accrual research when it comes to empirical work. Richardson et al. (2009) review the literature on accruals and anomalies, and it lists just about all references that one can reasonably hope for.

[3] To be sure, the concept of an accrual as employed in this paper always refers to a (period's) flow. The reason for noting this obvious convention here is that an often cited paper by Dechow et al. (2002) suggests that they have modeled accruals, which in my mind is unfounded insofar that they are actually dealing with stock variables. Specifically, in my reading of the paper, it has the flavor of a model of "errors" in balance sheet accounts – which are stocks and not flows. The errors pick up biases (upwards or downwards) as to the expected cash that will be realized at the end of the period. In my interpretation, therefore, rather than capturing accruals the model in question develops the consequences of fair market valuations when these can reflect an upward or downward bias.

to properties of accruals, including the question of how one can evaluate whether accruals are informative or not.

Because this paper deals with topics and themes that are by no means novel, much will be familiar to individuals versed in the literature. That said, how the various ideas connect with each other may be less so. As the links often involve subtleties, the paper envisions that one obtains a much better understanding of subject matter if one proceeds step by step without distracting discussions of empirical research papers and their findings. In sum, the flow and interdependence of ideas will be central.

To give the reader a sense of topics covered, the following supplies a list that the paper develops in some detail:

- The construct of an accrual depends solely on (consecutive) balance sheets and the classification of assets/liabilities into approximate cash assets/liabilities as distinguished from other assets/liabilities. The latter class of assets/liabilities can be thought of as those related to operations as opposed to financial activities.
- Conceptually and practically, to identify an accrual via cash flows statements combined with earnings confuses issues. Nor does it generally help to identify non-cash expenses such as depreciation if the focus is on a period's total accruals.
- In terms of economics, an accrual relates to the growth in operating activities alone. Under ideal circumstances the measurement of growth in operating activities and the accrual has a one-to-one correspondence. Financial activities do not influence the accrual measurement though these activities do of course reconcile with operating activities.
- The quality of earnings dependence on accruals is essentially independent of balance sheet conservatism; it is the change in the degree of conservatism that counts.[4] Similarly, the information content of accruals should not be conceptualized in terms of the extent to which operating assets/liabilities deviate from their fair market values.
- An informative accrual measures the growth in operating activities without a subsequent reversal: a serial correlation in total accruals is prima facie evidence of "bad" accounting.
- Dealing with the quality of earnings issue per GAAP reduces to attempts to come up with measures of growth in operating activities that are more informative than the accruals implied by GAAP. Such competing measure of growth in operating activities should facilitate the forecasting of future (operating) GAAP earnings. The growth of sales is potentially useful insofar that it generally ought to relate to growth in operating activities. As a practical matter, it leads to the hypothesis that the quality of earnings is low when the growth in sales is less than the growth in net operating assets.
- Traditional value relevance (cross-sectional) regressions – stock market returns on same-period accounting data – can assess the information content of accruals by putting it on the RHS with cash earnings. The methodology also permits a comparison of GAAP accruals to what one may hypothesize to be more informative measures of accruals. A particularly interesting question relates to the issue if one can construct an accrual that loads the same in the regression as cash earnings, in which case the two numbers aggregate without loss of information (in other words, on the regression's RHS one can add cash earnings and the accrual without significantly reducing the R^2).

2. Basics: Accruals and financial statements

Without referring to any particular accounting principles, accounting introduces accruals because transactions may, or may not, have a cash component:

[4] In the context of this paper, "quality of earnings" pertains to the idea that the current (net) accrual influences the forecasting of earnings in an upward or downward direction. If upwards (downwards) then the current earnings are of high (low) quality.

Cash Earnings + Accrual = Earnings.

This relation is definitional and thus not subject to challenge (the accrual, to be sure, is the total for the period.)[5] If the RHS is determined by GAAP (of any jurisdiction) and cash earnings are determined by some other accounting regime consistent with the term cash earnings, then the accrual is implied. More generally, any one of the three quantities can be inferred from the remaining two, of course. In the literature one finds a mixture of approaches though it does seem as if earnings (before or after some special items) are always taken as a given. But this observation about practice in empirical research should not be confused with some notion that the measurement of accruals or cash earnings *presupposes* an earnings number. Such thinking is unnecessarily rigid.

As a practical matter, one might well measure accrual earnings such that the number derives from two independently established components, cash earnings and an accrual. One can thereby think of accruals as having been measured independently of some existing balance sheets or an integrated set of financial statements. To consider the measurement of accruals without reference to earnings, balance sheets or cash flows is by no means fanciful. This approach becomes the modus operandi in the discussion of the topic "quality of earnings" as it relates to accruals. This paper revisits this idea in the discussion of this topic later. Before getting to that point the focus will be on cases when specific assets/liabilities and their carrying values are in place, i.e., what one might call "regular accounting."

In regular accounting, start- and end-of-period balance sheets underpin earnings measurements. The claim applies no less to the measurement of cash earnings than to (accrual) earnings since both cases require that the flows reconcile with the beginning–ending stocks. Cash earnings and regular accrual earnings accordingly differ only in the listing of assets/liabilities (and their carrying values) that support the two earnings measurements. While the specifics of how one identifies the two sets of assets/liabilities raises its own issues, which will be discussed later, here we note that to conceptualize cash earnings independently of supporting balance sheets removes us from regular accounting.

Suppose next that, (i) the accounting satisfies clean surplus for both concepts of earnings, and (ii) the dividends and capital contributions are of a cash variety, i.e., the two accounting regimes treat these transactions the same. It follows that the accrual equals the difference between the two regime's net worth changes (ending minus beginning balances).

The last sentence is awkward in its claim that the accrual derives from differences after having looked at changes over a period. Elementary algebra helps to communicate the statement. In the interest of simplicity, assume zero dividends and capital contributions. First note that one infers earnings from the clean surplus relation, i.e., the increase in net worth (or book value). Second, suppose that all asset/liabilities must be classified into one or the other out of two kinds:

ca = cash assets and the approximate equivalent of cash, positives net of negatives.
oa = other assets/liabilities, net.

Then

$$\{\mathrm{ca}(t) + \mathrm{oa}(t)\} - \{\mathrm{ca}(t-1) + \mathrm{oa}(t-1)\} = \mathrm{earnings}(t)$$

[5] One can ask whether cash earnings and cash flows are two different labels for the same thing. The literature lacks a standardized terminology if and how one distinguishes between the two terms. Most papers (if not all) use the terminology "cash flows" and make no reference to cash earnings, explicitly or implicitly. In doing so it seems that one should not generally equate cash flows to cash earnings. Such is my judgment at least. It is mostly based on the fact that authors seem to have in mind that the cash flows in question pertain to *current* cash flows, with no adjustment for capital expenditures. Jones's paper illustrates that; the average accrual is negative because it excludes the effect due to the average increase in PPE. Hence this paper does not embed a concept of cash earnings. Other papers deals with accruals much the same, though there are exceptions such as some of the more recent Sloan papers. It is my opinion that the cash earnings construct – with an emphasis on earnings – should serve as a starting point in any analysis of accruals, empirical or theoretical. Thus I maintain this perspective throughout, and I do not discriminate between cash earnings and cash flows.

The notation means that one identifies cash earnings as

$$\text{ca}(t) - \text{ca}(t-1) = \text{cash earnings}(t)$$

One trivially infers that

$$\text{oa}(t) - \text{oa}(t-1) = \text{accrual}(t)$$

In other words, the difference in non-cash assets (net of non-cash liabilities) identifies the accrual. As the last expression shows, it is inferred from assets/liabilities other than cash (and its approximate equivalents, positive or negative).

The above development disregards dividends and capital contributions. But such transactions do not change the analysis as long as both accounting schemes account for these the same. One modifies the definition of earnings by replacing ca(t) with ca(t) + net dividend(t), keeping ca($t-1$), oa(t) and oa($t-1$) the same. (There are no apparent reasons why the accounting for dividends/capital contributions should not be the same for the two earnings measurements.)

A delicate point must be noted. Because the arrangement embeds clean surplus accounting, each of the earnings measurements must be comprehensive. Any alternative approach would have to re-define the three ingredients in the foundation equation.[6] For example, one can try to identify how "other comprehensive gains/losses" impact on the 3 elements in the foundation equation. It should be doable. (That said, the literature does not provide clear guidance as to whether this is the right way to proceed or not.)

Though the relations impose discipline on how diverse pieces fit together, nothing has been said about what characteristics should identify a cash asset/liability as opposed to "other" assets/liabilities. This practical, and essential, topic is dealt with later. But there is of course substantial agreement on the differing nature of the two classes of assets/liabilities. Consider, for example, a balance sheet comprising the following prototype assets/liabilities: (i) cash, (ii) liquid marketable securities, (iii) inventories, (iv) net property, plant and equipment, (v) accrued expenses, (vi) accounts payable, and (vii) bank loans. Most people would then surely agree that (i), (ii) and (vii) fall into the category of ca(t). The liability (vi) may seem less than obvious, but it, too, should be part of ca(t) if it represents an outstanding liability as long as a definite amount of cash must be paid to extinguish the debt (in other words, its economic essence does not differ from a bank loan). The remaining assets/liabilities fall into the oa(t) category by necessity.[7,8]

The above development, simple as it is, lays bare that to add back depreciation and other so-called non-cash items to earnings are, at best, an around-about way when one construes cash earnings. The point reinforces that the *concept* of an accrual rests on a consistent classification of assets/liabilities in consecutive balance sheets, not on evaluating the line items in an income statement and finding their (non-) cash components. Moreover, to measure a GAAP accrual, there are no compelling reasons why one must turn to a statement of cash flows per GAAP. The simple balance sheet framework shows that an accrual construct hinges

[6] With the notable exception of Hribar and Collins (2002), the literature on accruals does not pay attention to this point. It leads to a slippery slope: the definition of earnings can vary widely across studies in their treatments of special items.

[7] To be sure, empirical studies that deal with accruals have often conceptualized measured accruals in ways that differ from the approach suggested in this paper.

[8] Textbooks, like Penman (2009) and many papers refer to NOA as representing "net operating assets". Does it correspond to oa(t)? The answer is a qualified yes. There are differences insofar that NOA tend to pertain to operations rather broadly, and thus it typically includes accounts receivable and payable plus even some portion of cash necessary to operate the business. I tend to think of oa(t) more narrowly like in Ohlson and Aier(2009). Now ca(t) includes (oa(t) excludes) all assets/liabilities that one can reasonably add/deduct from cash without losing information. Thus high quality accounts receivables and accounts payable are not treated as being accounted for via accruals. (The reader has to use his/her own judgment what makes the most sense.) At any rate, as Richardson et al. (2009) makes clear, many recent papers on accruals define the net accrual in terms of the change in NOA which of course in its essence does not differ from the accrual construct considered in this paper.

only on the idea that assets/liabilities can be split into two mutually exclusive yet exhaustive categories. To advocate otherwise at the very least demands some justification.[9]

The above assets/liabilities example illustrates what most accountants take for granted, namely that measurements related to cash assets/liabilities are less "ambiguous" than the remaining ones (oa). Cash assets/liabilities (ca) are relatively unambiguous insofar that their carrying values for (most) practical purposes approximate their market values. One can take this observation one step further and argue that cash assets/liabilities by definition are those assets and liabilities that generally match their market values. In contrast, all assets/liabilities falling into the oa(t) category have ambiguous carrying values: the accounting principles and their applications truly come into play (e.g., depreciation schedules, the equity method for unconsolidated subsidiaries, restructuring charges, pension liabilities, inventory accounting). There is no requirement that the carrying values of these other assets approximate their fair values or market values. In fact, the assets/liabilities comprising oa(t) would be no easier to deal with if one tried market (or fair) valuations because value-creating assets/liabilities are intrinsically illiquid. (At a minimum, one has to confront the relevance and practical meaning of net realizable value when the market is indistinct.)[10]

While the idea of splitting book value into ca(t) and oa(t) is predicated only on a basic understanding of accounting, implementations of the framework put the onus on judgments. To illustrate, consider accounts receivable. If these are of high quality – only an immaterial allowance for bad debts is needed – then they fit neatly into the ca(t) category. Under the circumstance they are in their economic essence similar to marketable securities; both can be sold with some ease for predictable amounts. A material balance in the allowance account relative to accounts receivable, in contrast, suggests that the net receivable is likely to be ambiguous; it naturally leads to an oa(t) classification. But the subjective nature of picking the appropriate cut-off point related to the percentage of allowance balance is unavoidable. Similar subjective judgments as to the ca(t) vs. oa(t) classification must be faced in case of assets such as finance receivables and more or less illiquid investments (like partnerships). Liabilities are no less problematic when it relates to cash estimates, such as obligations outstanding to employees and suppliers. An amount that seems relatively predictable tilts the classification in favor of a cash liability, of course.

3. The economics of accruals

The relations and observations so far deal solely with definitions, classifications and the structure of accounting. In no substantive way have we tackled what one may call "the information content" of accruals

[9] In much of the literature one finds that papers make no attempt at measuring the period's accrual in its totality. Instead, the idea is to focus on something referred to as the "current accrual". Thus one may consider the case when oa is split into two categories, $\{1, 2\}$. Let $\text{oa}(1, t) + \text{oa}(2, t) = \text{oa}(t)$, and similarly define $\text{accr}(1, t) + \text{accr}(2, t) = \text{accr}(t)$. One can then write $\text{ce}(t) + \text{accr}(2, t) = \text{earn}(t) - \text{accr}(1, t)$ where one can interpret the accrual term on the RHS as the current accrual. With some slight abuse of language one can then refer to the RHS as a calculation of "cash flows". Roughly, it can be thought of as corresponding to "cash provided from current operations" before depreciation and amortization. That said, one needs to keep in mind that it is implicit that there are other accruals that must be accounted for to derive cash earnings. (Just as one needs to keep in mind that it makes a difference if one considers comprehensive earnings as opposed to some other measure of earnings.)

[10] An elaboration of the word "ambiguity" helps to appreciate the operating vs. financial activities distinction. Ambiguous valuation of operating assets means that they interconnect and have a perceived value which is entirely idiosyncratic to a firm and depends on its strategic plan. These contextual use values are inherently very subjective. It leads to the imperative of transactions-contingent GAAP rules to generate carrying values for the balance sheet. Thus the income statement depends on the accrual – the change in the carrying values – though it is understood that the book values of operating assets do not in any real sense have much of a connection with the market values of operating assets, separately or in their totality. Cash assets and liabilities, in contrast, can be valued with less (or ideally no) ambiguity in that their use value and they are nowhere near as contextual and dependent on a firm's strategy. Thus the use of the word "ambiguity" is not to be thought of as "arbitrary", "non-nonsensical" or "best disregarded" or anything like it, but rather that contextual use values become exceedingly difficult to pin down from a balance sheet perspective. But that of course does not preclude that non-fair value rules can be quite useful in the measurement of earnings.

in combination with that of cash earnings. Interesting questions arise. What informational purpose do accounting accruals serve? Why recognize assets/liabilities with inherently ambiguous carrying values? Can one generally expect accruals to add to cash earnings without loss of information? Or are they more like apples and oranges?

Traditional accounting concepts speak to these kinds of questions by referring to two slightly different approaches: either one focuses on the end-of-period balance sheet or on the period's income measurement. Both approaches rely on the idea that accrual accounting countermands the deficiencies inherent in cash accounting when there are costly strategic activities that serve as the foundation for potentially creating value in subsequent periods.

From a balance sheet perspective, any reasonable concept of asset (liability) suggests that the lack of ambiguity of an asset's carrying value cannot be a requirement to recognize an asset. To invest in operations, firms must incur expenditures that are intrinsically difficult to value since their efficacy depends on the business strategy. But at least some of these expenditures offer expected future benefits in terms of subsequent sales, however ambiguous and hard to evaluate these connections may be. Such future benefits ought not to be dismissed and treated as a period expense if one looks for a more comprehensive picture of a firm's economic condition. In other words, assigning zero value to expenditures that generally enhance subsequent sales contradicts basic economics.

If one focuses on earnings measurement directly, then cash earnings alone mislead as a measure of performance when the company incurs expenditures that benefit the future. An adjustment in the form of an (net) accrual is now necessary insofar the firm has increased the size of its operations. After all, a firm cannot expand operations without disbursing cash or its approximate equivalent thereby reducing cash earnings; cash earnings decrease as the firm invests in the future in a one-to-one fashion if the presumption is the benchmark of zero NPV. In this way an accrual can be interpreted as having a one-to-one correspondence with growth. *More precisely, the oa(t)'s percentage increase equals accrual(t)/oa(t − 1); it serves as a measure of a firm's growth in operating activities. The sign of the accrual, accordingly, determines if a firm expands or reduces its operating activities.*

There is a subtlety involved that needs to be underscored. Why does the measurement of growth center solely on oa(t) as opposed to the total book value, oa(t) + c(t)? The answer requires an appreciation of traditional finance precepts with its demarcation of operating vs. financial activities. Within this framework other assets, oa(t), stands for operating assets. These are the assets that pertain to ex ante value creation – an inherently subjective and uncertain economic activity when it comes to assessing the likelihood of future success – thereby causing the ambiguity in the valuation of such assets. In contrast, the assumption is that changes in *cash* assets/liabilities are objectively neutral when it comes to forward looking value creation – zero NPV is implied – which is precisely why they are comparatively easy to account for. Unsurprisingly, carrying values for the cash and cash equivalent assets are close to their fair (market) values. In the spirit of Modigliani and Miller, *one naturally defines the cash assets/liabilities as the financial assets/liabilities because of their value creation neutrality*. Hence the cash (equivalent) assets/liabilities, and their changes, cannot tell us anything about the growth of the value creating activities. Any change in ca(t) adjusted for the net dividend – cash earnings – is of course influenced by operating activities, but that aspect does not bear on the change in the operating activities per se.[11]

The above discussion hints at the possibility that the accrual's magnitude should bear on the subsequent expected cash earnings (or cash flows, to follow the literature). Is such the case? On heuristic grounds the answer would seem to be "yes." After all, the accrual captures a net incremental investment, and one can think of this investment as increasing the expected future sales. With an unchanged margin, it follows indeed that one should expect improved cash earnings. This argument permits tightening; one can develop precisely how

[11] One can reasonably claim that this paper stretches language-usage insofar that it equates the accounting for operating activities with accruals and financial activities with cash-equivalence. Such a one-to-one correspondence is at variance with text-books in some respects. But these exceptions are minor. Thus here the understanding is that the accounting for, say, the amortization of a discount related to a bond is not an accrual. It is also understood that there is no cash necessary for operating purposes. In the grand scheme of problems discussed in this paper we believe this is reasonable. That said, one can certainly entertain refinements of the framework laid out in this paper.

an accrual forecasts future cash earnings. This can be done without making any reference to future sales (though this helps to motivate the conclusion).[12]

Readers familiar with the concept of "Free Cash Flows", FCF, may ask how a measure of cash earnings relates to FCF. To address this issue, two issues must be dealt with. First, FCF often classifies A/R and A/P as operating rather than financial. But this seems rather arbitrary, so one can assume that all qualifying cash assets/liabilities relevant for cash earnings coincide with financial assets/liabilities. Second, with this requirement in place FCF simply equals cash earnings adjusted for income/expenses related to financial activities. In particular, if one confines such expenses to interest items with a common interest rate, then *FCF equals residual cash earnings*.

4. Linking growth to accruals: A model

This section presents a stylized model of "proper" accruals. It formalizes that growth and accruals constitutes two sides of the same coin. Points made in the previous section should thereby be reinforced.

Let ce(t) denotes the current cash earnings (flows) for the period t and assume that these are paid out in dividends (to keep matters simple). Students of finance then learn that under perpetual, geometric expected growth the value of the firm follows from the well-known formula

$$V(t) = \text{ce}(t)(1+g)/(r-g)$$

where

g = growth rate (e.g., 0.04% or 4%))
r = discount factor (e.g., 0.1% or 10%)
$\text{ce}(t) = \text{ca}(t) - \text{ca}(t-1) + \text{net dividend}(t) = \text{cash earnings}(t)$

Accountants differ from finance theorists in that they focus on earnings, $\text{ce}(t) + \text{accr}(t)$, as the key input in the valuation as opposed to future cash earnings. Under idealized circumstances they have complete confidence in the accrual – it comes with no error whatsoever – so the earnings are also error free. The accountant can therefore refer to earnings capitalization to value the future cash earnings:

$$V(t) = [(1+r)/r][\text{ce}(t) + \text{accr}(t)] - \text{ce}(t)$$

[12] The literature suggests that a valid accrual should perform as a leading indicator of (or forecast of) subsequent cash earnings (or cash flows). The idea seems reasonable enough, though it's firming up is perhaps less so. Any modeling of how period t's accruals lead to $t+1$ cash earnings must confront that the future cash earnings interact with the same-period expected accrual. The point cannot be finessed. Future cash earnings depend directly on future growth in investments in operating activities; in turn the latter investment determines the future accrual. It gives rise to the question: as a matter of concept, how does the current accrual relate to future cash earnings when one allows for growth in the accrual? To answer this question, we need (i) an assumption on the meaning of a valid (or "properly measured", perfect) accrual, and (ii) an assumption on the significance of cash earnings in valuation. As to the latter, (ii), assume that the market value of operating assets is determined by the present value of cash earnings (to be sure, the market value generally differs from oa(t)). To keep the modeling simple, assume that the cash earnings are paid out in dividends. With respect to the first assumption, (i), assume that a perfect accrual satisfies $V(t) = [(1+r)/r][\text{ce}(t) + \text{accr}(t)] - \text{ce}(t)$ and where thus, per (ii), $V(t) = \text{PV}$ of expected cash earnings $= \sum_{\tau \geqslant 1}(1+r)^{-\tau} E_t[\widetilde{ce}(t+\tau)]$. (There is no need to specify the date t conditional information.) With these two assumptions in place, no more and no less, routine derivations lead to the dynamic $E_t[(\widetilde{accr}(t+1) + \Delta\widetilde{ce}(t+1)] = (1+r)(\text{accr}(t))$ The expression shows that the current accrual forecasts the change in cash flows plus an adjustment for the future expected accrual. In the special case when the expected accrual in the next period is zero (a no growth setting), then, and only then, does the current accrual forecast the change in the expected change in cash earnings (deflated by $(1+r)$). More generally, denoting the growth rate in operations by g (which can be information dependent so we could actually write $g(t)$), one obtains the answer to the question posed above: $E_t[\Delta\widetilde{ce}(t+1)] = (r-g)(\text{accr}(t))$ Note that at date t it may be the case that $r = g$. Now the RHS equals zero so that current cash earnings provide an unbiased estimate of next-period's cash earnings, regardless of the current accrual. A similar forecast also applies if the current accrual is zero, i.e., there has been no new net investment in operating activities. The concept of an accrual, as defined here, means the (net) accrual is equivalent to the (net) new investment in operating activities. To underscore this point, consider what explains the expected change in operating earnings: If $\text{ox}(t+1)$ denotes expected operating earnings (cash earnings plus accrual), then one readily shows that $\text{ox}(t+1) - \text{ox}(t) = r.\text{accr}(t)$. This relation is of course precisely what one should expect. One obtains this result without restrictions on the time-series behavior of accr(t), the point being that the model embeds no such restrictions.

This formula corresponds to the one used to value earnings from a savings account: earnings capitalized by $(1 + r)/r$ determine the cum-dividend value.

Can the accountant and finance student both be right? Yes: equivalence holds if and only if the accrual equals

$$\text{accr}(t) = g \times V(t)/(1 + g)$$

In other words, the accrual must emulate the growth in the expected cash earnings. (Routine algebra proves the equivalence). And note that as an approximation one can leave out $(1 + g)$ so that accr(t) is approximated by $g \times V(t)$. (The inverse of $(1 + g)$ is applied to $V(t)$ to estimate the start-of-period value of V, $V(t - 1)$.) The expression shows that the greater the growth, the greater the accrual and conversely.

Simple as the above model is, it does achieve the insight that, under idealized conditions, ce(t) and accr(t) add without loss of information. Knowing earnings suffices to infer the cum-dividend value of the firm, yet one cannot infer the accrual or cash earnings. (In general, the dividend need not equal the cash flow, in which case one cannot infer the two components of earnings.)

As an obvious implication of the model, *cash accounting measures earnings without error if and only if the firm is in a steady state, $g = 0$.* Thus one can think of a steady state as a condition when there is no need for an accrual. These observations build in the so-called cancelling error property: zero growth corresponds to no change in the oa(t) and hence the magnitude of oa(t) = oa($t - 1$) itself is irrelevant when one measures earnings. As we will see in the following sections, the no growth benchmark can usefully guide practical financial statement analysis.

5. Accruals and the quality of earnings

While the above modeling may help us appreciate the economics of accruals, the real world is of course far messier. There is no such thing as a true and observable accrual, but rather a sense that an accrual can misinform as well as inform depending upon circumstances. Practical financial statement analysis has long recognized the problems inherent in GAAP balance sheets and the accruals embedded in income statements. Because the operating asset's carrying values are intrinsically ambiguous, there is undeniably a sense that GAAP accounting can result in distortions and misinformation. The reasons for potential misinformation are diverse. They include the sheer complexity of accounting rules, and perhaps even malevolent management intentions. In the latter case "earnings management" tends to be the standard terminology. Thus financial analysts become aware that "earnings management" can lead to misleading earnings through the accruals. In research one often finds references to "discretionary" accruals, which is of course what Jones's model aims at. But this behavioral aspect should not be exaggerated. No less important are GAAP-consistent non-recurring charges that can have a very material effect on current and subsequent accruals, especially when these charges involve no cash. (A write-off reduces the current accrual and increases subsequent accruals, of course.) Because of potentially inherent deficiencies in GAAP, misleading accruals should not be ruled out even in the case of honest managers. The point deserves pondering insofar that much of the literature puts the onus on managers when accruals have undesirable properties.

Early on the paper emphasized that accounting relies on accruals because at least some assets/liabilities do not adequately connect with (approximate) cash values or, as accountants tend to put it, fair values. This observation may suggest that the problems with accruals can be traced to the lack of fair valuations for all assets/liabilities. Such a claim, however, is at best misleading: deviations from this presumed ideal should not be thought of as the source of erroneous accrual measurements. Such reasoning puts us on the wrong track because it suggests that "good" accounting is founded on fair market valuation. Traditional accounting rejects this approach because of its emphasis on income measurement; it builds on historical cost accounting including its extensions that stipulate realization principles for revenues and profits.

Nor does the degree of (or lack of) balance sheet conservatism act as a material culprit when an accrual misleads. The substantive issue revolves around the extent to which there is a *change* (date t compared to date $t - 1$) in the degree of conservatism. Increasing the *degree* of conservatism improves the quality of earnings and conversely when it is decreased.

Financial statement analysis teaches that overestimates of earnings tend to be followed by understatements and conversely. This observation in essence captures accrual reversals. It can also be thought of as being no different from overstatements and subsequent understatements of reported growth in net operating assets, which in turn reflects the "quality of earnings." Thus it becomes clear that, (i) understanding the characteristics of the period's accrual is necessary and arguably sufficient to understand a firm's operating income, and (ii) one needs to focus on changes in the degree of conservatism not the degree of conservatism itself, a point developed below. And as one thinks about the quality of earnings one must always keep in mind that the relevant construct – the validity of the growth in oa(t) – disregards the cash & (approximate) cash equivalent assets/liabilities. This aspect appeals because such easy-to-value assets/liabilities cannot be a source of misleading accounting (assuming no auditing type problems).

Of course, the "correct" oa(t) are never observable, and more importantly, nor is the "correct" oa(t) − oa($t-1$) or growth in oa(t) observable. It still helps to conceptualize the ideas of quality of earnings and reversals in terms of the correct oa(t). The motivating algebra runs as follows.

Suppose the oa(t) are correct and that these grow at a steady rate, $g > 0$. Consider next, two periods that end at dates $t+1$ and t, respectively. Now suppose the reported oa(t) exceeds the correct oa(t). It follows trivially that the observed period $t+1$ growth is less than g, whereas the observed period t growth is larger than g. In this sense the low quality of earnings builds in a reversal in accruals. As an interesting special case, noted earlier, if the true g equals 0, then any accrual acts as "pure noise" and negative accruals are followed by positive ones and conversely. Thus one can safely say that the accruals should be regarded as uninformative. A steady state setting thereby serves as an easy to appreciate case when accruals are both non-informative and negatively serially correlated.

Balance sheet conservatism does not by itself bring on measurement biases, provided that the extent of conservatism has been consistently applied across dates and the focus is on growth itself. To demonstrate this, suppose one scales the oa(t)'s with a constant, $k > 0$, which serves as index of lack of conservatism. In other words, write $k \cdot \text{oa}(t)$ so that the accounting is more conservative in relative terms as one decreases k. It is readily seen that the growth rate in operating assets remains the same for all k, that is $[k \cdot \text{oa}(t+1) - k \cdot \text{oa}(t)]/k \cdot \text{oa}(t)$ does not depend on k. More generally, without resorting to an index scalar, the quality of (operating) earnings for period $t+1$ is poor if and only if the degree of conservatism has decreased, date $t+1$ compared to date t. This analysis changes somewhat if one shifts the attention from a growth perspective to one which scales the difference oa($t+1$) − oa(t) by a constant. Now there will be an effect: the accrual decreases as the degree of conservatism increases. However, within practical bounds this effect is relatively small (and the sign remains intact). Thus the substantive quality of earnings issue reduces to the extent there has been a change in the degree of conservatism from one period to the next.

6. How to conceptualize accrual biases as a practical matter

The notion of an under- or overstated accrual suggests, at least implicitly, that there is something like an accurate, or at least more accurate, accrual. The claim is awkward since the degree of accuracy in accruals is never observable, no matter how much time has passed. Shall we then overlook what good/bad accounting is all about and accept that one has to live with the accruals as provided by GAAP? The answer to this question, I think, must be a resounding "no": practical financial statement analysis will always be concerned with accrual biases because over time overstated accruals reverse. It leads to the saying "the (operating) earnings reported for the current period can be a poor indicator of what will be reported in the future due to the current/past accruals."

So, how do we assess the degree of bias, or the potential for future reversals, in any GAAP accrual? To answer this question one tries to make the most of the accrual and growth connection.

Two separate steps show the way to an estimate of a competing accrual. First, one estimates the current value of the firm's net operating assets, which thus second guesses the actual accounting oa(t). Let est_oa(t) denote this estimate. Second, one estimates the current growth independently of the current growth in oa(t). Independence is essential since the presumption is that the actual accrual, oa(t) − oa($t-1$), may differ from its "true" measure. Let Γ denote an independently estimated growth in operations. The product of the two terms then yields an estimate of the "appropriate" accrual, which competes with the one implied by GAAP. Put

more bluntly, this two-step procedure is intended to second guess the GAAP accrual under the maintained hypothesis that this accrual could be misleading: the sign and difference between the estimated accrual vs. the GAAP accrual establishes the accrual bias or "the quality of earnings" conclusion.

As to the first step, the est_oa(t) term, it may seem natural to estimate it using a firm's market capitalization adjusted for ca (net financial position). But this approach has the drawback that it essentially presumes that the accounting is unbiased as opposed to conservative (from a balance sheet perspective). Under such circumstances the estimated accrual will not be directly comparable to a GAAP-based accrual since GAAP embraces balance sheet conservatism. In addition, one can also argue against this market value method because it presumes rational pricing (an "efficient" stock market); it puts the cart in front of the horse since the financial analysis tries to assess whether the price differs from the firm's intrinsic value. These objections suggest that it makes more sense to use accounting based estimates of est_oa(t). Obvious candidates are GAAP's net oa(t), or some combination of oa(t) and oa($t-1$). Of course these numbers can be viewed as being in error due to misapplications of GAAP, or problems inherent in GAAP itself, but the percentage error should generally be manageable in the scheme of things. The approach actually provides a more critical advantage. It addresses the quality of earnings issue solely focusing on whether the actual growth in oa is too large/small relative to an independent estimate of the growth in oa, namely Γ.

What about the second step, estimates of Γ? Here the current growth in sales revenues serves as a natural candidate. It is reasonably similar in concept to the Jones model of non-discretionary accruals, which in turn originates from traditional FSA analysis: the growth in (operating) earnings is of low quality whenever it exceeds the growth in sales. In other words, generally speaking, an improvement in a firm's profit margin does not give the same warm feeling as when a firm grows its sales, though both of these changes lead to improved earnings.[13]

Using sales growth as an estimate of Γ one can estimate a GAAP-competing accrual:

$$\text{accr}(t) = \text{growth in sales}(t) \times \text{est\_oa}(t)$$

where est_oa(t) is either

$$\text{oa}(t)/(1 + \text{growth in sales}(t))$$

or

$$\text{oa}(t-1)$$

or some weighted average of the two numbers.

To measure the growth in operating activities using sales growth does not necessarily work all the time, of course. A company that changes its marketing strategy from high margin/pricing to low margin/pricing will increase its sales without increasing its investments. So the idea of measuring growth via sales revenues is by no means perfect, and, in fact, somewhat arbitrary unless one believes that the there has been no (material) change in the "true" profit margin. This observation concerning the limits to using sales growth suggests that it can be worthwhile to consider alternative methods that estimate Γ.

What are the alternatives to sales growth? Because Γ refers to growth of the operating business, one may consider the growth in capital expenditures as a growth anchor. This approach would seem to be quite workable as long as one can postulate that in the previous period the capital expenditures were normal relative to sales. But this presupposition may be hard to validate, and the capital expenditures in the previous year may have been exceptionally small in which case the estimated growth will be biased upwards. To handle this objection one may consider measuring growth by looking at capital expenditures (net, the current period) relative to the depreciation incurred. More general procedures that averages over the past capital expenditures and

[13] When it comes to accounts receivable, the so-called "modified Jones model" makes an adjustment in the major independent variable, change in sales (normalized by total assets) to recognize the potential accrual classification of accounts receivable changes. In paper after paper, the Jones model is reconfigured by deducting the change in accounts receivable from the change in sales. It seems like an odd reconfiguration; rather than taking the change in accounts receivable, and deduct from the change in sales, it should of course be the change in the change in accounts receivable if one wants to obtain the change in cash sales. (Analytically, the correction to change in sales should be $(\text{AR}(t) - \text{AR}(t-1)) - (\text{AR}(t-1) - \text{AR}(t-2))$.) It also seems as if one ought to make an adjustment for deferred revenues.

depreciation charges can also be devised in attempts to measure the "appropriate" or "better" accrual via a measure of the underlying growth in the operating business.

The problem of second-guessing a GAAP-based accrual with one's own measurement is an intrinsically hard problem. We can never know if we are coming up with something better. That said, sometimes we have good reasons to believe the GAAP accrual is potentially materially distorted, as is the case when we believe that the company is, or has been, applying so-called "big bath" charges. Now one's own estimate of an accrual might well be an improvement. But ultimately this, too, is plain conjecture unless one evaluates its usefulness empirically.

7. A discussion of methodologies that assess accruals empirically: Stock price based approaches

Suppose we can agree on how to classify the assets/liabilities into their two kinds without controversy. Suppose further we have some measure of accruals, either via GAAP or, say, some estimating procedure like growth in sales times oa($t-1$). Can we then evaluate if the accrual measurements are informative? I think the answer is a qualified yes. It has to be qualified insofar that one has to buy into some criterion as to what the desirable properties ought to be.

The accounting literature offers a number of possibilities as to how one assesses the usefulness of accruals. In the spirit of Sloan's early paper, as a first possibility one may consider whether GAAP accrual measurements allow us to make money in the stock market. (One could also do this for non-GAAP estimates of accruals.) This criterion suggests the back-testing of portfolio strategies on the basis of accruals.[14] For example, one can calculate accrual-to-price ratios, keep cash earnings to price ratios constant, and then evaluate the returns for portfolio strategies that use this scheme to select long vs. short positions. As Sloan's empirical results suggest, superior returns might well be available, and, if true, this state of affairs is obviously of great practical interest (to put it mildly).[15] From a more academic perspective, however, this approach seems doubtful insofar that it runs counter to the disciplining hypothesis that the stock market is efficient. A delicate issue lurks in the background. The possibility of making excess returns depends on the accrual being misleading so that the market potentially gets "deceived" and prices thereby become inefficient. But to say that an accrual is useful because others misinterpret the accrual does not deal with whether the accrual is informative in a more traditional sense that presumes homogenous and "accurate" beliefs.

There is no need to rely on investment strategies and the forecasting of returns to assess the utility or role of accruals, whether GAAP or not. The huge literature on "value-relevance" can also guide the research. Specifically, accounting researchers conventionally rely on (cross-sectional) returns –earnings regressions to examine the value-relevance of earnings and its components. (The returns, earnings and any other variables on the RHS, are contemporaneous; the start-of-period price scales the RHS variables.) Applying such value-relevance methodology, one can thus regress annual cross-sections $r(t)$ (market returns) on two variables, cash earnings and the estimate of the accrual (or, as a competing alternative, the GAAP accrual). One can then declare a degree of success if both the estimated coefficients achieve statistical significance and they exceed one. Greater than one is essential since it shows that a dollar of cash and a dollar of earnings are at least worth a dollar in the market. An even better result is obtained if additionally the estimated coefficients are (approximately) the same for the two independent variables. Such a finding means that *the two earnings components aggregate without loss of information*, an essential feature of "good" accounting.

One can also consider an accrual construct based on a model that competes with a GAAP-based accrual. In such a regression the related two independent variables, cash earnings and the model accrual, one can hypothesize that the related R^2 exceeds those that are associated with GAAP earnings or a regression with cash earnings plus GAAP accruals on the RHS. If significant, the result points toward the model accrual being more informative than the GAAP accrual. Yet another horse race between a model based accrual construct

[14] From this observation it should be apparent that one cannot practically distinguish the accrual anomaly from the so-called "investment anomaly". Richardson et al. (2009) discuss the investment and accruals anomalies and their close connection.

[15] The growth-accrual connection makes it presence felt in evaluations of the (Sloan type) accrual anomaly: can it not instead be a growth stock anomaly? See in particular Fairfield et al. (2003) and the review paper by Richardson et al. (2009).

and GAAP accruals puts these two accrual variables combined with cash earnings on the RHS of the regression to explain returns. One then evaluates which of the two competing accruals contributes the most to the R^2.

Is it likely that model accruals work better than GAAP accruals in regressions explaining returns? It is hard to say, especially since there are more than a few devils in the details, i.e., how to measure the cash earnings and the estimated model accrual. There are also all kinds of specification issues, like the role of expectations and other potential confounding variables. But it certainly would seem to be worth a try to pursue these kinds of research hypotheses.

What about the possibility that the R^2 is disappointing because the stock market happens to be, in fact, inefficient? To handle this problem one can simply add yet another RHS variable to the returns-earnings-accruals regressions, namely, the subsequent period's market return, $r(t+1)$. This additional variable will filter out the noise in the contemporaneous returns-earnings regression due to any market inefficiencies as manifest in the predictability of future returns.[16]

8. A discussion of methodologies that assess accruals empirically: Without reference to stock prices or returns

Sloan and others consider the problem of how one tests empirically whether (GAAP) accruals appropriately inform investors without referring to stock prices (or returns). He argues that GAAP accruals tendency to reverse requires a separation of accruals and cash flows when one forecasts subsequent earnings. Specifically, because accruals hypothetically have lower persistence than cash flows, in the forecasting equation the accrual should have a lower weight as compared to the weight on cash earnings. The idea exerts a pull in financial analysis since it suggests that accruals can misinform if added to cash earnings. Having said that, one still has to keep in mind that the setting is not as straightforward as one would like because a cross-sectional setting requires a deflation of the variables to adjust for size. Sloan picks total assets as the deflator variable. One can thus think of Sloan's approach as addressing a practical problem that forecasts ROA using two independent variables, current cash earnings deflated by total assets and the current accrual also deflated by total assets. As a drawback, the forecasting of ROA does not seem to be prominent in practice.

Focusing on practical problems, one may consider forecasting the change in firms' (operating) profit margins per GAAP. It is of obvious practical interest since analysts tend to forecast operating earnings via a forecast of sales growth combined with an (operating) profit margin. But this forecasting perspective also addresses the issue of the quality of (current) earnings. If current earnings can be identified as of poor quality, then such an evaluation leads to the forecasting of a decline in the future profit margin. Thus the operating profit margin can serve as a useful dependent variable because it confronts the quality of earnings issue head on yet it is also of practical interest. And now one naturally extends the analysis to check whether competing accruals (like those previously discussed) can aid in the forecasting of the change in the operating profit margin. To be specific, does the difference between a GAAP accrual and a model accrual facilitate the forecast of change in the GAAP profit margin?

9. Assessing reversals empirically

The profit margin comprises two parts: the cash margin (cash earnings scaled by sales) and the margin due to the accrual component. This simple observation suggests that one can evaluate whether the accrual component has a negative serial correlation, i.e., it reverses. (One can use a linear model or an n by n contingency table to evaluate this empirical hypothesis). This analysis looks reasonable enough, yet it is unsatisfactory in a cross-sectional setting. The reason is that for growing firms one should expect positive accruals to be followed by positive accruals; for non-growth firms low accruals should be followed, on average, by low accruals. This merely amounts to saying that the reversal property in the accrual margin does not fit a cross-sectional mode

[16] If one assumes market efficiency in its weak form – the market returns are serially uncorrelated, $\text{corr}[r(t+1), r(t)] = 0$ – then $r(t+1)$ on the RHS in the regression loads if and only if it correlates with the remaining variables (date t) on the RHS. Hence the market is not efficient in the so-called semi-strong form since date t variables correlate with the subsequent returns. The general problem of value relevance and correcting for inefficient markets is extensively discussed by Aboody et al. (2002).

of analysis because there has been no adjustment for trends varying in the cross-section. In other words, looking at accruals over two adjacent years for a large number of firms cannot tell us much about reversals. Statistical power has been lost.

So what can be done if we want to analyze reversals in a cross-sectional setting? Answer: we need a model of what a firm's accrual *ought to be* in any given period. Thus, to implement the statistics, one relies on the observation

$$\{\text{accr}(t) \text{ per GAAP}\}/\text{sales}(t) \text{ minus } \{\text{accr}(t) \text{ per Model}\}/\text{sales}(t)$$

where the "per Model" corresponds to what was discussed in a previous section, namely, in a base case, put accr(t) per Model = growth in sales(t) · oa($t-1$). In this way of looking at the problem, under the alternative hypothesis the reversal direction of the GAAP accrual can be assessed by looking at the sign of the actual accrual minus the model accrual; pluses are followed by minuses and conversely (on average). Now one has a framework to examine the reversal in a cross-sectional setting, but at the "cost" of having to maintain an assumption on how the "correct" accrual should be measured.[17]

Another, perhaps more direct, approach simply looks at the growth in oa(t) per GAAP and uses growth in sales as the benchmark. Thus the unit of observation for purposes of statistics reduces to

$$\{\text{oa}(t) - \text{oa}(t-1)\}/\text{oa}(t-1) \text{ minus } \{\text{sales}(t) - \text{sales}(t-1)\}/\text{sales}(t-1)$$

A hypothesis of reversals now implies that these observations have a negative serial correlation: negative values tend to be followed by positive values with a probability greater than 50–50. And this test can be applied for any 2 adjacent years in an n by n contingency table or, alternatively, as a simple (rank) correlation. This way of looking at reversals takes us back to very traditional FSA: The change in a firm's so called asset – turnover provides an indicator of the quality of earnings.[18] A drawback with this approach is that it may not work well when sales relative to oa is large; it could create excess volatility in the growth in oa as compared to the growth in sales. And of course, there are issues involved insofar the oa-growth should precede the sales growth; an assumption that the two growth measures should move contemporaneously may be too stringent.[19]

Should one conclude predictable, and material, reversals in GAAP's accruals reflect either earnings management (in the spirit of Jones's "discretionary accruals") or poor accounting standards? As to earnings management, I think not. As to poor accounting standards, I think at most "maybe". The point that needs to be appreciated is the possibility of non-recurring items (or special items to use a different jargon). These items can of course be present in both accruals and cash earnings (not to mention earnings), but there are good reasons to hypothesize that they are much more pervasive in accruals than cash earnings due to write-offs and restructuring charges. If such is indeed the case, then it makes sense to hypothesize that the non-recurring items have a material impact and possibly compel empirical results in favor of a reversal conclusion. But special items do not necessarily reflect earnings management since they generally are consistent with GAAP. And they reflect "bad" accounting only if one now buys into the prior proposition that GAAP is too lenient when it comes to the use of special items. Stated somewhat differently, if one makes the case that sound accounting should leave ample room for non-recurring items when one accounts for operating activities, then there are reasons to expect that the period's net accrual reverses.

10. Some implications for future research

As noted in the introduction, it is outside the scope of this paper to critically evaluate the (essentially empirical) literature on accruals. The task would have been as formidable as tricky insofar that it is all too easy to

[17] More generally, the probability of seeing a negative GAAP-accrual minus model accrual should depend on the extent to which there has been a positive observation not only in the previous period but also in periods prior to the previous one.

[18] Changes in ATO (sales divided by oa) acting as a leading indicator of changes in earnings haves been assessed by Fairfield and Yohn (2001). Again, many papers dealing with FSA issues can be thought of equally well as dealing with accrual reversals.

[19] One can ask whether reversals in accruals relate to Basu's concept of (conditional) accounting conservatism. Though the analysis needs to be worked out, it would seem so. The reason is that bad news tends to correlate with write-offs, and write-offs lead to significant negative accruals (on average), which in turn would clear the deck for subsequent positive accruals.

slip into discussions of issues that are relatively minor in the overall scheme of things. It is probably more worthwhile to look toward future research. In this spirit I will state what I view as some of the more significant implications related to previous discussions. I do not claim novelty; no doubt a careful literature review will find papers that come very close to making arguments not all that different to those stated below. My choice of points made depends primarily on the extent I believe they can usefully guide research on accruals without concern given to specific topics.

- In dealing with accruals it makes sense to always use, as a starting point, the framework that recognizes comprehensive earnings and (comprehensive) cash earnings as reconciling with the net accrual. To implement this approach it helps to clarify which particular assets/liabilities have been classified as cash vs. those that are operating. Following that a researcher may well introduce some measure of "cash flows" to distinguish these from cash earnings. Thus a researcher may, for example, concern herself with "cash provided by current operations" (as he/she chooses to define it) and in a complimentary fashion identify the related accruals. This approach should paint a coherent picture; it allows a reader to see more clearly the construct and measurements that motivate the research design. From a broad perspective, the issue at hand is: what should be the generally understood framework when dealing with accruals? If comprehensive earnings and cash earnings are not the core ingredients, then what makes more sense?
- Researchers help readers by making it clear whether they rely on the "apples" and "oranges" metaphor to set the stage for the research question. In other words, is it crucial that the accruals and cash earnings may not add because it would lead to significant loss of information? If this theme is expanded on, like in research settings that bear on value relevance or market inefficiency, a researcher can effectively communicate research objectives or maintained hypotheses. It also helps if the researcher spells out whether the apples & oranges dichotomy depends on a particular context (such as the presence of write-offs or a firm going to the capital market to obtain additional financing) or applies more broadly.
- In case there is a need to deflate/scale accruals or cash earnings, a firm's sales revenue seems preferable to its total assets. The argument here is that a firm's (operating) profit margin is of great interest in the financial community. The same cannot be said for ROA. Moreover, the forecasting of the profit margin, and its two components (cash margin and accrual margin), in terms of current accrual diagnostics can become part of quality of earnings research. It also naturally complements growth in sales which plays such a crucial role to understand the cash earnings/accrual mix.
- Research that concerns itself with "bad" accruals, such as "reversals" and "quality of earnings" issues, can help the reader by suggesting how one might measure an accrual so it becomes more informative. That is, this task addresses what effective financial statement analysis should look like as a practical matter. The research can also spell out why, or why not, it makes sense to evaluate competing accruals as to their information content or other properties.
- A researcher helps a reader by stating whether the setting invokes a perspective where the measured accrual corresponds to a measurement of the growth in a firm's operating activities, and operating activities alone. It is a matter of avoiding confusion since one can reasonably argue that, in fact, there are accruals related to financial activities.
- Finally, given the enormous increase in the literature on accruals and the high likelihood of seeing no abatement in the future, it helps if the researcher spells out his/her concept of an accrual and how it may differ from alternative uses of the term. Nobody has a monopoly on how to use accounting jargon, and thus the need for clarity has escalated as the literature has grown.

11. Concluding remarks

Most discussions of accruals tend to have a negative tenor and rarely do they fail to mention the dangers of interpreting accruals as cash equivalents. In an extreme view accruals purportedly act as "noise" due to the arcane/arbitrary historical cost accounting rules inherent in GAAP: as a consequence accruals are best dismissed. Finance texts occasionally still espouse this view, though of course most accountants would argue

otherwise. While academic accountants generally admit that accruals can be misleading, on average accruals provide useful information as indicators of future cash flows and earnings that go beyond the information in current cash earnings. As Sloan and many others have argued, the-numbers-do-not-add qualifier means that financial analysis benefits from splitting earnings into their cash earnings and accrual components. That said, it is well to note that at least in principle one can visualize a third perspective, namely accruals that do not reverse; in other words under such idealized conditions accruals add to cash earnings without loss of information. How to implement such accounting is an open question, though I hope some of the points made in this paper provide a sense of direction about how it may be done. It goes to the heart of accounting when it works at its best: what does it take to ensure that the bottom line need not be split into components? The question would seem to be interesting not only as a matter of accounting theory but also as matter of dealing with quality of earnings issues. To appreciate this third perspective on accruals, one can even consider a fourth possibility which is rarely hypothesized. Under some circumstances one can argue that earnings should be split into its two components because a dollar of an accrual is worth *more* than a dollar of cash earnings. This possibility arises in settings with conservative accounting and growth in expected operating assets.[20]

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[20] Feltham and Ohlson (1995) provide sufficient assumptions.

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Board affiliation and pay gap

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ABSTRACT

This paper examines the effects of board affiliation on the corporate pay gap. Using a sample of Chinese listed firms from 2005 to 2011, we find that boards with a greater presence of directors appointed by block shareholders have lower pay gaps. Furthermore, the governance effects of board affiliation with and without pay are distinguished. The empirical results show that board affiliation without pay is negatively related to the pay gap, while board affiliation with pay is positively related to the pay gap. Overall, the results shed light on how block shareholders affect their companies' pay gaps through board affiliation.

1. Introduction

Compensation packages are an important part of a modern company's incentive system. Most relevant research has focused on examining the level of executive pay and the different components of executive compensation, while ignoring further discussion about a company's pay gap. Originally, the pay-gap phenomenon could be chiefly explained by tournament theory. That is, an appropriate pay gap increases employee motivation and productivity. However, in recent years, company pay gaps have continuously widened, which appears to be due to company executives manipulating the formulation process of compensation to increase

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their salaries beyond the optimal level (Bebchuk and Fried, 2003). According to the executive-power theory, executive misuse of their power to obtain excessive pay has a series of negative economic consequences, such as the failure of salary–incentive mechanisms and a decline in overall company performance (Bebchuk et al., 2011).

Within the ongoing development of the Chinese economy, the compensation received by executives in Chinese companies is increasing rapidly and company pay gaps are widening. For example, the 2010 annual report of China International Marine Containers (Group) Ltd. (stock code 000039) indicates that the company's largest compensation package of that year was 6.0 million RMB yuan, while its average annual employee wage was only 65,800 yuan. In 2011, the highest executive compensation reached 9.6 million yuan, while the average annual employee wage was only 78,600 yuan. The company's pay gap thus increased between 2010 and 2011, from a highest 90 times of the average employee pay, to a highest 121 times of the average employee pay. When considering the possible negative effect of the pay gap, it is necessary to determine whether the company's governance mechanisms are able to effectively reduce its pay gap and ease the agency problem during the process of formulating compensation packages.

In China's specific institutional setting, block shareholders are entitled to appoint personnel to listed companies as directors. This is one of the major ways for block shareholders to supervise company executives. Once the block shareholders of a company have realized that an agency problem is affecting the salary-setting process, they appoint certain personnel as company directors responsible for supervising executives' opportunistic behavior. However, the governance effect of board affiliation may differ substantially due to differences in receiving compensation. Currently, the directors appointed by block shareholders may either receive or not receive pay from the listed companies for which they work. Salaried directors appointed by block shareholders are more reliant than their non-salaried counterparts on the executives of the listed company, which may reduce director independence and thus impair the efficiency of their executive supervision. In contrast, non-salaried directors appointed by the block shareholders are more independent, better able to represent the interests of block shareholders to supervise executives, and ultimately achieve a better supervision effect. As a result, only non-salaried directors appointed by block shareholders can help significantly to ease the agency problem and reduce a company's pay gap.

Using a sample of Chinese A-share listed firms from the 2005–2011 period, we examine the effects of the company-governance mechanism of board affiliation on the pay gap. Following other studies on this topic, we interpret the pay gap between executives and employees, and the pay gap among executives as proxies for the pay gap (Bu and Peng, 2010; Banker et al., 2011; Kato and Long, 2011). We measure board affiliation using the ratio of the number of directors appointed by block shareholders to the total number of directors on the board (Yeh and Woidtke, 2005; Chen et al., 2013). We also examine the different roles of salaried and non-salaried directors appointed by block shareholders. We measure the proportion of salaried directors as the ratio of the number of salaried directors appointed by block shareholders to the total number of directors on the board. We measure the proportion of non-salaried directors as the ratio of the number of non-salaried directors appointed by block shareholders to the total number of directors on the board.

Consistent with our prediction, we find that board affiliation is negatively related to the pay gap. Furthermore, the results show that a greater presence of salaried directors appointed by block shareholders is associated with a higher pay gap, whereas a greater presence of non-salaried directors appointed by block shareholders is associated with a lower pay gap. These findings still hold when tested with a two-stage regression model, so endogeneity issues are less likely to bias our empirical findings.

Next, we investigate certain factors that may affect the relationship between board affiliation and the pay gap. We begin by examining whether differences in product market competition affect how board affiliation reduces the pay gap. If a firm uses its pay gap as an incentive mechanism and the product market is highly competitive, the salaried directors appointed by the firm's block shareholders will increase the pay gap to stimulate executives to work hard. However, under the same conditions, non-salaried directors appointed by block shareholders will decrease rather than increase the pay gap. We find that the governance effect of board affiliation on the pay gap is particularly prominent in industries in more competitive product markets.

Second, we investigate whether differences in ownership affect the extent that board affiliation reduces the pay gap. The results indicate no significant differences in the effects of salaried and non-salaried directors appointed by block shareholders on the pay gap between state-owned and non-state-owned enterprises. This

implies that pay-gap issues resulting from the agency problem receive considerable attention from block shareholders in both state-owned firms and non-state-owned firms.

Third, as controlling and non-controlling shareholders may have different motivations for appointing directors, we separately examine the effects on the pay gap of directors appointed by controlling shareholders and those appointed by non-controlling shareholders. We find no significant difference in the governance function of board affiliation between controlling shareholders and non-controlling shareholders.

Finally, we determine whether different administrative duties affect the extent to which board affiliation reduces the pay gap. We distinguish between the administrative duties of the highest-paid executives and investigate the relationship between board affiliation and the pay gap in each case. The results suggest that differences in administrative duties do not affect the governance function of board affiliation.

This paper contributes to the literatures in the following ways. First, it offers supportive evidence on company pay gaps. For example, Bebchuk et al. (2011) find that executive pay gaps are associated with lower firm value and lower future cash flows. Our results suggest that the presence of non-salaried directors appointed by block shareholders decreases the pay gap. Second, our study provides implications for research on board affiliation. For a sample of Japanese companies, Colpan and Yoshikawa (2012) investigate the governance effect of directors appointed by block shareholders on the agency problem. Our paper adds to the literature by using a sample of Chinese listed firms and explores the different roles of salaried and non-salaried directors appointed by block shareholders.

The rest of the paper proceeds as follows. In Section 2, we review the relevant literature. In Section 3, we develop hypotheses based on an analysis of the institutional background. In Section 4, we describe our sample, variables and research design. In Section 5, we present our empirical results and analysis. Section 6 concludes the paper.

2. Literature review

Recently, the rapid growth in executive compensation has caused company pay gaps to bigger. Bebchuk and Grinstein (2005) examine the changes in executive compensation in U.S. listed companies from 1993 to 2003, and find that the growth in executive compensation during this period was much higher than company growth in terms of size and performance, with the growth in CEO compensation exceeding the total growth in the compensation of executives at the second, third, fourth and fifth levels. Specifically, the proportion of CEO compensation in the total compensation received by top-five executives increased from 39% in 1993 to 43% in 2003. Li (2011) examines 1993–2006 data on executive compensation in U.S. capital-market listed companies and finds that the difference between CEO compensation and No. 2 executive compensation increased from 40% in 1993 to 60% in 2006. Using a sample of Canadian listed companies during 2000–2005, Sapp (2008) reports that within this six-year period, the pay gap between CEOs and other executives doubled. Investigating Chinese listed companies in 1999 to 2000, Lin et al. (2003) report that the compensation received by CEOs was 1.43 times greater than the compensation provided to other executives. The pay gap has also expanded after 2001, with CEO compensation 2.328 times that of other executives' compensation in 2009.

In addition to the widening pay gap among executives, the pay gap between executives and employees is also expanding. Hall and Murph (2003), using S&P500 firms as their sample, report that executive compensation increased from 30 times that of other employees in 1970 to 1990 times in 2002. Studies on Chinese listed companies describe a similar phenomenon. The proportion of companies with the pay gap within five times is declining, while the companies with the pay gap more than eight times increased from 10% to 24.53% (Zhang, 2008). In a recent study, Liu and Sun (2010) find that the absolute pay gap between executives and employees in state-owned enterprises reached 290,000 yuan in 2007, which is almost double the pay gap in 2004. Thus, the expansion of company pay gaps now seems to be a common worldwide phenomenon.

"Tournament theory" has been used to explain the effects of the pay gap. This theory explains that increasing the pay gap can help enhance executives' enthusiasm for work, reduce supervising costs and ultimately improve corporate performance. When a company designs a compensation package based on tournament theory, the level of executive compensation depends on relative performance rather than absolute performance. As a result, the pay gap gradually increases as promotions occur (Lazear and Rosen, 1981; Rosen, 1986). This kind salary structure can have a positive and incentivizing effect on executives, prompting them to exert more

effort to compete for better positions. However, as economic activities have become more complex and supervising executives has become a more difficult and costly process, companies' need for an internal pay gap has increased. An appropriate pay gap can help to reduce opportunistic behavior among competitive executives, therefore reduce supervising costs. Research in this area has also addressed the necessity of a company pay gap from the perspective of internal CEO candidate structure and CEO succession risk (Schwarz and Severinov, 2010). With these criteria in mind, an internal pay gap is one of the most important means for a company to motivate employees and attract the talents, making it a form of valuable expenditure that shareholders are willing to accept. It can thus have a positive effect on company performance.

However, the phenomenon of the continuously widening pay gap has in recent years led people to reflect and sometimes cast doubt on the positive, incentivizing effect of tournament theory. "Executive-power theory" explains that widening pay gaps lead to excessive pay gaps as a result of executive misuse of their power to increase their own level of pay and obtain private benefits (Bebchuk and Fried, 2003). Fundamental to this theory is the assumption that company executives, especially CEOs, are eager to pursue and secure greater power. With a sufficient level of power, they can control the board of directors and thereby influence the design of their companies' compensation contracts to increase their own compensation without the constraints and limitations imposed by shareholders and regulators. This leads to the expansion of the company pay gap (Adams et al., 2005). According to executive-power theory, therefore, excessive pay gaps are likely to result from the misuse of executive power to influence the design of compensation contracts.

The findings of recent empirical studies support the executive-power theory. Bebchuk et al. (2011) analyze 12,011 U.S. companies from the 1993–2004 period and report that the larger the pay gaps between the top-five executives, the lower the value of the company. Chen et al. (2011b) examine U.S. listed companies between 1993 and 2007, and argue that a large pay gap between executives signifies to those external to the company that the company has a serious agency problem. This leads to a significant increase in the company's cost of capital. The authors also observe that the agency problem is more serious in companies with greater cash flows and those that have experienced changes in executive structure. In other words, the positive relationship between the pay gap and agency problems is much stronger under these conditions.

3. Institutional background and research hypothesis

3.1. Institutional background

Until the end of 1992, although the Chinese government encouraged enterprises to widen their pay gaps to some extent when designing employee-compensation plans, a clear restriction was still in place: executive compensation was not permitted to exceed three times that of the average employee. However, egalitarian compensation designs tend to reduce employee enthusiasm, thus impairing overall company productivity. To accelerate the development of China's market economy, the government advocated from 1993 to 2003 that companies "give priority to efficiency with due consideration to fairness." Relevant laws and regulations were introduced to facilitate the expansion of pay gaps "among all kinds of personnel" to increase employee enthusiasm and maximize social wealth. Encouraged by the government, companies' internal pay gaps expanded rapidly. The data disclosed by the SASAC (the State-owned Assets Supervision and Administration Commission) show that executive compensation in China's central government controlled enterprises was 12 times than average employee salary in 2002, reached 13.6 times in 2003, and continues to expand.

The negative effects of these excessive pay gaps aroused great concerns from China's government, which accordingly made several adjustments to its policy during major conferences. In 2009, during the first session of the 11th National People's Congress, the government expressed the intention to "progressively reverse" the widening trend of the pay gap. In 2012, during the second session of the 11th National People's Congress, it promised to "speedily reverse" the trend. Analysis of the rhetoric of the Congress suggests that the government became less tolerant of the excessive pay gap and thus increased its efforts to reduce the excessive pay gap. From expressing "encouragement" of the widening gap, it proposed "gradually reversing" this trend, and eventually described a "resolute" and "speedy" reversal. This indicates that the negative effects of an excessive pay gap on the development of China's economy now urgently require a solution from the Chinese government.

3.2. Research hypothesis

Once the block shareholders in a company realize that the company's excessive pay gap is due to the agency cost of executive power, they are likely to introduce governance mechanisms to mitigate these agency problems. Fama and Jensen (1983) point out that a company's board of directors plays an important role in supervising executives and reducing the agency costs. It is common for block shareholders to directly appoint personnel to a company's board of directors in a supervisory capacity, in order to ensure that executives efficiently represent the interests of the company's shareholders (Yeh and Woidtke, 2005). The contribution of a shareholder-appointed director significantly improves company governance. For example, Colpan and Yoshikawa (2012) examine Japanese listed companies and find that directors appointed by block shareholders can reduce companies' agency problems by enhancing the sensitivity of the relationship between compensation and performance. In supervising executives, the directors represent shareholders' interests and deploy effective governance mechanisms to control the pay gap caused by the misuse of executive power, thereby reducing the opportunistic behavior of executives in pursuit of excessive compensation, and ultimately reducing the company's overall pay gap. We thus propose the following hypothesis.

Hypothesis 1. The ratio of directors appointed by shareholders to the total number of directors is negatively related to the company pay gap.

Generally, company directors have two main functions: supervising other employees and providing strategic recommendations (Brickley and Zimmerman, 2010). However, high performance in one area may compromise the success of the other. Masulis et al. (2012) report that based on their sample, foreign independent directors hired by U.S. listed companies successfully provide strategic advice, such as helping executives to implement cross-border mergers and acquisitions strategies, and achieve high returns. However, the authors also observe that such directors fail to fulfill their supervisory role. They are frequently absent from board meetings and CEO compensation tends to be too high. Moreover, when company performance is poor, foreign independent directors often fail to dismiss incompetent CEOs in a timely fashion. Investigating directors' supervisory role, Faleye et al. (2011) report that in companies with stronger director supervision, there is a greater correlation between change in CEO and performance. In addition, the CEOs of these companies receive less excessive compensation and perform less earnings management. However, the strategic performance of the directors of these companies is comparatively weak.

Two kinds of directors may be appointed by block shareholders to China's listed companies: salaried and non-salaried directors. Salaried directors appointed by block shareholders often provide executives with strategic management advice and either participate in or are responsible for company management. Such directors are independent, but are also more susceptible to the influence of other executives, making it difficult for them to effectively perform the duties required of them by the company shareholders. In contrast, non-salaried directors appointed by shareholders who receive compensation directly from the shareholders and work to further their interests through participation in company governance and the supervision of executive behavior. Such directors are less susceptible to the influence of the listed company's other executives and thus act more independently. In short, when directors appointed by shareholders receive compensation from the companies, they are more susceptible to the constraints of executive power when participating in company governance and making decisions. As they are also more likely to share the interests and priorities of the company executives, they may sacrifice shareholders' interests to gain more private income, which increases the company's pay gap. In contrast, when directors appointed by shareholders receive compensation from the shareholders, they do not have a direct economic connection with executives and are more likely to share and pursue shareholders' interests by strengthening their supervision of executive behavior, and ultimately reducing the company's pay gap. This suggests the following hypotheses:

Hypothesis 2. The ratio of salaried directors appointed by shareholders to the total number of directors is positively related to the company pay gap.

Hypothesis 3. The ratio of non-salaried directors appointed by shareholders to the total number of directors is negatively related to the company pay gap.

4. Research design

4.1. Sample

The 2005 revision of the "Annual Reporting Standards" required listed companies for the first time to disclose executive compensation on an individual basis. To ensure the integrity of the sample and to effectively investigate the relationship between shareholder-appointed directors and the pay gap, we examine listed companies in the 2005–2011 period, using all types of listed companies in our initial study sample except financial and insurance companies. After excluding incomplete observations, our sample comprises 9186 observations. Ownership data of listed companies was hand-collected from company annual reports and compensation and financial data were obtained from the China Stock Market and Accounting Research (CSMAR) database. As the sample is composed of different companies in different years, giving mixed (pooled) data, the annual observations of a given company do not meet the requirement of independence, which could lead us to overvalue the statistical significance of the regression results. To correct this statistical problem, we use a "clustering" method to adjust the standard error of the estimated coefficient for each company (Petersen, 2009).

4.2. Variables

4.2.1. Company pay gap

In line with existing research, we use the relative pay gap between executives and employees, and the relative compensation among executives to measure the company pay gap (Bu and Peng, 2010; Banker et al., 2011; Kato and Long, 2011).

We use the following equation to calculate the relative pay gap between executives and employees.

$$\mathrm{LEGap} = \mathrm{Ln}\left[\mathrm{MaxMPay} \Big/ \frac{\mathrm{CashPay} + \mathrm{SalPayCh} - \mathrm{TotMPay}}{\mathrm{EmpNum} - \mathrm{TotMNum}}\right] \tag{1}$$

We use the following equation to calculate the relative pay gap between the highest paid top executive and the other top executives.

$$\mathrm{LMGap} = \mathrm{Ln}\left[\mathrm{MaxMPay} \Big/ \frac{\mathrm{TotMPay} - \mathrm{MaxMPay}}{\mathrm{TotMNum} - 1}\right] \tag{2}$$

In the equations above, LEGap represents the natural logarithm of the relative pay gap between executives and employees, LMGay represents the natural logarithm of the relative pay gap between the highest paid top executive and the other top executives, and MaxMPay represents a company's highest executive compensation. CashPay represents the cash paid by the company to its employees, SalPayCh represents the change in the employee compensation paid by the company, TotMpay represents the total executive compensation awarded by the company, EmpNum represents the total number of employees and TotMNum represents the total number of executives.

4.2.2. Directors appointed by shareholders

Our measure of directors appointed by block shareholders is represented by the ratio of the number of directors appointed by block shareholders to the total number of directors on the board (Yeh and Woidtke, 2005; Chen et al., 2013). In Chinese listed companies, directors appointed by shareholders may receive compensation directly from the company for which they work, or from a source external to the company. Therefore, we define the following three variables: (1) directors appointed by shareholders (TPR), which is represented by the ratio of the number of directors appointed by shareholders to the total number of directors on the board; (2) salaried directors appointed by shareholders (PR), which is represented by the ratio of the number of shareholder-appointed directors who receive compensation directly from the listed company for which they work to the total number of directors on the board; and (3) non-salaried directors appointed by shareholders (NPR), which is represented by the ratio of the number of shareholder-appointed directors who do not receive compensation directly from their companies to the total number of directors on the board.

4.2.3. Control variables

Following recommendations made in the literature, we include the following control variables (Fang, 2009; Xin and Tan, 2009; Chen et al., 2011a): (1) Chairman and CEO duality (CEOD), which is equal to 1 if the chairman also holds the position of CEO, otherwise 0; (2) the size of the board of directors (Bsize), which is equal to the natural logarithm of the number of directors on the board; (3) independent directors (IndepR), which is equal to the ratio of the number of independent directors to the total number of directors on the board; (4) compensation committee (Commit), a dummy variable equal to 1 if the company has a compensation committee in the year under study, otherwise 0; (5) company performance (ROA), which is equal to the ratio of the company's net profit to its year-end total assets; (6) company size (Size), which is equal to the natural logarithm of the company's total assets in that year; (7) the company's leverage (Lev), which is equal to the ratio of the company's year-end long-term liabilities to its year-end total assets; (8) company risk (Risk), which is equal to the standard deviation of the monthly returns of the company's stock in that year; (9) company growth potential (Q), which is equal to the ratio of the sum of the company's tradable stock-market value, non-tradable stock-market value and liabilities to its last-year-end total assets; (10) cross-listing (Exch), which is equal to 1 if that year the company was also listed on other overseas exchanges, otherwise 0; and (11) special treatment (ST), which is equal to 1 if that year the company was under ST or *ST, otherwise 0.

4.3. Research model

First, we use the following regression model to examine the relationship between the presence of shareholder-appointed directors and the pay gap.

$$\begin{aligned}\text{Gap} = {} & \alpha + \beta_1 \text{TPR} + \beta_2 \text{CEOD} + \beta_3 \text{Bsize} + \beta_4 \text{IndepR} + \beta_5 \text{Commit} + \beta_6 \text{ROA} + \beta_7 \text{Size} + \beta_8 \text{Lev} \\ & + \beta_9 \text{Risk} + \beta_{10} Q + \beta_{11} \text{Exch} + \beta_{12} \text{ST} + \text{Year fixed effect} + \text{Industry fixed effect} + \varepsilon \end{aligned} \quad (3)$$

Table 1
Variable definitions.

Variables	Definitions
Pay-gap variables	
EGap	Ratio of the highest executive compensation to average employee (excluding executives') compensation
LEGap	Natural logarithm of EGap.
MGap	Ratio of the highest executive compensation to the average compensation of other executives
LMGap	Natural logarithm of MGap
Shareholder-appointed director variables	
TPR	Ratio of the number of directors appointed by block shareholders to the total number of directors on the board.
PR	Ratio of the number of directors appointed by block shareholders who receive salaries from the listed company to the total number of directors on the board.
NPR	Ratio of the number of directors appointed by block shareholders who do not receive salaries from the listed company to the total number of directors on the board
Board of director variables	
CEOD	Equal to 1 if the chairman also holds the position of CEO, otherwise 0
Bsize	Natural logarithm of the number of directors on the board
IndepR	Ratio of the number of independent directors to the total number of directors on the board
Commit	Equal to 1 if that year the company has a compensation committee, otherwise 0
Company variables	
ROA	Ratio of the company's net profit to its year-end total assets
Size	Natural logarithm of the company's year-end total assets
Lev	Ratio of the company's year-end long-term liabilities to its year-end total assets
Risk	Standard deviation of the monthly returns on the company's stock in that year
Q	Ratio of the sum of the company's tradable stock-market value, non-tradable stock-book value and liabilities to its last-year-end total assets
Exch	Equal to 1 if that year the company was also listed on other overseas exchanges, otherwise 0
ST	Equal to 1 if that year the company was under ST or *ST, otherwise 0

The following regression model is used to further investigate the different effects on the pay gap of salaried and non-salaried directors appointed by block shareholders.

$$\begin{aligned}\text{Gap} = {} & \alpha + \beta_1 \text{PR} + \beta_2 \text{NPR} + \beta_3 \text{CEOD} + \beta_4 \text{Bsize} + \beta_5 \text{IndepR} + \beta_6 \text{Commit} + \beta_7 \text{ROA} \\ & + \beta_8 \text{Size} + \beta_9 \text{Lev} + \beta_{10} \text{Risk} + \beta_{11} Q + \beta_{12} \text{Exch} + \beta_{13} \text{ST} + \text{Year fixed effect} \\ & + \text{Industry fixed effect} + \varepsilon \end{aligned} \tag{4}$$

The definitions of the variables used in the model are listed in Table 1. "Gap" signifies either LEGap or LMGap, as appropriate.

5. Empirical results and analysis

5.1. Descriptive statistics

To mitigate the effect of extreme values on our empirical analysis, we winsorize the top and bottom 1% of values for all continuous variables. Table 2 presents the descriptive statistics. In Panel A, we provide descriptive statistics for sub-groups of firms with and without directors appointed by shareholders. In firms with directors appointed by block shareholders, the mean (median) of the pay gap between executives and employees is 2.003 (1.978). In firms without directors appointed by block shareholders, the mean (median) of the pay gap between executives and employees is 1.916 (1.875). The differences between the mean and median for the two groups are significant at the 1% level ($t = 3.575$, $z = 3.912$). There are also significant differences in the mean and median of executives' pay gap between firms with and without directors appointed by shareholders. In Panel B, we divide firms with shareholder-appointed directors into firms with company-salaried and non-company-salaried directors to analyze differences in the company pay gap. In firms with salaried shareholder-appointed directors, the mean (median) of the pay gap between executives and employees is 2.085 (2.065) and the mean (median) of the pay gap between executives is 0.998 (0.956). In firms with non-salaried shareholder-appointed directors, the mean (median) of the pay gap between executives and employees is 1.810 (1.761) and the mean (median) of the pay gap between executives is 0.872 (0.805). Furthermore, the pay gap in firms with salaried directors appointed by shareholders is significantly larger than that in firms with non-salaried directors ($t = 15.731$, $z = 15.430$; $t = 15.768$, $z = 16.299$). This is probably due to the tendency for salaried directors appointed by block shareholders to increase the pay gap and for non-salaried directors appointed by block shareholders to decrease the pay gap.

In Panel C, we report the descriptive statistics for this paper's main variables. The average pay gap between executives and employees is 9.385, with the highest at 53.735. The average pay gap between executives is 2.706 and the highest is 8.290. The mean of the ratio of directors appointed by shareholders is 0.296. As the mean of the ratio of salaried shareholder-appointed directors is 0.103 and the mean of the ratio of non-salaried shareholder-appointed directors is 0.192, the ratio of non-salaried directors appointed by shareholders is nearly twice that of salaried directors. These findings indicate that the shareholders of the listed companies under study appoint more non-salaried than salaried directors. Regarding board of director variables, it is uncommon for CEOs to also be chairmen of the board, and there is little variation in the size of the boards of directors. Generally, independent directors comprise nearly one third of the board of directors and most of the companies have a compensation committee in the year under study. Of the sample companies, 3.2% are cross-listed and 9.3% are classified as ST in the year under study.

5.2. Correlation analysis

In Table 3, we provide the results of the correlation analysis of the main variables. The correlation coefficients of TPR and LEGap or LMGap are −0.046 and −0.043, respectively, and are significant at the 5% level. The correlation coefficients of PR and LEGap or LMGap are 0.140 and 0.141, respectively, and are significant at the 5% level. The correlation coefficients of NPR and LEGap or LMGap are −0.158 and −0.155, respectively, and are negatively significant at the 5% level. The results show that there is a negative correlation between the ratio of directors appointed by shareholders and the pay gap. More specifically, the ratio of

Table 2
Descriptive statistics.

Variables	Firms with directors appointed by block shareholders $N = 8053$			Firms without directors appointed by block shareholders $N = 1133$			t-Statistic	z-Statistic
	Mean	Median	SD	Mean	Median	SD		
Panel A: Descriptive statistics for pay gap in firms with and without directors appointed by shareholders								
LEGap	2.003	1.978	0.777	1.916	1.875	0.774	3.575***	3.912***
LMGap	0.942	0.890	0.357	0.921	0.860	0.361	1.826*	2.408**
Variables	Firms with salaried directors appointed by block shareholders $N = 3078$			Firms with non-salaried directors appointed by block shareholders $N = 4975$			t-Statistic	z-Statistic
	Mean	Median	SD	Mean	Median	SD		
Panel B: Descriptive statistics for pay gap in firms with salaried and non-salaried directors appointed by shareholders								
LEGap	2.085	2.065	0.785	1.810	1.761	0.748	15.731***	15.430***
LMGap	0.998	0.956	0.370	0.872	0.805	0.347	15.768***	16.299***
Variables	N	Mean	SD	Min	Q1	Median	Q3	Max
Panel C: Descriptive statistics for the main variables								
Pay gap variables								
EGap	9186	9.385	8.724	1.268	4.036	6.600	11.602	53.735
LEGap	9186	1.926	0.775	0.237	1.395	1.887	2.451	3.984
MGap	9186	2.706	1.183	1.364	1.937	2.371	3.089	8.290
LMGap	9186	0.923	0.361	0.310	0.661	0.864	1.128	2.115
Shareholder-appointed director variables								
TPR	9186	0.296	0.184	0.000	0.143	0.300	0.444	0.667
PR	9186	0.103	0.138	0.000	0.000	0.000	0.167	0.556
NPR	9186	0.192	0.176	0.000	0.000	0.167	0.333	0.600
Board of director variables								
CEOD	9186	0.162	0.368	0.000	0.000	0.000	0.000	1.000
Bsize	9186	2.204	0.202	1.609	2.197	2.197	2.303	2.708
IndepR	9186	0.361	0.049	0.250	0.333	0.333	0.375	0.556
Commit	9186	0.784	0.411	0.000	1.000	1.000	1.000	1.000
Company variables								
ROA	9186	0.039	0.072	−0.265	0.011	0.038	0.072	0.233
Size	9186	21.604	1.182	19.140	20.783	21.457	22.251	25.303
Lev	9186	0.074	0.104	0.000	0.000	0.026	0.110	0.471
Risk	9186	0.143	0.058	0.057	0.101	0.131	0.174	0.353
Q	9186	1.668	1.472	−2.795	0.883	1.345	2.096	9.169
Exch	9186	0.032	0.175	0.000	0.000	0.000	0.000	1.000
ST	9186	0.093	0.290	0.000	0.000	0.000	0.000	1.000

Table 3
Correlation analysis.

	LEGap	LMGap	TPR	PR	NPR	CEOD	Bsize	IndepR	Commit	ROA	Size	Lev	Risk	*Q*	Exch
LMGap	0.505*														
TPR	−0.046*	−0.043*													
PR	0.140*	0.141*	0.433*												
NPR	−0.158*	−0.155*	0.699*	−0.339*											
CEOD	0.059*	0.087*	−0.174*	0.006	−0.187*										
Bsize	0.051*	−0.017	0.186*	0.015	0.184*	−0.141*									
IndepR	0.029*	0.069*	−0.186*	−0.022*	−0.175*	0.079*	−0.327*								
Commit	0.089*	0.088*	−0.054*	0.026*	−0.076*	0.040*	−0.039*	0.096*							
ROA	0.217*	0.070*	0.029*	0.058*	−0.015	0.013	0.053*	−0.013	0.059*						
Size	0.182*	−0.048*	0.152*	0.059*	0.111*	−0.133*	0.265*	0.052*	0.119*	0.184*					
Lev	0.003	−0.023*	0.107*	0.0429*	0.079*	−0.116*	0.136*	0.011	0.033*	−0.074*	0.423*				
Risk	−0.062*	−0.006	0.013	−0.009	0.021*	−0.035*	−0.022*	−0.009	−0.017	−0.117*	−0.110*	−0.014			
Q	−0.044*	−0.064*	0.079*	0.018	0.068*	−0.087*	0.072*	−0.016	−0.035*	−0.197*	0.248*	0.276*	0.086*		
Exch	0.067*	0.003	0.038*	0.067*	−0.016	−0.042*	0.121*	0.060*	0.036*	0.020	0.332*	0.124*	−0.048*	0.053*	
ST	−0.109*	0.015	−0.008	−0.039*	0.024*	0.023*	−0.084*	0.005	0.009	−0.247*	−0.215*	−0.022*	0.118*	0.077*	−0.026*

* Significant at the 5% level (two-tailed test).

salaried directors appointed by shareholders is positively correlated with the pay gap, while the ratio of non-salaried directors appointed by shareholders is negatively correlated with the pay gap. This indicates that due to differences in their means of receiving compensation, directors appointed by shareholders have different effects on the pay gap. The pay gap increases with the increased presence of shareholder-appointed directors who receive compensation from a listed company, and decreases with the increased presence of shareholder-appointed directors who do not receive compensation from the company. Company risk (Risk), company growth potential (Q) and special treatment (ST) are negatively correlated with LEGap and are significant at the 5% level, whereas the other variables are positively correlated with LEGap. The size of the board of directors (Bsize) and the company's size (Size), leverage (Lev), risk (Risk) and growth potential (Q) are negatively correlated with LMGap, whereas the other variables are positively correlated with LMGap.

5.3. Regression analysis

Table 4 shows the regression results for the effects on the pay gap of directors appointed by block shareholders, salaried directors appointed by block shareholders and non-salaried directors appointed by block shareholders. We first examine the effects on the pay gap of the ratio of directors appointed by block shareholders and provide the corresponding regression results in columns (1) and (2) of Table 4. When the dependent variable is LEGap, TPR's regression coefficient is -0.197 and is significant at the 5% level ($t = -2.53$). This shows that when the ratio of directors appointed by block shareholders increases by one standard deviation, the pay gap between executives and employees will significantly decrease, by 3.63%. When the dependent variable is LMGap, TPR's regression coefficient is -0.006, so the pay gap between executives and employees will decrease by 1.10% with a one standard deviation increase in the ratio of directors appointed by shareholders. However, this coefficient is not significant ($t = -0.15$). Overall, these regression results show that the higher the ratio of directors appointed by block shareholders, the smaller the pay gap. This means that directors appointed by shareholders are to some extent able to represent shareholders' interests by effectively supervising executives, reducing their opportunistic behavior in pursuit of excessive pay, and thereby decreasing the company's pay gap. The regression results described above thus support our first hypothesis.

The directors appointed by block shareholders can be further divided into salaried directors appointed by block shareholders and non-salaried directors appointed by block shareholders, according to whether they receive compensation from the listed companies for which they work. We compare the effects on the pay gap of salaried and non-salaried directors appointed by block shareholders and report the corresponding regression results in columns (3) and (4) of Table 4. When the dependent variable is LEGap, the regression coefficient of the variable PR is 0.403, and that of the variable NPR is -0.532, both significant ($t = 4.01$; $t = -6.10$) at the 1% level. These results show that when the ratio of salaried directors appointed by block shareholders increases by one standard deviation, the pay gap between executives and employees increases by 5.56%. When the ratio of non-salaried directors appointed by shareholders increases by one standard deviation, the pay gap between executives and employees decreases by 9.36%. When the dependent variable is LMGap, PR's regression coefficient is 0.282 and NPR's regression coefficient is -0.165, and both are significant at the 1% level ($t = 5.51$; $t = -4.07$), which is consistent with the results for LEGap given in column (3). The results show that the higher the ratio of salaried directors appointed by block shareholders, the larger the pay gap, and the higher the ratio of non-salaried directors appointed by block shareholders, the smaller the pay gap. This suggests that only non-salaried directors appointed by block shareholders are able to provide effective supervision and thereby a better governance effect, namely decreasing the company pay gap. When the directors appointed to a listed company by its block shareholders receive compensation from the listed company itself, they are more likely to rely on the company's executives than to act independently on behalf of shareholders. As a result, they increase the company's pay gap further. In contrast, when the directors appointed by shareholders do not receive compensation from the listed company, they are more independent and are able to represent shareholders' interests by supervising executives and reducing their opportunistic efforts to obtain excessive pay. As a result, non-salaried directors reduce both agency costs and the company pay gap. The regression results provide supportive empirical evidence for our second and third hypotheses.

To eliminate the potential adverse effects of endogeneity, we also use the instrumental-variable regression method. In line with recent studies (Hoechle et al., 2012; Wintoki et al., 2012; Jayaraman and Milbourn, 2012),

Table 4
Regression results for the effects on pay gap of directors appointed by block shareholders.

	(1) Dependent variable: LEGap	(2) Dependent variable: LMGap	(3) Dependent variable: LEGap	(4) Dependent variable: LMGap
TPR	−0.197**	−0.006		
	(−2.53)	(−0.15)		
PR			0.403***	0.282***
			(4.01)	(5.51)
NPR			−0.532***	−0.165***
			(−6.10)	(−4.07)
CEOD	0.114***	0.064***	0.089**	0.052***
	(3.14)	(3.45)	(2.47)	(2.82)
Bsize	0.131	0.079**	0.161**	0.093**
	(1.58)	(2.10)	(1.98)	(2.51)
IndepR	0.061	0.470***	−0.018	0.432***
	(0.21)	(3.23)	(−0.06)	(2.97)
Commit	0.067**	0.054***	0.064**	0.052***
	(2.10)	(3.62)	(2.03)	(3.59)
ROA	1.763***	0.363***	1.704***	0.334***
	(10.12)	(4.36)	(9.88)	(4.07)
Size	0.112***	−0.024***	0.117***	−0.022***
	(6.15)	(−2.92)	(6.60)	(−2.67)
Lev	0.221	0.128*	0.184	0.110
	(1.41)	(1.72)	(1.19)	(1.51)
Risk	−0.337*	−0.071	−0.267	−0.038
	(−1.68)	(−0.74)	(−1.34)	(−0.40)
Q	−0.017**	−0.007	−0.018**	−0.007*
	(−2.07)	(−1.57)	(−2.30)	(−1.79)
Exch	0.105	0.047	0.052	0.021
	(1.00)	(0.94)	(0.50)	(0.44)
ST	−0.089**	0.023	−0.070	0.033
	(−2.01)	(1.08)	(−1.59)	(1.57)
Intercept	−0.905**	1.009***	−1.025**	0.952***
	(−2.17)	(5.31)	(−2.53)	(5.04)
Industry	Control	Control	Control	Control
Year	Control	Control	Control	Control
N	9186	9186	9186	9186
Adj. R−sq	0.124	0.040	0.145	0.063
*N*_clust	1985	1985	1985	1985
F	15.176	6.426	18.289	9.251

Note: All coefficient estimates are adjusted using heteroskedasticity and company clustering to obtain robust standard errors. Adjusted *t*-Statistics are provided in brackets.
* Significance at the 10% level (two-tailed test).
** Significance at the 5% levels (two-tailed test).
*** Significance at the 1% levels (two-tailed test).

our instrumental variables for the two-stage least-squares regression are the industry's mean and the previous year's value of the ratio of directors appointed by shareholders (ratio of salaried directors appointed by block shareholders and ratio of non-salaried directors appointed by block shareholders). Following the recommendations by Larcker and Rusticus (2010), we also conduct a validation test on the correlation conditions and exogenous conditions of the two instrumental variables.

In Table 5, we report the results of the instrumental-variable correlation test, the exogenous test and the instrumental-variable regression. When the dependent variable is LEGap, the instrumental-variable correlation test gives *F*-values for PR and NPR that are both larger than 10 ($F = 963.62 > 10$; $F = 1531.82 > 10$), which means that our selected instrumental variables fulfill the correlation conditions. The results of the instrumental-variable exogenous test do not have statistical significance ($J = 3.170$, $P = 0.2049$), so we cannot reject the null hypothesis. That is, our results pass the instrumental-variable exogenous test. As they fulfill both the correlation conditions and the exogenous conditions, our instrumental variables can be considered

Table 5
Regression results using instrumental variables.

	Dependent variable: LEGap	Dependent variable: LMGap
PR	0.572***	0.385***
	(3.88)	(5.08)
NPR	−0.667***	−0.174***
	(−5.29)	(−2.95)
CEOD	0.079*	0.061***
	(1.83)	(2.75)
Bsize	0.126	0.085**
	(1.40)	(2.08)
IndepR	−0.184	0.501***
	(−0.59)	(3.17)
Commit	0.067*	0.043**
	(1.82)	(2.54)
ROA	1.715***	0.405***
	(9.14)	(4.56)
Size	0.128***	−0.022**
	(6.82)	(−2.41)
Lev	0.098	0.085
	(0.60)	(1.09)
Risk	−0.178	0.035
	(−0.83)	(0.34)
Q	−0.020**	−0.007
	(−2.52)	(−1.60)
Exch	0.022	0.022
	(0.20)	(0.42)
ST	−0.062	0.039*
	(−1.34)	(1.73)
Intercept	−0.848*	1.039***
	(−1.91)	(4.88)
Industry	Control	Control
Year	Control	Control
N	7266	7266
Adj. R-sq	0.143	0.069
*N*_clust	1597	1597
F	14.784	7.184
Weak instrumental-variable test	PR: $F = 963.62$	PR: $F = 963.62$
	NPR: $F = 1531.82$	NPR: $F = 1531.82$
Overidentifying-restrictions *J*-test and *P*-value	$J = 3.170$, $P = 0.2049$	$J = 5.236$, $P = 0.0729$

Note: All of the coefficient estimates are adjusted using heteroskedasticity and company clustering to obtain robust standard errors. Adjusted *z*-Statistics are provided in brackets.
* Significance at the level of 10% (two-tailed test).
** Significance at the level of 5% (two-tailed test).
*** Significance at the level of 1% (two-tailed test).

valid. Using the instrumental variables, the regression results for PR and NPR are 0.572 and −0.667, which are both significant at the 1% level ($z = 3.88$, $z = -5.29$). When the dependent variable is LMGap, the results are almost the same. Therefore, after addressing the endogeneity problem, the results of the study still hold. In short, salaried directors appointed by block shareholders significantly increase their companies' pay gap, while non-salaried directors appointed by block shareholders significantly decrease their companies' pay gap.

5.4. Additional tests

5.4.1. The effects of industry competition

Table 6 shows the regression results for the effects of different levels of industry competition on the governance effects of directors appointed by block shareholders, with the total number of companies in the industry

Table 6
Regression results of the effects of product market competition.

	Dependent variable: LEGap		Dependent variable: LMGap	
	(1) High competition	(2) Low competition	(3) High competition	(4) Low competition
PR	0.414***	0.405***	0.199***	0.368***
	(2.85)	(3.05)	(2.69)	(5.65)
NPR	−0.664***	−0.432***	−0.255***	−0.088
	(−5.40)	(−3.68)	(−4.54)	(−1.59)
CEOD	0.050	0.115**	0.030	0.070***
	(1.04)	(2.23)	(1.32)	(2.62)
Bsize	−0.051	0.329***	0.078	0.109**
	(−0.41)	(3.17)	(1.46)	(2.21)
IndepR	−0.085	0.006	0.574**	0.329*
	(−0.18)	(0.02)	(2.34)	(1.94)
Commit	0.104**	0.025	0.062***	0.042**
	(2.31)	(0.60)	(2.97)	(2.17)
ROA	2.080***	1.349***	0.575***	0.110
	(8.52)	(6.01)	(4.96)	(1.03)
Size	0.102***	0.131***	−0.025**	−0.020*
	(3.91)	(5.62)	(−2.16)	(−1.78)
Lev	0.265	0.080	0.137	0.061
	(1.08)	(0.42)	(1.19)	(0.67)
Risk	−0.427	−0.026	−0.170	0.118
	(−1.52)	(−0.09)	(−1.28)	(0.88)
Q	−0.014	−0.021**	−0.005	−0.009*
	(−1.09)	(−2.22)	(−0.76)	(−1.78)
Exch	0.027	0.063	−0.027	0.060
	(0.18)	(0.48)	(−0.42)	(0.93)
ST	−0.070	−0.064	0.072**	−0.005
	(−1.11)	(−1.10)	(2.36)	(−0.18)
Intercept	−0.185	−1.747***	1.013***	0.875***
	(−0.32)	(−3.32)	(3.84)	(3.43)
Industry	Control	Control	Control	Control
Year	Control	Control	Control	Control
N	4240	4946	4240	4946
Adj. R-sq	0.133	0.162	0.065	0.065
*N*_clust	1045	1143	1045	1143
F	12.158	14.018	7.794	7.099

Note: All of the coefficient estimates are adjusted using heteroskedasticity and company clustering to obtain robust standard errors. Adjusted *t*-Statistics are provided in brackets.
* Significance at the level of 10% (two-tailed test).
** Significance at the level of 5% (two-tailed test).
*** Significance at the level of 1% (two-tailed test).

used as a proxy for industry competition. This measure is common in existing papers (e.g. Li, 2010). We divide the sample into a group of firms facing high competition and a group of firms facing low competition, according to the magnitude of each company's industry. When the dependent variable is LEGap, PR's regression coefficients in the high-competition group and the low-competition group are 0.414 and 0.405 respectively, and both are significantly positive at the 1% level ($t = 2.85$, $t = 3.05$). The differences in the regression coefficients for these two groups do not pass the significance test (p-value = 0.94), so different levels of industry competition can be considered to have no significant effects on the relationship between the governance of salaried shareholder-appointed directors and the pay gap. NPR's regression coefficients in the high-competition and low-competition group are −0.664 and −0.432, respectively, and are significant at the 1% level ($t = -5.40$, $t = -3.68$). It is clear that when an industry is highly competitive, the role of non-salaried shareholder-appointed directors in decreasing the pay gap is much larger, with this difference statistically significant (p-value = 0.09). When the dependent variable is LMgap, the results are consistent. In highly competitive industries, the governance effects of non-salaried shareholder-appointed directors on the pay gap are more

significant. The regression results indicate that the pay-gap phenomenon exhibited by China's listed companies is due to agency problems within the companies, rather than the result of incentivizing pay. This is at odds with our competitive hypothesis: that the increased pay gap is due to the use of incentives. It also shows that the presence of non-salaried directors appointed by block shareholders and external industry competition play complementary roles in the process by which effective governance decreases the pay gap.

5.4.2. The influence of state ownership

We also examine differences in the governance effects of directors appointed by block shareholders between state-owned enterprises and non-state-owned enterprises. In Table 7, we report the regression results for the effects of salaried and non-salaried directors appointed by block shareholders on the pay gap in state-owned enterprises and non-state-owned enterprises. As shown in the table, when the dependent variable is LEGap, PR's regression coefficients are 0.482 and 0.256, significant at the 1% level ($t = 3.26$) and the 5% level ($t = 2.00$)

Table 7
Regression results for the effects of state ownership on the governance of directors appointed by shareholders.

	Dependent variable: LEGap		Dependent variable: LMGap	
	(1) State-owned	(2) Non-state-owned	(3) State-owned	(4) Non-state-owned
PR	0.482***	0.256**	0.392***	0.150**
	(3.26)	(2.00)	(5.64)	(2.10)
NPR	−0.247**	−0.497***	−0.053	−0.097
	(−2.13)	(−3.69)	(−1.05)	(−1.35)
CEOD	0.077	0.034	0.017	0.044*
	(1.29)	(0.81)	(0.61)	(1.86)
Bsize	0.068	0.426***	0.070	0.184***
	(0.67)	(3.73)	(1.60)	(3.13)
IndepR	−0.325	0.947**	0.412**	0.690***
	(−0.97)	(2.19)	(2.58)	(2.79)
Commit	0.070*	0.066	0.065***	0.040*
	(1.73)	(1.51)	(3.69)	(1.70)
ROA	1.440***	1.620***	0.356***	0.116
	(6.05)	(7.25)	(3.37)	(0.95)
Size	0.110***	0.220***	−0.023**	0.013
	(5.03)	(8.10)	(−2.35)	(0.94)
Lev	0.099	0.649***	0.086	0.225*
	(0.53)	(2.75)	(0.99)	(1.73)
Risk	−0.217	−0.301	−0.011	−0.026
	(−0.82)	(−1.08)	(−0.09)	(−0.18)
Q	−0.013	−0.027**	−0.004	−0.010*
	(−1.28)	(−2.53)	(−0.79)	(−1.68)
Exch	0.149	0.259	0.039	0.209*
	(1.47)	(1.13)	(0.81)	(1.67)
ST	−0.076	−0.042	0.035	0.030
	(−1.31)	(−0.71)	(1.37)	(0.91)
Intercept	−0.787	−3.809***	0.939***	−0.003
	(−1.55)	(−6.28)	(4.28)	(−0.01)
Industry	Control	Control	Control	Control
Year	Control	Control	Control	Control
N	5301	3885	5301	3885
Adj. R-sq	0.127	0.206	0.058	0.044
*N*_clust	1011	1120	1011	1120
F	8.602	12.349	4.734	3.097

Note: All of the coefficient estimates are adjusted using heteroskedasticity and company clustering to obtain robust standard errors. Adjusted *t*-Statistics are provided in brackets.

* Significance at the level of 10% (two-tailed test).

** Significance at the level of 5% (two-tailed test).

*** Significance at the level of 1% (two-tailed test).

Table 8
Regression results for the effects on pay gap of directors appointed by controlling shareholders and non-controlling shareholders.

	Dependent variable: LEGap		Dependent variable: LMGap	
	(1)	(2)	(3)	(4)
PR	0.403***		0.282***	
	(4.01)		(5.51)	
NPR	−0.532***		−0.165***	
	(−6.10)		(−4.07)	
CPR		0.392***		0.233***
		(3.41)		(3.98)
NCPR		0.309		0.464***
		(1.62)		(4.78)
CNPR		−0.774***		−0.194***
		(−7.57)		(−4.06)
NCNPR		−0.113		−0.113*
		(−0.91)		(−1.90)
CEOD	0.089**	0.079**	0.052***	0.050***
	(2.47)	(2.22)	(2.82)	(2.74)
Bsize	0.161**	0.133	0.093**	0.084**
	(1.98)	(1.64)	(2.51)	(2.26)
IndepR	−0.018	−0.040	0.432***	0.429***
	(−0.06)	(−0.14)	(2.97)	(2.96)
Commit	0.064**	0.063**	0.052***	0.051***
	(2.03)	(2.00)	(3.59)	(3.53)
ROA	1.704***	1.721***	0.334***	0.341***
	(9.88)	(10.00)	(4.07)	(4.15)
Size	0.117***	0.127***	−0.022***	−0.020**
	(6.60)	(7.09)	(−2.67)	(−2.36)
Lev	0.184	0.188	0.110	0.112
	(1.19)	(1.22)	(1.51)	(1.53)
Risk	−0.267	−0.276	−0.038	−0.043
	(−1.34)	(−1.38)	(−0.40)	(−0.45)
Q	−0.018**	−0.019**	−0.007*	−0.007*
	(−2.30)	(−2.44)	(−1.79)	(−1.84)
Exch	0.052	0.052	0.021	0.016
	(0.50)	(0.51)	(0.44)	(0.33)
ST	−0.070	−0.064	0.033	0.032
	(−1.59)	(−1.47)	(1.57)	(1.55)
Intercept	−1.025**	−1.163***	0.952***	0.927***
	(−2.53)	(−2.87)	(5.04)	(4.88)
Industry	Control	Control	Control	Control
Year	Control	Control	Control	Control
N	9186	9186	9186	9186
Adj. R-sq	0.145	0.151	0.063	0.065
*N*_clust	1985	1985	1985	1985
F	18.289	17.698	9.251	9.051

Note: All of the coefficient estimates are adjusted using heteroskedasticity and company clustering to obtain robust standard errors. Adjusted *t*-Statistics are provided in brackets.
* Significance at the level of 10% (two-tailed test).
** Significance at the level of 5% (two-tailed test).
*** Significance at the level of 1% (two-tailed test).

for the group of state-owned enterprises and the group of non-state-owned enterprises, respectively. NPR's regression coefficients are −0.247 and −0.497, respectively, significant at the 5% level ($t = -2.13$) and the 1% level ($t = -3.69$). When the dependent variable is LMGap, PR's regression coefficients are 0.392 and 0.150, significant at the 1% level ($t = 5.64$) and the 5% level ($t = 2.10$) for the group of state-owned enterprises and the group of non-state-owned enterprises, respectively. NPR's regression coefficients are −0.053 and −0.097 respectively, but are insignificant ($t = -1.05$, $t = -1.35$). The regression results indicate that salaried

directors appointed by block shareholders increase the pay gap, while non-salaried directors appointed by shareholders decrease the pay gap, and that there is no difference in these relationships between state-owned enterprises and non-state-owned enterprises. In other words, the relationship between the pay gap and the presence of directors appointed by block shareholders is not affected by state ownership.

5.4.3. The effects of directors appointed by controlling shareholders and non-controlling shareholders

To assess the different motivations of directors appointed by controlling shareholders and non-controlling shareholders, we examine separately the effects on the pay gap of directors appointed by controlling shareholders and those appointed by non-controlling shareholders. We manually obtain the data for the two variables (directors appointed by controlling shareholders and directors appointed by non-controlling shareholders) by extracting details of the directors appointed by all types of shareholders from the CSMAR

Table 9
Regression results for the effects of directors appointed by shareholders on pay gap when the individual with the highest compensation has different administrative positions.

	Dependent variable: LEGap			Dependent variable: LMGap		
	Chairman of the board	General manager	Others	Chairman of the board	General manager	Others
PR	0.265**	0.438***	0.535**	0.170***	0.390***	0.305**
	(2.11)	(3.37)	(2.12)	(2.85)	(5.66)	(2.32)
NPR	−0.459***	−0.395***	−0.711***	−0.159***	−0.170***	−0.201*
	(−3.70)	(−3.62)	(−3.40)	(−2.70)	(−3.38)	(−1.77)
CEOD	0.054	0.150***	0.083	0.064***	0.041*	0.099**
	(1.30)	(3.59)	(1.01)	(2.94)	(1.88)	(2.17)
Bsize	0.233**	0.080	0.456**	0.094**	0.076*	0.084
	(2.15)	(0.85)	(2.27)	(2.00)	(1.77)	(0.80)
IndepR	0.437	−0.315	−0.073	0.365*	0.445***	−0.141
	(1.09)	(−0.96)	(−0.11)	(1.76)	(2.76)	(−0.41)
Commit	0.071*	0.066*	0.061	0.060***	0.048***	0.083*
	(1.75)	(1.68)	(0.71)	(3.09)	(2.65)	(1.92)
ROA	1.723***	1.771***	1.119***	0.394***	0.317***	−0.130
	(7.09)	(8.29)	(2.86)	(3.34)	(3.33)	(−0.62)
Size	0.170***	0.108***	0.016	−0.019*	−0.024**	−0.007
	(7.15)	(5.13)	(0.42)	(−1.72)	(−2.36)	(−0.33)
Lev	−0.007	0.284	0.437	0.111	0.140	−0.058
	(−0.03)	(1.50)	(1.25)	(1.01)	(1.52)	(−0.33)
Risk	−0.124	−0.288	0.424	−0.080	−0.155	0.486*
	(−0.47)	(−1.07)	(0.76)	(−0.62)	(−1.26)	(1.67)
Q	−0.029***	−0.011	−0.028	−0.009	−0.006	−0.008
	(−2.65)	(−1.14)	(−1.37)	(−1.62)	(−1.15)	(−0.86)
Exch	−0.099	0.050	0.364**	0.040	−0.024	0.104
	(−0.61)	(0.47)	(2.24)	(0.47)	(−0.49)	(1.20)
ST	−0.026	−0.053	−0.185*	0.058*	0.038	−0.006
	(−0.44)	(−0.99)	(−1.83)	(1.90)	(1.52)	(−0.11)
Intercept	−2.422***	−0.586	0.348	0.893***	1.087***	0.735
	(−4.47)	(−1.21)	(0.39)	(3.54)	(4.70)	(1.45)
Industry	Control	Control	Control	Control	Control	Control
Year	Control	Control	Control	Control	Control	Control
N	4833	5307	832	4833	5307	832
Adj. R-sq	0.150	0.151	0.132	0.055	0.080	0.072
N_clust	1439	1600	490	1439	1600	490
F	10.790	13.563	3.290	5.277	7.532	1.869

Note: All of the coefficient estimates are adjusted using heteroskedasticity and company clustering to obtain robust standard errors. Adjusted *t*-Statistics are provided in brackets.

* Significance at the level of 10% (two-tailed test).

** Significance at the level of 5% (two-tailed test).

*** Significance at the level of 1% (two-tailed test).

database, checking them one by one, and thus distinguishing the directors appointed by controlling shareholders from those appointed by non-controlling shareholders. To examine further effects of this variable, if any, on the pay gap, we divide the ratio of salaried directors appointed by shareholders (PR) into the ratio of salaried directors appointed by controlling shareholders (CPR) and the ratio of salaried directors appointed by non-controlling shareholders (NCPR), and divide the ratio of non-salaried directors appointed by shareholders (NPR) into the ratio of non-salaried directors appointed by controlling shareholders (CNPR) and the ratio of non-salaried directors appointed by non-controlling shareholders (NCNPR).

In Table 8, we report the corresponding regression results. When the dependent variable is LEGap, the regression coefficients of PR and NPR, as shown in column (1), are 0.403 and −0.532, respectively, both significant at the 1% level ($t = 4.01$, $t = -6.10$). The regression coefficient of CPR, as shown in column (2), is 0.392, significant at the 1% level ($t = 3.41$), whereas the regression coefficient of NCPR is 0.309, which is insignificant ($t = 1.62$). The regression coefficient of CNPR is −0.774, significant at the 1% level ($t = -7.57$), whereas the regression coefficient of NCNPR is −0.113, which is insignificant ($t = -0.91$). When the dependent variable is LMGap, the regression coefficients of PR and NPR, as shown in column (3), are 0.282 and −0.165, respectively, both significant at the 1% level ($t = 5.51$, $t = -4.07$). The regression coefficients of CPR and NCPR, as shown in column (4), are both significantly positive, whereas the regression coefficients of CNPR and NCNPR are both significantly negative. Taken together, these results indicate that the governance of directors appointed by controlling shareholders does not differ from that of directors appointed by non-controlling shareholders with regard to pay gaps resulting from agency problems.

5.4.4. The influence of administrative posts

To assess the potential influence of the administrative post of the company executives who receive the highest compensation, we first divide the company personnel with the highest compensation into chairmen of the board (including Vice Chairmen), general managers (including Vice Presidents) and other executive positions. Next, we use these subsamples to examine the governance effect of directors appointed by block shareholders on the pay gap. In Table 9, we report the corresponding regression results. The results for the three subsamples show that salaried directors appointed by shareholders significantly increase the pay gap, whereas non-salaried directors appointed by shareholders significantly decrease the pay gap. The results obtained from carrying out separate regressions on the three categories—chairmen of the board, general managers and other executive positions—indicates that the administrative post has no significant effect on the results reported in this paper.

6. Conclusion and discussion

Originally, the pay gap phenomenon could generally be explained by tournament theory. That is, an appropriate pay gap can increase employee motivation and productivity. However, in recent years, company pay gaps have continued to widen, which now seems to be due to the misuse of power by company executives to influence the formulation of compensation. Therefore, based on the executive-power theory, this paper examines the effects of companies' governance mechanisms on their pay gap. According to the executive-power theory, CEOs are particularly likely to use their power to influence the design of compensation packages in order to increase their own compensation beyond the optimal pay level, thereby producing an excessive pay gap. Such a pay gap has a series of negative economic consequences, such as the failure of salary–related incentive mechanisms and a decline in company performance. Therefore, it is necessary to examine how companies' governance mechanisms ease the agency problem during the formulation of salary structure and thereby reduce excessive pay gaps.

Using a sample of Chinese A-share listed companies during the 2005–2011 period, we first examine the effects on pay gap of the presence of directors appointed by shareholders. The results show that on average, directors appointed by shareholders have a negative effect on the pay gap. Next, we distinguish between shareholder-appointed directors according to whether they are salaried by the company or an external source. The results show that the presence of salaried directors appointed by shareholders significantly increases the pay gap, while the presence of non-salaried directors appointed by shareholders significantly decreases the pay gap. Therefore, it may be difficult for salaried directors appointed by the shareholders of listed companies to effectively supervise the company's executives, due to a lack of independence. In contrast, non-salaried

directors appointed by block shareholders are better able to represent shareholders' interests in carrying out effective supervision of executives. In this paper, we also use the instrumental-variable regression method to eliminate the potential adverse effect of endogeneity and conduct some further tests to reduce the potential effect of correlated factors on the results of the paper. Our conclusions cast light on the pay-gap phenomenon exhibited by China's listed companies and offer insights into the decision-making behavior of salaried and non-salaried directors appointed by block shareholders to supervise executives.

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Independent directors' board networks and controlling shareholders' tunneling behavior☆

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ABSTRACT

As one of the channels by which board directors build important relationships, board networks can affect the governance role of independent directors. Defining director board networks as their connections based on direct ties they establish when serving on at least one common board, this paper explores the role of the network centrality of independent directors in restraining tunneling behavior by controlling shareholders in the Chinese capital market. Our empirical evidence shows that tunneling behavior by controlling shareholders is negatively related to the network centrality of independent directors and that this relationship is stronger when non-operating fund occupation is used as the measure of tunneling. The results of our study show that board networks can help independent directors to restrain tunneling behavior by large shareholders, which plays a positive role in corporate governance.

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1. Introduction

In the corporate governance field, relations among directors are one kind of social network that cannot be ignored (Conyon and Muldoon, 2006; Engelberg et al., 2012; Fracassi and Tate, 2012). The behavior of directors depends simply not only on their own contacts, but also on the influence of other people's contacts within social networks (Granovetter, 1985). Independent directors not only play a role in monitoring the company, but also play many other social roles, such as serving as company executives, industry association leaders, government officials, university professors and members of a variety of associations. Directors with many social roles naturally have a variety of social network connections, such as through their membership of professional associations, alumni networks and clubs, fellowships, in-law relationships and kinship networks. This paper focuses on one of the unique forms of social networks – interconnections forged among directors of listed companies by serving on at least one common board at the same time – to investigate the governance role of independent directors in China.[1]

Specifically, this paper examines the role of independent director board networks in mitigating agency problems between large shareholders and minority shareholders. That is, whether the network centrality of independent directors pushes them to deter tunneling by controlling shareholders. In comparison with the U.S. and a few countries with characteristics of dispersed ownership, most countries have more concentrated equity ownership (La Porta et al., 1999), and most firms are controlled by one or a few large shareholders. The existence of controlling shareholders gives prominence to agency problems with minority shareholders and tunneling[2] is the most direct form of evidence of controlling shareholders' agency problems that seriously damage the interests of minority shareholders.[3] The tunneling behavior of controlling shareholders in China's capital market hinders its healthy development (Chen and Wang, 2005; Jiang et al., 2010). A series of policies have been issued to restrain tunneling behavior by controlling shareholders. However, these policies have not achieved their goals in practice (see Section 3 for more details). Many tunneling events have occurred in China's capital market to date. Moreover, these events are becoming increasingly serious.[4]

This paper does not examine all types of network relations among directors and is limited to an investigation of the network centrality and governance role of independent directors. There are three reasons for this approach: first, the weak tie and structural hole theories hold that independent directors play the key role in board networks, whereas most inside directors are isolated and their network characteristics are not obvious. Second, most inside directors are also executives, which reduces their monitoring role (Fama and Jensen, 1983). This is especially in China, where the chairman of the board plays a role somewhat similar to that of the CEO in the U.S. (Firth et al., 2007; Ye et al., 2011). Third, due to the mandatory policies on independent directors implemented in China's capital market from 2003 to date, many prior studies find that the average proportion of independent directors is one third, just meeting the CSRC requirement, and that they have no obvious governance role in China. Hence, given this institutional background, this paper only investigates independent director networks and their economic consequences.

Among the various mechanisms designed to prevent controlling shareholders from tunneling in China, governance by independent directors has been one of the key measures since it was introduced for A-shares in

[1] For example, I1, I2 and I3 are three independent directors. I1 and I2 do not serve on the same board, so there is no direct connection between them; however, when I1 and I3 both serve on the board of Company B, and I2 and I3 both serve on the board of Company C, then I1 and I2 are indirectly connected by I3.

[2] The word "tunneling" was proposed by Johnson et al. (2000) to describe the behavior of company controllers transferring the company's assets and profits to further their own interests.

[3] Under certain circumstances, controlling shareholders prop up listed companies. For example, Jian and Wong (2010) find that controlling shareholders prop up listed companies through abnormal related party transactions to reach refinancing standards or avoid delisting. However, they also point out that such propping behavior is accompanied by controlling shareholders transferring listed company funds in the next period.

[4] Based on CSRC data on penalties imposed on controlling shareholders for using listed company funds from 2007 to the end of 2010, we find that such penalties were imposed in relation to 30 listed companies (involving 80 year-observations). During this period, the number of penalty observations for the use of company funds by large shareholders was still 38 in years after 2007, accounting for 23% of all such observations between 2000 and 2010.

2001. Independent directors of companies listed on the Chinese capital market have special powers in the supervision of "significant related party transactions and related financial problems," one of six regulatory requirements. Thus, independent directors must monitor and issue independent opinions on significant related party transactions and the use of related funds. While no clear conclusion can be drawn from existing empirical evidence on the governance role of independent directors (Gao et al., 2006; Ye et al., 2007), this paper adopts a board network perspective to provide detailed new evidence on the role of independent directors in curbing tunneling behavior by controlling shareholders. Using various measures for the use of controlling shareholders' funds, the empirical results show that the higher the degree of network centrality among independent directors, the smaller the extent to which controlling shareholders use shareholders' funds, especially when the use of non-operating funds is used as the tunneling measure. These empirical results imply that the network centrality of independent directors promotes their governance role in deterring tunneling by controlling shareholders. In other words, board networks can contribute to the governance practices of independent directors and reduce Type II agency problems (problems between large shareholders and minority shareholders). This paper differs from studies focusing on the role of director networks in the United States. For example, Hwang and Kim (2009) find that independent directors who have social networks with the firm lose their independence. Fracassi and Tate (2012) find that internally prompted earnings restatements and value-decreasing M&A activities occur in firms with more extensive relations among their directors.

The remainder of this paper is organized as follows. Following a review of the literature in Sections 2 and 3 analyzes the institutional background and develops our hypothesis. Section 4 describes the research design. Section 5 provides the empirical analysis and Section 6 concludes the paper.

2. Literature review

As the first researchers to use the word "tunneling" to describe the misuse of company funds by controlling shareholders, Johnson et al. (2000) list several methods by which it is achieved: transferring growth opportunities belonging to listed company to themselves or their subsidiaries; transferring profits via intra-group transactions from listed companies to other subsidiaries they own or control; using assets or capital belonging to the listed company or using them as collateral or guarantees for their financing activities; and capital operations aimed at diluting the interests of other shareholders. Friedman et al. (2003) propose a model showing how large shareholders tunnel or prop listed companies in different financial positions. Meanwhile, companies with a pyramid ownership structure are more likely to be tunneled, but are more likely to be propped when facing adverse shocks.

In the Chinese capital market, Yu and Xia (2004) find that related party transactions are significantly more prevalent in companies with controlling shareholders. Li et al. (2004) finds that the use of listed company funds by controlling shareholders exhibits an inverted U-shaped nonlinear relationship with the proportion of equity held by the largest shareholders. Wang and Xiao (2005) find that the use of funds by the 10 largest shareholders for related party transactions is significantly less common in listed companies with institutional investors and that an increase in the stake held by institutional investors is significantly negatively related to the extent of funds used by related parties in listed companies. Chen and Wang (2005) find that the value of related party transactions is significantly positively related to ownership concentration and that increasing the number of controlling shareholders holding more than 10% reduces both the probability of related party transactions occurring and the value of such transactions. Jiang and Yue (2005) find a negative relationship between the use of funds by large shareholders and future profitability in listed companies, and show that the use of funds by large shareholders has a negative effect on the company. Gao et al. (2006) conclude that tunneling by controlling shareholders is exacerbated by ownership concentration and business group control, but is inhibited by managerial ownership and fund holdings, information disclosure transparency, investor protection and product market competition. Luo and Tang (2007) observe that the less the regional government intervenes in the market and the more developed are financial markets, the lower the probability of tunneling by controlling shareholders in listed companies in the region. Ju and Pan (2010) find that listed firms that are smaller, have higher leverage or lower operating margins, or in which non-operating profit accounts for a larger proportion of total profit are more likely to engage in related party transactions. Du et al. (2010) find that high-quality auditing can significantly inhibit the use of company funds by large shareholders of listed companies, but that

companies with more serious cases of funds being used by large shareholders may not choose to have high-quality audits performed. Jiang et al. (2010) examine other receivables in Chinese listed companies to examine the nature, content and economic consequences of controlling shareholder behavior. Jian and Wong (2010) point out that abnormal related sales are one means of propping used by the controlling shareholders of listed companies, and that it is more prevalent in state-owned listed companies and regions with a poor institutional environment. They also show that abnormal related party transactions take place in conjunction with the next phase of associated lending for cash transfers among controlling shareholders. Using Chinese data to verify the model of Friedman et al. (2003), Peng et al. (2010) find that in financially healthy (financially distressed) listed firms, controlling shareholders are more likely to tunnel (prop) the firm through related party transactions, and that the market reacts negatively (positively) to such transactions. They also find that all types of related party transactions can be used as a means of tunneling or propping. Wang and Xiao (2011) investigate the relationship between the tunneling behavior of listed company controlling shareholders and executive compensation incentives in China, and find that tunneling by controlling shareholders reduces executives' pay-for-performance sensitivity. This implies that controlling shareholders lower the incentives in the relationship between managerial pay and performance for their own interests.

Prior studies have examined the relationship between the supervision of independent directors and related party transactions or company fund use by listed company controlling shareholders. Among these studies, Tang et al. (2005) find that independent directors play a governance role in suppressing channel excavation by large shareholders through related party transactions, such as the use of company funds, asset sales and security and cash dividends, but that these effects are not obvious. In contrast, Gao et al. (2006) find that independent directors have no monitoring effect on tunneling behavior by controlling shareholders. After controlling for the endogeneity of independent directors, Ye et al. (2007) find that increasing the number and proportion of independent directors may deter controlling shareholders from using company funds. Huang and Pan (2010) find that the professionalism of independent directors has a significant monitoring effect on related party transactions between controlling shareholders and listed companies. They also demonstrate that independent director compensation is significantly positively related to the frequency of related party transactions between controlling shareholders and listed companies, but that the proportion of independent directors has no significant effect on such transactions.

Although the literature has yet to explore the relationship between social networking among corporate boards and the tunneling behavior of controlling shareholders, some recent studies examine the nexus between board social networks and corporate finance. Hochberg et al. (2007) find that venture capital companies with more network relationships perform better in the follow-up financing and exit stages. Kuhnen (2009) shows that mutual fund directors and fund administration consulting firms prioritize appointing each other based on the degree of contact they have had in the past, but that such strong director-consultant links do not lead to better or worse consequences. Based on a sample of 29,637 firm observations in the United States from 2000 to 2007, Larcker et al. (2013) find that firms with more central director positions earn higher stock returns. They measure centrality by the number of directors common to two companies. If a portfolio is constructed by buying stocks of firms with a central position in a board network and selling stocks of those without, an average annual excess return of 4.68% can be obtained. Their results show that the board of director network is a signal of economic benefits not immediately reflected in stock prices. In the Chinese capital market, Chen and Xie (2011, 2012) investigate the relationship between the board network of independent directors of listed companies and investment efficiency or executive incentives.

In sum, findings on the effect of independent director governance on the tunneling behavior of controlling shareholders are not conclusive. This paper provides further empirical evidence on this question from the board network perspective.

3. Background and hypothesis development

3.1. Independent directors and tunneling by controlling shareholders

In firms with concentrated ownership, controlling shareholders can rely on their controlling capacity to gain private benefits via various types of transactions with the firm (e.g., selling assets, commodities or services

to the firm at a high price or acquiring assets at a low price). This can occur more frequently in countries with an inefficient legal environment and weak corporate governance (Shleifer and Vishny, 1997). In the emerging and transitional market of China, most firms are controlled by large shareholders. The concentration of ownership among Chinese firms means that Type II agency problems (between controlling and minority shareholders) are more prevalent and tunneling is one of the most direct ways in which controlling shareholders misuse company assets at the expense of minority shareholders. Controlling shareholders use various methods to tunnel listed firms, such as related party transactions and the use of company funds, the latter of which is the most visible and serious means of tunneling in the Chinese capital market (Jiang et al., 2010; Wang and Xiao, 2011).

Because the primary objective of the Chinese capital market is to broaden the financing channels of SOEs, most of the listed companies are SOEs controlled by the government and its affiliated bodies. The non-tradable shares problem these shareholders face further strengthens their tunneling motivation (Jiang and Yue, 2005).[5] Moreover, weak investor protection and penalties for violations provide additional impetus for tunneling behavior. From 2003 to 2006, regulators implemented penalties for tunneling behavior by controlling shareholders. For example, on August 28, 2003, the CSRC and the State-Owned Assets Supervision and Administration Commission of the State Council (SASAC) jointly announced the "normalization of external guarantees between listed companies and related parties," and specified the method by which tunneling would be prevented among related shareholders. On July 27, 2004, the CSRC and the SASAC issued a policy relating to debt-equity swaps involving controlling shareholders to use this method to solve the tunneling problem. In June 2005, the CSRC required listed companies to resolve their cash occupation problems by the end of the year. On November 7, 2006, eight councils of the Chinese government jointly issued the "announcement on cleaning up the use of listed company cash by controlling shareholders," and also required that a continuing policy be established. Though regulators have issued various policies to prohibit tunneling behavior, the governance effect of these measures is not clear. An interesting phenomenon is that while the CSRC has penalized many firms, firms' controlling shareholders act in their own way through more implicit methods. From 2007 to 2010, 38 firms were sanctioned for the illegal use of cash. Tunneling by controlling shareholders remains a major problem in the Chinese capital market (Jiang et al., 2010).

Among various corporate government mechanisms, the independent director policy is aimed at monitoring controlling shareholders and protecting investors' interests. On August 16, 2001, the CSRC issued the "announcement on implementing the independent director policy in listed companies" and endowed independent directors with six special powers, the first one being that major related party transactions must be approved by independent directors before being submitted to the board for discussion. In addition, independent directors were required to express their own views on whether loans or cash transferred to listed companies' shareholders, ultimate controllers and related parties amount to more than 5% of total assets. On August 28, 2003, the announcement on the normalization of external guarantees between listed companies and related parties required independent directors to express their own views on the firm's guarantees. All of the foregoing policies provide independent directors with more powers to prevent tunneling behavior by controlling shareholders in China. The 2004 Annual Report of the Shanghai Stock Exchange shows that nearly 80% of independent directors considered their role were limited to related party transactions and the use of company funds.[6] However, evidence on their success in fulfilling this role is mixed. Gao et al. (2006) and Huang and Pan (2010) find that independent directors have no effect on tunneling behavior by controlling shareholders, whereas Tang et al. (2005) and Ye et al. (2007) find that they have a positive effect. As the proportion of independent directors in most firms is about 33%, which just meets the CSRC requirement, their monitoring role could not be distinguished because of the small degree of variance in the data. Thus, research on the network characteristics of independent directors is more important in China.

[5] Xu (2009) finds that although the non-tradable share reform has reduced this problem, Type II agency problems haven't been entirely resolved.

[6] For details, see the 2004 Corporate Governance Report on Chinese Companies: Independence and Efficiency of Board Directors, Research Centre of Shanghai Stock Exchange, Fudan University Press.

3.2. Board networks, governance role of independent directors and tunneling

We follow Xie and Chen (2012) by defining a board network as directors' connection sets based on direct ties established when serving on at least one common board. From the sociology perspective, network relationships can be expressed as a structure comprising nodes and connections. Thus, in a board network, the nodes can be seen as the directors and the connections can be seen as the relationships among the directors. If two directors serve on at least one common board, they are jointly related and directly connected. The set of direct and indirect connections forms a board network (Larcker et al., 2013). Based on this definition of a network and on the measurable characteristics of networks, their nature and network data, we define a board network as the relationships among board members, which is different from other social relations such as school ties, club relations and kinship. We consider that this type of network is more suitable for empirical study than others, because weak tie theory and structural hole theory in the social network field imply that independent directors, rather than inside directors, play the key role in board networks. Thus, we focus on networks among independent directors in this paper.

Fig. 1 illustrates the board network of three listed firms (Xie and Chen, 2012). The figure shows that independent director O1 will certainly be influenced by his own attributes when making corporate governance decisions. For example, as an accounting professor, he will be an expert in the financial disclosure field. Meanwhile, because independent director O2 has the same background as O1, they may have the same corporate governance effect according to prior research (assuming their other attributes are the same). Independent director I11 in firm A has a legal background, and inside director I33 in firm C is an industry expert (we assume that firms B and C are in the same industry). Therefore, O1 can gain information and professional knowledge about the law and the industry when communicating with I11 and I33 respectively. However, O2 cannot obtain similar information and knowledge because he serves on the board of firm B. Hence, in firm B, O1 has a more significant effect on corporate governance than O2 because of the embeddedness of the board network. This is the logic of board networks.

We consider that the governance role of directors can be influenced by their board network and that the embeddedness of networks can mediate both over-socialization and under-socialization (Granovetter, 1985). On the one hand, network embeddedness can maintain individual directors' independence and help them make decisions based on their professional background and preferences. On the other hand, the network view shows that directors' governance and decision behavior can evolve into a dynamic and interactive process. Directors in a network can exchange information and obtain specific knowledge from each other to improve the efficiency of governance. Therefore, director behavior is embedded in their social networks.

People's positions in the social structure and social connections can influence their ability to gain information and resources, which in turn influences their economic actions (Luo, 2010). The network centrality of independent directors means that they play an active and important role in the overall board network, through which they can gain more information and broaden their knowledge. Differences in network positions can influence independent directors' reputational incentives and ability to exercise independence. First, the network positions of directors are an important channel by which they can build a reputation (Freeman, 1979). Sitting in the middle of the entire board network, independent directors can obtain more governance information and knowledge, strengthen their influence on the board, and gradually accumulate a reputation for corporate governance, and may eventually be more likely to secure additional board seats.[7] All of these can be described as the expert reputation the board network provides.[8] Second, Lin (2002) considers that network-based prestige has a "symbolic effect"; even if actors cannot gain the resources embedded in the social

[7] Cashman et al. (2010) find that if board network centrality increases, the probability of securing additional board seats in the future is greater.

[8] Although Fich and Shivdasani (2006) and Andres and Lehman (2010) find that interlocking relationships among directors may reduce their corporate governance effect, Fama (1980) and Fama and Jensen (1983) demonstrate that the external market for directors is the channel by which independent directors build their reputation (we refer to this as the reputation capital perspective). In addition, more academic evidence shows that interlocking directorships can increase the corporate governance effect. Many studies use the number of seats a director has as an indicator of their reputation in the external labor market (Tan et al., 2010; Ye et al., 2011).

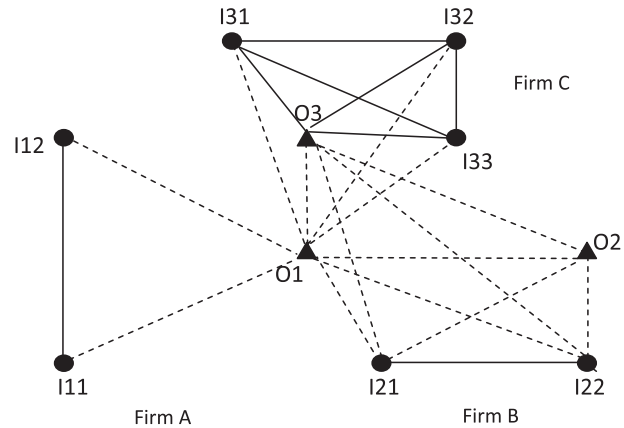

Figure 1. Sample board network.

network, they can be seen as having these resources, which other people view as a symbol. Hence, the more central the independent director's network position, the more prestige he gains. Third, if an independent director's position is central, a virtual group can be formed around him, and most members of this group are elite members of society, which is called an elite circle (Davis et al., 2003; Nguyen, 2009). Wang (2007) finds that there is mutual recognition among members of the elite group.[9] The greater the network centrality of independent directors, the more attention they will pay to others' recognition and the more time they will spend making corporate governance decisions. In contrast, if directors with central positions in the network cannot prevent tunneling behavior, the "outrage cost" from media and the public could be extremely large and their reputation within the network will be damaged, a possibility that independent directors should take seriously. In sum, the expert reputation, social prestige and recognition of the elite group can make independent directors who attain a central position in the network more sensitive to their reputation, and can give them more of an incentive and greater pressure to make decisions to prevent tunneling behavior by controlling shareholders.

Moreover, as independent directors with a more central position do not worry about their future board seats (Cashman et al., 2010), they have greater bargaining power with controlling shareholders, and have more opportunities to make independent decisions to restrict the tunneling behavior of controlling shareholders, such as related party transactions or the use of company funds. Furthermore, public pressure may force controlling shareholders to change their tunneling methods in a more implicit way. Because the ability of directors to collect information can be differentiated by the different network positions they occupy, independent directors in a central network position can gain more specific knowledge of how to detect implicit tunneling behavior than those in non-central positions. Hence, the "learning effect" indicates that independent directors with more central positions are more likely to become aware of and prevent tunneling by controlling shareholders. We thus hypothesize as follows:

Where the network centrality of independent directors in the firm is greater, tunneling by controlling shareholders is less likely to occur and is likely to be less prevalent.

4. Research design

4.1. Measurement of board network centrality

In sociology, network centrality is used to measure different degrees of involvement in a social network (Freeman, 1979; Wasserman and Faust, 1994). We follow the sociology literature by using network centrality

[9] Zhou (2010) finds that in China, relationships between people have changed from those based on traditional relation-based trust represented by "differential patterns" to those characterized by relation-based recognition as represented by "colleagues, friends and 'friends of friends'".

as a measure representing independent directors' network positions and connections in the whole board network.[10] There are four basic network centrality measures: degree centrality, betweenness centrality, closeness centrality and eigenvector centrality (see Appendix A for more details). Wasserman and Faust (1994) point out that as each specific centrality measure has its own advantages and disadvantages, researchers should not use only one measure and ignore the others. For the degree of network centrality, if a director's degree of centrality is small, his position isolates him from other directors in the board network and weakens his participation in ongoing communication. Betweenness centrality gauges the ability of a director to gain information from the network with initiative, speed and accuracy. Closeness centrality represents how independently and accurately a director obtains information. That is, if the director does not occupy a central position in the network, then he must rely on others to obtain information, which reduces its timeliness and accuracy. Eigenvector centrality, a recursive measure of degree centrality, represents the quality of connections. In sum, degree centrality focuses on participation in communication, betweenness centrality on control and initiative in communication, closeness centrality on independence and effectiveness of communication, and eigenvector centrality on quality of communication. We draw on these concepts to construct a new and more comprehensive integrated measure of network centrality (Wasserman and Faust, 1994; Larcker et al., 2013).

Specifically, we collect information on all directors of A-share listed firms and arrange them in matrix form. We first calculate the four network centrality measures for each director for completeness of measurement, then focus exclusively on independent director networks. To construct a firm-level network measure, we compute the median and mean values of the network centrality of a firm's independent directors to estimate the firm's network centrality. In robustness tests, we also use the maximum and minimum values (Schonlau and Singh, 2009; Larcker et al., 2013). We have two reasons for doing so: first, the median value represents the typical centrality of the independent directors' network; and second, one independent director's influence is more representative than that of others. In line with Larcker et al. (2013), to reduce the influence of different dimensions and outliers, we rank the network centrality measures in 10 groups (labeled 0–9) for every year, then take the mean value as the measure of the firm's network centrality (score_median, score_max).

4.2. Measurement of tunneling by controlling shareholders

We use the amount of funds used by controlling shareholders for related party transactions as a proxy for tunneling behavior. Controlling shareholders make two types of loans to listed companies. Operating loans generated by normal related party transactions such as accounts receivable and other receivables beyond normal transactions, such as the use of non-operating funds. The latter type is the key supervisory target of CSRC regulations (Ye et al., 2007; Zeng and Chen, 2009). Thus, we use other receivables held by the largest shareholder and its affiliated firms as a proxy for tunneling behavior (TUN). Peng et al. (2010) find that controlling shareholders use all types of related party transactions for tunneling, two of which are used in this paper: the use of operating funds (ABNTUN) and the use of non-operating funds (NMTUN). However, the use of non-operating funds by controlling shareholders is adopted as the main measure in this paper. Gao et al. (2006) and Zeng and Chen (2009) find that listed firms also use funds from their controlling shareholders. Hence, we also use the net use of funds in robustness tests (ΔTUN, ΔABNTUN, ΔNMTUN). The specific definitions of the variables are listed in Table 1.

4.3. Model and variables

The model used to test the relationship between the network centrality of independent directors and tunneling by controlling shareholders is as follows:

$$Tunnel_t = \alpha_0 + \alpha_1 CEN_t + \sum Controls + \sum IND + \sum Year + \varepsilon \quad (1)$$

[10] Hochberg et al. (2007), Crespi and Fuster (2009), Barnea and Guedj (2009), Horton et al. (2009), Schonlau and Singh (2009), Farina (2009), Andres and Lehman (2010), Chuluun et al. (2010), Cashman et al. (2010), Liu (2010) and Larcker et al. (2013) use similar network measures in the finance and accounting literature. However, most of them use one or several specific measures; only Larcker et al. (2013) use a comprehensive measure.

Table 1
Variable definitions.

Name	Symbol	Definition
Controlling shareholders' tunneling	TUN	Sum of accounts receivable, account prepayments and other receivables held by controlling shareholders, scaled by total assets
	ABNTUN	Other receivables held by controlling shareholders, scaled by total assets
	NMTUN	Sum of accounts receivable and account prepayments held by controlling shareholders, scaled by total assets; equals (TUN − ABNTUN)
	ΔTUN	(accounts receivable + accounts prepayments + other receivables − accounts payable − receivables in advance − other payables) held by controlling shareholders, scaled by total assets
	ΔABNTUN	Other receivables held by controlling shareholders minus other payables held by the listed firm, scaled by total assets
	ΔNMTUN	ΔTUN − ΔABNTUN
Network centrality of independent directors	CEN	The integrated network centrality of independent directors at the firm level (score_median and score _max)
Ultimate controller's ownership	SOE	An indicator variable that takes the value of 1 if the firm is state-owned and 0 otherwise
Concentration of ownership	FSHR	The ratio of shares held by the largest shareholder divided by the total number of shares outstanding at the end of the year
Equity restriction	HFD	The proportion representing the combined ownership stakes of the second to fifth largest shareholders at the end of the year
Separation of ownership and control	CO	The proportion of control rights and cash flow rights held by the ultimate controller. See Claessens et al. (2000) for the calculation process
Firm group	GROUP	An indicator variable that takes the value of 0 if the firm's ultimate controller is an individual, the SASAC, a university, a social organization, a research institution, an ESOP association or an investment corporation, and 1 otherwise (Li et al., 2004; Tang et al., 2005)
Performance	ROE	Net income scaled by equity at the end of the year
Size	SIZE	The natural logarithm of total assets at the end of the year
Leverage	LEV	Total liabilities divided by total assets
Market environment	MKT	A dummy variable equal to 1 if the index of the market environment is above the median and 0 otherwise. See Fan et al. (2010) for index details
Non-tradable shares reform	GG	An indicator variable that takes the value of 1 if the firm's non-tradable reform process is successful and 0 otherwise
Board size	BOARD	The number of board directors
Duality	DUAL	An indicator variable that takes the value of 1 if the board chairman and CEO are the same person and 0 otherwise
Proportion of independent directors	OUT	The proportion of independent directors on the board in the current year
Industry/year	IND/YEAR	The industry dummies are based on CSRC benchmarks (2001) and six year dummies

Table 1 defines all of the variables in our model. $Tunnel_t$ is the dependent variable, which is represented by the fund use measures: TUN, ABNTUN and NMTUN. In robustness tests, we also use ΔTUN, ΔABNTUN and ΔNMTUN as additional measures. CEN_t is the explanatory variable. We predict that α_1 is negative, that is, the greater the network centrality of the independent directors, the greater their monitoring effect and the less prevalent tunneling is by controlling shareholders. We run a Tobit regression for TUN/ABNTUN/NMTUN/ΔTUN/ΔABNTUN/ΔNMTUN to account for the significant number of zero observations.

Similar to those of Jiang et al. (2010), Jian and Wong (2010) and Ye et al. (2007), our control variables include the ultimate controller's ownership (SOE), the proportion of the firm's equity owned by the largest shareholder (FSHR), the sum of the ownership stakes of the second to fifth largest shareholders (HFD), separation of the ownership and control rights of the ultimate controlling shareholder (CO), whether the listed firm is part of a group (GROUP), firm performance (ROE) and the market environment (MKT). Given the finding of Zhang et al. (2010) that the largest shareholder's role changed after the non-tradable share reform was implemented, we control for this phenomenon (GG). As there was a focus on cleaning up the misuse of funds at about the same time as the non-tradable share reform, the GG variable also controls for regulatory policy. We also control for variables influencing the governance role of independent directors such as

Table 2
Descriptive statistics.

Variables	Obs.	Mean	Median	Max	Min	STD
TUN	7572	0.0213	0.0008	0.5138	0.0000	0.0659
ABNTUN	6714	0.0115	0.0000	0.4347	0.0000	0.0517
NMTUN	6714	0.0102	0.0001	0.2077	0.0000	0.0295
score_median	9757	3.4861	3.0000	9.0000	0.0000	2.7506
score_max	9757	4.0323	4.0000	9.0000	0.0000	2.8066
SOE	9757	0.6141	1.0000	1.0000	0.0000	0.4868
FSHR	9757	0.3830	0.3608	0.7584	0.0923	0.1603
HFD	9757	0.0193	0.0073	0.1160	0.0000	0.0259
CO	9757	1.5013	1.0000	6.6051	1.0000	0.9819
GROUP	9757	0.1698	0.0000	1.0000	0.0000	0.3755
ROE	9434	0.0520	0.0694	0.4325	−1.2033	0.2019
SIZE	9754	21.3576	21.2416	25.0182	18.7185	1.1797
LEV	9754	0.5303	0.5132	1.9083	0.0728	0.2773
MKT	9757	0.7483	1.0000	1.0000	0.0000	0.4340
GG	8247	0.4422	0.0000	1.0000	0.0000	0.4967
BOARD	9642	9.4105	9.0000	17.0000	5.0000	2.0450
DUAL	9757	0.1444	0.0000	1.0000	0.0000	0.3515
OUT	9639	0.3522	0.3333	0.5000	0.0000	0.0495

board size (BOARD), duality (DUAL) and the proportion of independent directors (OUT). We also adopt other common control variables such as firm size (SIZE), leverage (LEV) and industry (IND) and year (YEAR) dummy variables.

4.4. Sample and data

We start with observations for all Chinese A-share listed firms from 2003 to 2009. Financial industries are removed from the original dataset. The removal of items with missing data substantially reduces the number of observations, yielding a final sample comprising 9757 firm-year observations. All of the data are from the CSMAR database, among which the data on controlling shareholders' use of funds for related party transactions are from the "cash transfers for related party transactions" CSMAR sub-database. All observations in the top and bottom 1% for continuous variables are winsorized to control for outliers, and *t*-values are clustered at the firm level. The Matlab and Pajek software applications (the most widely recognized software for analyzing large amounts of social network data) are used to calculate directors' network centrality.

5. Empirical analysis

5.1. Descriptive statistics and correlation analysis

Table 2 lists the descriptive statistics of all variables. The results show that controlling shareholders' tunneling of operating funds (TUN) has a mean of 2.13% and a maximum of 51.38%. The mean and maximum for tunneling of non-operating funds (ABNTUN) are 1.15% and 43.47%, respectively. These results imply that tunneling is a serious problem among controlling shareholders in China. The means of score_median and score_max are 3.49 and 4.03, respectively. The mean of FSHR is 38% and the median is 36.08%, indicating a need to improve the monitoring incentives and tunneling suppression capacity of independent directors in Chinese firms with highly concentrated ownership. The mean and median of OUT are 35.22% and 33.33%, respectively, implying that the proportion of independent directors in most listed firms meets or just exceeds the CSRC requirement.

Table 3 lists the correlations among the main variables.[11] There are negative correlations between score_median, score_max and all proxies for tunneling by controlling shareholders, especially TUN and ABNTUN.

[11] Due to the length of this paper, the correlation values of the control variables are not reported.

Table 3
Correlation matrix.

	score_median	score_max	TUN	ΔTUN	ABNTUN	ΔABNTUN	NMTUN	ΔNMTUN
score_median		0.828***	−0.006*	−0.04***	−0.034***	−0.025**	−0.045	−0.022*
score_max	0.850***		−0.015**	−0.039***	−0.045***	−0.021*	−0.044	−0.024**
TUN	−0.057***	−0.071***		0.807***	0.844***	0.651***	0.607***	0.545***
ΔTUN	−0.045***	−0.049***	0.532***		0.716***	0.889***	0.445***	0.526***
ABNTUN	−0.063***	−0.074***	0.648***	0.391***		0.779***	0.144***	0.144***
ΔABNTUN	−0.04***	−0.037***	0.296***	0.722***	0.472***		0.099***	0.127***
NMTUN	−0.019	−0.036***	0.788***	0.331***	0.25***	0.026**		0.87***
ΔNMTUN	−0.029**	−0.044***	0.461***	0.603***	0.132***	0.108***	0.532***	

Note: Spearman correlations are listed in the upper right of this table and Pearson correlations in the lower left.
* Significance at the 10% level.
** Significance at the 5% level.
*** Significance at the 1% level.

Neither the Spearman nor the Pearson coefficients of NMTUN, score_median and score_max are significant. Although there are generally negative correlations between the network centrality of independent directors and tunneling by controlling shareholders, this relationship does not exist when measured by the use of operating funds. The correlation matrix, however, merely shows the univariate results. Multivariate tests are needed to obtain more meaningful empirical findings. The correlations of the non-listed variables are no higher than 0.5, thus indicating that multicollinearity is not a serious problem in this study.

5.2. Multivariate regression analysis

Table 4 lists the main regression results and shows that when the dependent variable is TUN, the coefficient on score_median is negative and marginally significant (t-value of −1.58) and the coefficient on score_max is significantly negative at the 5% level. When the dependent variable is ABNTUN, the coefficients on both score_median and score_max are significantly negative. However, when the dependent variable is NMTUN, the coefficients on score_median and score_max are insignificant. These results imply that controlling shareholders are more likely to tunnel by using non-operating funds than by appropriating operating funds and that the effect of independent director network centrality is mainly reflected in the use of non-operating funds. Thus, the empirical results reported above show that the greater the network centrality of independent directors, the less pervasive tunneling is by controlling shareholders. Our prediction is thus supported, showing that the board networks of independent directors have the effect of suppressing tunneling by controlling shareholders. These empirical results demonstrate that studying independent director networks is more meaningful than merely testing the ratio of independent directors on each board.

Among the control variables, the coefficients on SOE are significantly positive at the 1% level, thus indicating that tunneling is more likely to occur in SOEs, which is similar to the finding of Gao et al. (2006). The coefficients on FSHR are significantly positive at the 1% level, implying that the larger the ownership stake of the largest shareholder, the more serious tunneling is likely to be, thus corroborating the findings of Yu and Xia (2004) and Li et al. (2004). MKT is significantly negatively related to all of the dependent variables, other than ABNTUN, thus showing that tunneling by controlling shareholders is weaker under better market environments, a result confirming that of Luo and Tang (2006). GG is significantly negatively related to tunneling, thus demonstrating that the incentive for tunneling diminished as shares owned by controlling shareholders became tradable after the non-tradable share reform.

5.3. Robustness tests[12]

When testing for tunneling by controlling shareholders, the transfer of funds from controlling shareholders to the listed company must also be considered (Gao et al., 2006; Zeng and Chen, 2009). Therefore, the first

[12] Results not reported here can be provided to interested readers.

Table 4
Multivariate results for independent director network centrality and tunneling.

	TUN		ABNTUN		NMTUN	
	score_median	score_max	score_median	score_max	score_median	score_max
CEN	−0.0006	−0.0008**	−0.0009**	−0.0010***	0.0001	−0.0001
	(−1.58)	(−2.46)	(−2.55)	(−3.03)	(0.59)	(−0.49)
SOE	0.0101***	0.0107***	0.0069***	0.0069***	0.0072***	0.0072***
	(5.21)	(5.45)	(3.38)	(3.40)	(5.39)	(5.45)
FSHR	0.0536***	0.0485***	0.0286***	0.0285***	0.0360***	0.0358***
	(9.40)	(8.36)	(4.79)	(4.77)	(9.19)	(9.16)
HFD	0.0200	0.0123	−0.0075	−0.0095	0.0292	0.0284
	(0.59)	(0.36)	(−0.22)	(−0.27)	(1.28)	(1.24)
CO	0.0003	−0.0001	−0.0007	−0.0007	−0.0002	−0.0001
	(0.32)	(−0.10)	(−0.62)	(−0.62)	(−0.23)	(−0.21)
GROUP	0.0037*	0.0027	0.0001	0.0001	0.0005	0.0005
	(1.84)	(1.25)	(0.04)	(0.03)	(0.36)	(0.35)
ROE	−0.0629***	−0.0645***	−0.0682***	−0.0681***	−0.0117***	−0.0116***
	(−12.53)	(−12.69)	(−13.59)	(−13.56)	(−3.41)	(−3.36)
SIZE	−0.0017**	−0.0003	0.0014	0.0014	0.0007	0.0008
	(−2.00)	(−0.35)	(1.49)	(1.52)	(1.16)	(1.29)
LEV	0.0118***	0.0088*	0.0130***	0.0130***	−0.0043	−0.0044
	(2.66)	(1.92)	(2.78)	(2.79)	(−1.42)	(−1.43)
MKT	−0.0044**	−0.0047***	0.0010	0.0011	−0.0049***	−0.0047***
	(−2.56)	(−2.72)	(0.58)	(0.61)	(−4.20)	(−4.07)
GG	−0.0109***	−0.0064*	−0.0047	−0.0046	−0.0014	−0.0014
	(−5.06)	(−1.72)	(−1.18)	(−1.15)	(−0.56)	(−0.57)
BOARD	−0.0009**	−0.0008*	−0.0016***	−0.0016***	0.0001	0.0002
	(−2.26)	(−1.82)	(−3.79)	(−3.64)	(0.49)	(0.66)
DUAL	−0.0031	−0.0026	0.0019	0.0018	−0.0052***	−0.0052***
	(−1.30)	(−1.08)	(0.77)	(0.74)	(−3.17)	(−3.19)
OUT	−0.0721***	−0.0654***	−0.0584***	−0.0545***	−0.0368***	−0.0363***
	(−4.12)	(−3.71)	(−3.29)	(−3.06)	(−3.14)	(−3.09)
Constant	0.0502***	0.0172	−0.0132	−0.0153	−0.0328***	−0.0340***
	(2.83)	(0.93)	(−0.69)	(−0.81)	(−2.65)	(−2.74)
IND/YEAR	√	√	√	√	√	√
Pseudo R^2 (R^2)	0.061	0.079	0.211	0.212	0.058	0.058
LR chi2 (F-Value)	565.9	729.24	790.29	792.94	525.94	525.84
Obs.	6305	6259	5609	5609	5609	5609

Note: t-values are reported in brackets.
* Significance at the 10% level.
** Significance at the 5% level.
*** Significance at the 1% level.

robustness test measures the net balance of tunneling by controlling shareholders. Since Gao et al. (2006) find that there are two types of incentives for related party transactions, tunneling and propping, we exclude propping firms from our sample. We delete observations with negative values for ΔTUN, ΔABNTUN and ΔNMTUN and rerun the regressions.[13] The results are reported in Table 5, which shows that the network centrality of independent directors is significantly negatively related to tunneling by controlling shareholders and that this holds for both total tunneling (ΔTUN) and the use of non-operating funds (ΔABNTUN). Tunneling by using non-operating funds (ΔNMTUN) is, however, insignificantly related to network centrality, reflecting the main results in Table 4. Because controlling shareholders tunnel listed firms mainly by using company funds in related party transactions and independent directors have difficulty recognizing whether operating transactions constitute tunneling behavior, as do investors (Ye et al., 2007), most of the effect of independent directors in suppressing tunneling by controlling shareholders is reflected in the use of non-operating funds.

[13] The results do not change if these observations are not deleted from the sample.

Table 5
Results for the net value of tunneling and independent director network centrality.

	ΔTUN		ΔABNTUN		ΔNMTUN	
	score_median	score_max	score_median	score_max	score_median	score_max
CEN	−0.0010*	−0.0014***	−0.0012**	−0.0013***	0.0002	−0.0000
	(−1.86)	(−2.98)	(−2.17)	(−2.58)	(0.62)	(−0.05)
SOE	0.0097***	0.0098***	0.0124***	0.0125***	0.0053***	0.0053***
	(3.46)	(3.50)	(4.02)	(4.05)	(3.29)	(3.33)
FSHR	0.0255***	0.0251***	0.0022	0.0020	0.0282***	0.0281***
	(3.07)	(3.04)	(0.25)	(0.22)	(5.96)	(5.93)
HFD	−0.0195	−0.0232	−0.0450	−0.0481	0.0065	0.0060
	(−0.40)	(−0.48)	(−0.87)	(−0.94)	(0.23)	(0.22)
CO	0.0001	0.0001	−0.0007	−0.0007	0.0001	0.0001
	(0.06)	(0.08)	(−0.45)	(−0.45)	(0.11)	(0.12)
GROUP	0.0023	0.0022	0.0029	0.0028	−0.0004	−0.0004
	(0.75)	(0.74)	(0.91)	(0.90)	(−0.24)	(−0.24)
ROE	−0.0900***	−0.0895***	−0.0919***	−0.0916***	−0.0155***	−0.0154***
	(−12.54)	(−12.48)	(−12.51)	(−12.48)	(−3.76)	(−3.73)
SIZE	−0.0015	−0.0013	−0.0003	−0.0003	−0.0013*	−0.0012*
	(−1.14)	(−1.02)	(−0.22)	(−0.20)	(−1.73)	(−1.65)
LEV	−0.0104	−0.0105	0.0042	0.0042	−0.0074**	−0.0074**
	(−1.57)	(−1.59)	(0.59)	(0.60)	(−1.99)	(−2.00)
MKT	−0.0048*	−0.0045*	0.0023	0.0024	−0.0039***	−0.0038***
	(−1.93)	(−1.84)	(0.85)	(0.89)	(−2.79)	(−2.70)
GG	−0.0081	−0.0080	−0.0119*	−0.0118*	−0.0014	−0.0015
	(−1.48)	(−1.47)	(−1.88)	(−1.86)	(−0.48)	(−0.49)
BOARD	−0.0016***	−0.0015**	−0.0022***	−0.0021***	−0.0001	−0.0000
	(−2.65)	(−2.40)	(−3.48)	(−3.34)	(−0.23)	(−0.13)
DUAL	−0.0019	−0.0020	0.0016	0.0015	−0.0047**	−0.0048**
	(−0.56)	(−0.57)	(0.45)	(0.42)	(−2.40)	(−2.41)
OUT	−0.0837***	−0.0778***	−0.0738***	−0.0686***	−0.0394***	−0.0394***
	(−3.35)	(−3.11)	(−2.83)	(−2.62)	(−2.79)	(−2.78)
Constant	0.0561**	0.0515*	0.0281	0.0253	0.0102	0.0094
	(2.09)	(1.91)	(0.96)	(0.87)	(0.67)	(0.62)
IND/YEAR	√	√	√	√	√	√
Pseudo R^2	0.429	0.433	0.187	0.187	0.064	0.065
LR chi2	675.91	681.29	840.52	842.45	281.48	281.1
Obs.	6259	6259	5609	5609	5609	5609

Note: *t*-values are reported in brackets.
* Significance at the 10% level.
** Significance at the 5% level.
*** Significance at the 1% level.

We also run a two-stage linear regression to reduce the potential for endogeneity. Adams and Ferreira (2007) and Armstrong et al. (2010) find that the governance role of independent directors depends on the firm's information environment. We therefore choose a number of instrumental variables related to the information environment for inclusion in the regression: daily stock volatility over one year (STD), analyst following (NUM) and growth (TQ). In the first stage, we regress the network centrality of independent directors on the three instrumental variables, the ownership stake of the largest shareholder, the sum of the square of the second to fifth largest shareholders' ownership stakes, SOE, management ownership ratio, firm size, debt ratio and industry and year dummy variables. The model is specified as follows:

$$\mathrm{CEN}_t = \beta_0 + \beta_1 STD_t + \beta_2 NUM_t + \beta_3 TQ_t + \beta_4 FSHR_t + \beta_5 HFD_t + \beta_6 SOE_t + \beta_7 ESHR_t + \beta_8 SIZE_t + \beta_9 LEV_t + \sum IND + \sum YEAR + \gamma \quad (2)$$

where STD is the standard deviation of daily stock returns during the year; NUM is the analyst following in year t; TQ = (stock price × outstanding shares + net assets per share × non-trading shares + book value to

Table 6
Two-stage instrumental variable regression results.

	TUN		ABNTUN		NMTUN	
	score_median	score_max	score_median	score_max	score_median	score_max
PCEN	−0.0050*	−0.0045*	−0.0075*	−0.0039*	−0.0037	−0.0029
	(−1.84)	(−1.87)	(−1.85)	(−1.67)	(−1.61)	(−1.59)
SOE	0.0060***	0.0061***	0.0050**	0.0047**	0.0051***	0.0051***
	(2.80)	(2.84)	(2.41)	(2.28)	(4.09)	(4.14)
FSHR	0.0291***	0.0291***	−0.0023	−0.0044	0.0292***	0.0286***
	(4.61)	(4.60)	(−0.38)	(−0.72)	(8.04)	(7.94)
HFD	0.0623	0.0623	0.0508	0.0354	0.0348	0.0332
	(1.61)	(1.60)	(1.36)	(0.96)	(1.57)	(1.51)
CO	0.0002	0.0003	0.0005	0.0008	−0.0007	−0.0006
	(0.22)	(0.25)	(0.45)	(0.72)	(−1.10)	(−0.96)
GROUP	−0.0007	−0.0007	−0.0034	−0.0028	0.0010	−0.0002
	(−0.30)	(−0.27)	(−1.45)	(−1.20)	(0.72)	(−0.11)
ROE	−0.0992***	−0.0990***	−0.0923***	−0.0921***	−0.0129***	−0.0125***
	(−16.83)	(−16.76)	(−16.58)	(−16.62)	(−3.84)	(−3.73)
SIZE	−0.0020*	−0.0020*	0.0009	0.0003	0.0012*	0.0011*
	(−1.90)	(−1.81)	(0.75)	(0.33)	(1.73)	(1.71)
LEV	0.0276***	0.0278***	0.0294***	0.0288***	0.0036	0.0038
	(5.39)	(5.41)	(5.87)	(5.84)	(1.22)	(1.30)
MKT	−0.0013	−0.0014	0.0057***	0.0061***	−0.0040***	−0.0040***
	(−0.68)	(−0.71)	(2.94)	(3.18)	(−3.56)	(−3.52)
GG	−0.0069	−0.0068	−0.0087**	−0.0091**	0.0012	0.0001
	(−1.61)	(−1.59)	(−2.07)	(−2.17)	(0.51)	(0.08)
BOARD	−0.0013***	−0.0013***	−0.0015***	−0.0015***	−0.0002	−0.0002
	(−2.82)	(−2.69)	(−3.31)	(−3.22)	(−0.58)	(−0.60)
DUAL	−0.0031	−0.0032	0.0012	0.0013	−0.0057***	−0.0058***
	(−1.17)	(−1.23)	(0.45)	(0.52)	(−3.77)	(−3.82)
OUT	−0.0957***	−0.0966***	−0.0680***	−0.0695***	−0.0277**	−0.0248**
	(−4.84)	(−4.88)	(−3.59)	(−3.67)	(−2.48)	(−2.23)
Constant	0.1152***	0.1105***	0.0683***	0.0497**	−0.0179	−0.0197*
	(5.48)	(5.32)	(3.24)	(2.48)	(−1.45)	(−1.66)
IND/YEAR	√	√	√	√	√	√
Pseudo R^2 (R^2)	0.061	0.062	0.107	0.103	0.047	0.046
LR chi2 (F-Value)	749.71	755.87	839.15	809.4	647.16	637.49
Obs.	7375	7375	6904	6904	6904	6904

Note: t-values are reported in brackets.
* Significance at the 10% level.
** Significance at the 5% level.
*** Significance at the 1% level.

liabilities)/total assets at the end of the year (if all shares are tradable, TQ = (total market value of equity + -book value of total liabilities)/total assets at the end of the year). The predicted value of the network centrality of independent directors from the first-stage regression is then added to the second regression model as follows:

$$\mathrm{TUNNEL}_t = \alpha_0 + \alpha_1 PCEN_t + \sum Controls + \sum IND + \sum YEAR + \lambda \quad (3)$$

As shown in Table 6, the results based on this two-stage regression are consistent with those of the main tests, regardless of whether score_median or score_max is used.

We also follow Xiao et al. (2009) and Chen et al. (2010) by running a proxy variable two-stage regression.[14] In the first stage, we regress the network centrality of independent directors on director size, duality, independence of directors, and the ownership stake of the largest shareholder, the square of the sum of the ownership

[14] This proxy variable approach provides useful information from the residual values of the model with which to run the second-stage regression, but no regression is run on the explanatory variables. This approach can be used to find the instrumental variables more easily.

stakes of the second to fifth largest shareholders, SOE, firm size, debt ratio, and return on total assets in the previous year. The residuals of the first-stage regression are then added to the second stage model. Unreported results show that the CEN_residual is negatively related to TUN at the 5% or 10% level of significance.

In a third robustness test of the main results, we use the two integrated measures of score_median and score_max to proxy for the network centrality of independent directors. Our results also hold when using the mean and minimum values of firm-level centrality. The results show that the coefficients for two of the three measures of centrality are significant, the exception being that for the eigenvector centrality of the network. Rank index values of network centrality also provide similar results. In summary, all of our robustness tests support our hypothesis.

Moreover, because Jiang and Yue (2005) and Jiang et al. (2010) find that all "other receivables" can be used for tunneling, we also use this measure. In untabulated analysis, our main results hold when using "other receivables" as the proxy for controlling shareholders' tunneling behavior.

6. Conclusions

In China, the motivation for establishing a system of independent directors was to constrain the tunneling behavior of controlling shareholders and protect the interests of minority investors. However, because the appointment of independent directors is controlled by controlling shareholders themselves, the expectation that the monitoring ability of independent directors would be enhanced by increasing their number and proportion has undoubtedly proven futile. Moreover, given their concern with social status and reputation, not all independent directors are willing to serve as whistleblowers. Hence, more attention should be paid to the motivations and abilities enabling prospective independent directors to monitor controlling shareholders. Few prior studies focus in detail on the relationship between social networks and corporate governance. This paper adopts a social networking perspective to investigate the governance role of independent directors in China. Specifically, using various indicators of the use of company funds by controlling shareholders, we examine the relationship between the network centrality of independent directors and controlling shareholders' appropriation of firm funds. Empirical evidence shows that tunneling behavior is negatively related to network centrality, especially when non-operating cash is used as the measure of tunneling. All of our results imply that independent directors can reduce tunneling by large shareholders through their board network and play a positive and meaningful role in corporate governance.

Although we define networks as direct connections among directors sitting on at least one common board, we also recognize that other networks of independent directors that are unrelated to their board activities, such as school ties, will also have an effect on their governance role. We look forward to collecting data relevant to such networks for further study.

Appendix A. Measurement of board network centrality

We follow Freeman (1979), Wasserman and Faust (1994) and Xie and Chen (2012) by using network centrality analysis, which is part of social network analysis, to represent independent directors' positions in the board network of all listed firms. The basic measures are degree centrality, betweenness centrality, closeness centrality and eigenvector centrality, which together characterize the different elements of network centrality. The specific calculation methods are as follows:

(1) Degree centrality: $Degree_i = \frac{\sum_j X_{ji}}{g-1}$

This measure represents the number of direct ties a director has in a board network, which characterizes the director's participation in the network. Where i measures a director, j measures all directors other than i in one year; X_{ji} is a network relation indicator that takes the value of 1 if director i and director j are on the same board and 0 otherwise; g is the number of directors in the board network in one year. As the scope of the board network differs between years, $(g-1)$ is used to eliminate the scale difference.

(2) Betweenness centrality: $Betweenness_i = \frac{\sum_{j<k} g_{jk(n_i)}/g_{jk}}{(g-1)(g-2)}$

This measure represents the degree to which one director controls communication among others and reflects the degree to which the same director reduces the path distance between all pairs of other directors. It is a measure of the extent to which the director acts as a "bridge" in helping others to form connections. Where $g_{jk(n_i)}$ is the number of geodesics in which director j communicates with director k. $\sum_{j<k} g_{jk(n_i)}/g_{jk}$ means the geodesics of all pairs of other directors including director i. We use $(g-1)(g-2)/2$ to eliminate differences in board size (Freeman, 1979).

(3) Closeness centrality: $Closeness_i = \left[\frac{\sum_{j=1}^{g} d(i,j)}{g-1}\right]^{-1}$

This measure is defined as the reciprocal value of the sum of distances travelled when director i communicates with all other directors and indicates how quickly and independently one director can relate to others. Where $d(i, j)$is the distance between director i and director j. If one director does not connect with all other directors, then this method cannot be used to accurately calculate the degree of centrality. Therefore, similar to Liu (2010), we divide the number of directors to whom he can relate directly in the network, then multiply the result by the proportion it bears to the total number of directors in the board network.

(4) Eigenvector centrality: $Eigenvector_i = \frac{1}{\lambda}\sum_j b_{ij}E_j$

This measure is the weighted value of a director's direct connections and indicates the extent to which a director's network centrality is related to that of his neighbors (Bonacich, 1972). The weights represent the importance of the directors to whom he connects. Eigenvector centrality can be calculated by the standard "eigenvalue–eigenvector" model: $BE = \lambda E$, where b_{ij} is an adjacency matrix that takes the value of 1 if director i and director j are on the same board and 0 otherwise. λ is the largest eigenvalue and E_j is the eigenvalue of director j's centrality. In the social network field, actors who receive more information are valuable sources of information. This measure of centrality is aimed at finding the most central actor, but does not focus on the fractional structure (Bonacich, 1972).

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Local fiscal distress and investment efficiency of local SOEs ☆,☆☆

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ABSTRACT

In this paper, we use A-share listed firms between 2002 and 2010 to investigate the relationship between local fiscal distress and the investment efficiency of local SOEs, along with the effect of corporate tax payments on this relationship. We find a positive relationship between the extent of local SOEs' overinvestment and the fiscal distress of the corresponding local government where the enterprise and this relationship become stronger for firms that pay fewer taxes. The pattern of underinvestment among local SOEs was in contrast, and these relationships do not exist for non-SOEs or central SOEs. Moreover, we find that expanding a firm's investment scale leads to an increase in total taxes paid, including income and turnover taxes, which further result in more local fiscal revenue. Overall, we conclude that local governments have an incentive to increase fiscal revenue when faced with fiscal distress by raising the investment scale of local SOEs and that the incentives and effects of such interventions appear to be stronger among firms that contribute less to local fiscal revenue.

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1. Introduction

Investment efficiency has long been a hot topic in accounting research (Jensen and Meckling, 1976; Jensen, 1986; Stulz, 1990; Wei and Liu, 2007), with Jensen (1986) initially investigating the problem using the agency theory framework, followed by Narayanan (1988) and Malmendler and Tate (2005) exploring the issue from the perspectives of information asymmetry and managerial overconfidence, respectively. The three main causes of enterprises' overinvestment are found to be agency problems, information asymmetry, and managerial overconfidence. Subsequently, Fazzari et al. (1988), Aggarwal and Samwick (2006), Tang et al. (2007), Xin et al. (2007) and Jiang et al. (2009) separately conduct in-depth assessments of the problem from the perspectives of financing constraints, management incentives, cash dividends, executive compensation, and management background, based on the theories of agency conflicts and information asymmetry.

The studies listed above restrict their focus to firm-level factors, which certainly do not cover all of China. State-owned enterprises (SOEs) in China are controlled by either the central or the local governments at different levels. The agency conflicts between the government, which is the biggest shareholder in most circumstances, and external minority shareholders are quite different from the common conflicts between managers and shareholders and between shareholders and bondholders (La Porta et al., 1999; Jensen and Meckling, 1976). Yang and Hu (2007), Cheng et al. (2008) and Chen et al. (2011) investigate the investment efficiency problem from the perspectives of the specific institutional environment and government intervention in China. They find that the institutional environment in China and government intervention influence the relationship between the factors of firms' free cash flow, debt financing, cash dividends, management compensation, and corporate governance and the level of corporate overinvestment, creating a non-negligible factor that leads to firms' overinvestment.

Controlled by the government, SOEs are endowed with the responsibility for assisting the corresponding regional government in achieving various goals, such as the economic, social, and political goals of boosting regional economic growth; facilitating increases in regional tax revenues and employment rates; maintaining social stability; and ensuring that investments in emerging industries flourish. This decreases the focus on the elementary goal of effective operations, compared to non-SOEs (Chen et al., 2011; Wei and Liu, 2007). SOEs bear heavy policy burdens that can lead to multiple targets and inefficient operations. Thus, SOEs may suffer from low investment and decreased operational efficiency, in addition to low pay performance sensitivity (PPS) among executives. Studies find that there have been incentives for local governments to boost their regional GDP by forcing the local SOEs under their control to overinvest (Tang et al., 2010) and that such activity has been an important approach for local bureaucrats to obtain promotions. Moreover, Xue and Bai (2008) and Chen et al. (2012) both find that local governments have an incentive to lift the local employment rate through overemployment in local SOEs.

Following China's decentralization reform in the 1980s, the planned economy has disintegrated gradually, providing local governments with extensive autonomous rights, including the right to control tax revenue. As a result, local governments acquire financial incentives to compete with each other (Jin et al., 2005; Young, 2000). After the 1994 reform of the tax system, tax revenue became a crucial source of local fiscal revenue and fiscal health became a core economic and social objective of local governments (Chen et al., 2011), together with the goal of regional economic development. In addition, it became an important approach to help local governments to implement their government functions and maintain social stability, along with the goal of regional employment. Each social and political goal is an important incentive for the local government to press political interventions into the operation of local SOEs and the firms that bear policy burdens from the government should behave differently from those without. However, studies on local fiscal and financial conditions' influence over the operation of local SOEs are rare, and this paper aims to fill this gap in the literature.

The State Council of China issued the *Decision of the State Council to Implement Tax Distribution Financial Management System* on December 15, 1993. It announced that every province, including provincial-level autonomous regions and municipalities, should abandon the present local fiscal responsibility system and switch to the tax distribution financial management system on January 1, 1994. The tax categories would

be unified under the following categories: central tax, local tax, and central-local shared tax. Likewise, a standardized system of tax returns and transfers from the central to local governments would be gradually established,[2] which is called the reform of tax system. Under the newly established tax distribution system, tax returns from the central government constitute a certain portion of local fiscal expenditures, ensuring sufficient supply for the needs of local fiscal expenditure.[3] The dependence on tax returns and transfers from the central government varies greatly across regions, based on their different levels of economic development. According to the financial statistics of each province (including provincial-level autonomous regions and municipalities), approximately 12.41–86.34% of local fiscal revenue comes from tax returns and transfers from the central government, and the levels of each province's deficit (the gap between fiscal revenue and expenditure) vary from 4.91% to 94.7%,[4] indicating that tax returns and transfers from the central government constitute a large, non-negligible portion of local fiscal revenue that reflects local government's demand for funds. Thus, we define a situation in which a provincial local government faces a deficit based on their corresponding fiscal revenue and expenditure, which requires the assistance of funds from tax returns and transfers from the central government to pay the post-deficit expenditures prompted by local fiscal distress. The level of the deficit and the ratio of tax returns and transfers from the central government on the local government's total revenue can then be used as proxies for the measurement of local fiscal distress.

Based on the decentralization reform in the 1980s and the 1994 tax system reform, in this paper, we investigate the relationship between the level of local fiscal distress and the investment efficiency of local SOEs, along with the influence of total taxes paid by the firm on the above relationship, using the data of all A-share listed firms between 2002 and 2010. The sample is classified into local SOEs, non-SOEs, and central SOEs for robustness checks, with Richardson's (2006) overinvestment model, adjusted based on China's economic regions and different development levels, measuring the extent of investment distortions. The results show that the level of local SOEs' overinvestment (underinvestment) is positively (negatively) related to the extent of corresponding local governments' fiscal distress and that paying lower corporate taxes enhances the positive (negative) relationship between the extent of local fiscal distress and firms' overinvestment (underinvestment). These patterns do not exist for non-SOEs. Moreover, following further study, we also find that raising firms' investment scales leads to an increase in total corporate taxes paid, including both income and turnover taxes, which further results in higher local fiscal revenue. Underinvested firms should increase their investment level directly, whereas those that have already overinvested should adjust their production, operation, and capital structures to match the present investment level before expanding their investment scale. In addition, we perform robustness checks with a sample of central SOEs, rather than local SOEs, to rule out alternative explanations, such as the existence of abundant investment opportunities or other factors unrelated to government intervention or political promotion tournaments, and with 2SLS instead of OLS to rule out the potential for reverse causality between the dependent and the independent variables. Pearson correlation tests of corporate taxes paid on adjusted/unadjusted BTD and ETR are used to rule out the alternative approach of increasing tax revenue through stronger tax enforcement instead of forcing local SOEs to invest more, with tax intensity rather than the level of corporate tax paid to rule out the competitive explanation that firms pay fewer taxes, thereby preserving more money, which can lead to overinvestment. Basu's (1997) accounting conservatism model is also used to rule out the possibility of the government helping hand hypothesis.

This paper makes at least four contributions. First, prior studies such as Tang et al. (2010), Zhou (2004), Xue and Bai (2008) and Chen et al. (2012) study the effect of political burdens on the behavior of SOEs from the perspectives of economic growth and employment rates, whereas we investigate the effect of government's social and political goals on SOEs' operational behavior from a financial perspective, which supplements the literature on the political burdens from the government that result in firms' multiple objectives. Second, we find that local governments have an incentive to increase fiscal revenue by forcing local SOEs to expand their investment scale and that such intervention leads to local SOEs' overinvestment or a lowering of the level of underinvestment due to other reasons. Moreover, the local government's intervention can, to some extent,

[2] Refer to the *Decision of the State Council to Implement Tax Distribution Financial Management System.*

[3] Refer to the *Decision of the State Council to Implement Tax Distribution Financial Management System.*

[4] Each percentage is calculated based on statistics from the *Financial Year Book of China* (2003–2011), and the level of the deficit is calculated by the ratio of the absolute value of the deficit divided by the corresponding year's local expenditure.

result in what is expected by the local government, and that underinvestment leads to firms paying lower taxes. Based on the above finding, we provide theoretical bases and references for the ways in which local governments make fiscal policies and improve the supervisory roles they play in relation to local SOEs. Third, we provide empirical evidence of the government grabbing hand theory through the perspectives of local public finance and enterprise investment. Finally, we offer a new research perspective for the study of fiscal issues through firm-level aspects.

The remainder of this paper proceeds as follows: Section 2 reviews the literature and describes China's institutional background to develop the research hypotheses. Section 3 describes the research design and sample selection procedure. Descriptive statistics and empirical results, including robustness checks and further analysis, are in Section 4. Section 5 concludes the paper.

2. Literature, institutional background and hypotheses development

In the perfect world described by Modigliani and Miller (1958), enterprise investment depends on the net present value of the project and has nothing to do with other factors. In reality, scholars in financial fields find that Modigliani and Miller's perfect market theory does not effectively explain actual investment activities. In fact, some enterprises invest in projects of negative net present value (NPV) (Jensen, 1986; Aggarwal and Samwick, 2006). They confirm that factors such as agency problems (Jensen, 1986), information asymmetry (Myers and Majluf, 1984), and managerial overconfidence (Roll, 1986; Malmendler and Tate, 2005) affect firms' investment decisions. The mainstream view argues that agency problems affect the level of enterprise investment expenditure, further resulting in underinvestment or overinvestment (Jensen, 1986; Aggarwal and Samwick, 2006). The separation of ownership from management renders the interests of managers and shareholders inconsistent, and managers make decisions that distract from the shareholders' primary goal of value maximization for their own private interests. This results in overinvestment most of the time (Jensen and Meckling, 1976; Stulz, 1990). In contrast, the resources controlled by the manager generally increase with the free cash flow preserved in the firm, which brings them more private benefits and better reputations. As a result, managers have an incentive to engage in empire building (Chen et al., 2011), which results in overinvestment (Jensen, 1986). From another perspective, information asymmetry scholars suggest that overinvestment is most likely when insiders have more information than shareholders, especially regarding the value of present assets owned by the firm or the prospective cash flows of investment projects, in which the financing securities of the firm are probably overvalued or undervalued (Myers and Majluf, 1984). The theory of managers' overconfidence suggests that overinvestment may be due to managers' overconfidence in their ability or the firm's competitiveness, even though the manager is utterly loyal to shareholders' goal of value maximization (Malmendler and Tate, 2005).

The traditional agency theory suggests that agency conflicts mainly exist between shareholders and managers (Berle and Means, 1932; Jensen and Meckling, 1976) and between shareholders and bondholders (Myers, 1977). However, studies based on China's capital markets find that there exists a third agency conflict, namely that between the government and the minority shareholders. In most situations, the government is also the biggest shareholder (La Porta et al., 1999; Chen et al., 2011). On the one hand, the government is an owner of the enterprise and obtains benefits from its operational activities, as do other owners. On the other hand, the government simultaneously acts as society's administrator, responsible for boosting regional economic development (GDP growth) to facilitate increases in regional tax revenues and employment rates (Chen et al., 2011; Zhang and Wang, 2010). This leads to the multiple goals of SOEs, which usually differ from the primary goal of shareholders' value maximization (Zhang and Wang, 2010). Moreover, the government may act as the grabbing hand in pursuing its social and political goals (Frye and Shleifer, 1997), reducing the value of local SOEs by tunneling. To summarize, all of these activities conflict with the interests of minority shareholders.

The literature finds that local governments have an incentive to boost local GDP growth through overinvestment by local SOEs (Tang et al., 2010) and to help local bureaucrats succeed in political promotion tournaments – the main criterion for which is GDP growth (Li and Zhou, 2005). In addition, Jin et al. (2005), Young (2000) and Montinola et al. (1995) suggest that China's decentralization reform in the 1980s has created incentives not only for political promotion among local bureaucrats, but also for fiscal revenue. China's tax system reform, which began in 1994, specifies that both SOEs and non-SOEs should pay business and income taxes to the government, declaring an end to a history in which SOEs need not pay taxes under the

system of fiscal contract responsibility. Subsequently, tax revenue has become one of the most important sources of local fiscal revenue and local bureaucrats compete for both local economic growth and tax revenue (Zhou, 2004). Compared to the central government, local governments control fewer resources and thus have stronger incentives to seek help from the local SOEs under their control (Chen et al., 2011). Jin et al. (2005) also suggest that local governments have an incentive to increase local fiscal revenue by forcing local SOEs to increase their investment level.

Based on the financial statistics of each province (Table 1), income taxes constitute about 20% of local governments' tax revenue each year, with the remaining 80% represented by turnover taxes, which make up the vast majority of tax revenue. The objects of taxation for turnover taxes are the amount of transfers generated by the production and circulation procedures for commodities and the number of turnovers for non-commodities, so increasing a firm's investment level ought to result in transfer activities for commodities or turnover for non-commodities, leading to an increase in turnover taxes. In addition, increasing the investment level could help to expand a firm's scale, given a normal level of investment, thus improving its production capacity, further raising its profitability, and ultimately increasing the income taxes paid by the firm. In addition, Jian and Wong (2010) and Cheung et al. (2008) find that compared to central SOEs, it is more common for local SOEs to transport resources and interests to the local government under which they operate. In terms of non-SOEs, they are relatively free from the intervention of local governments and thus are less likely to invest in negative net present value projects for the sake of the government's social and political goals, such as local GDP growth, tax revenue, and employment rate factors. Therefore, as the ultimate controllers of local SOEs, local governments have an incentive to force local SOEs to raise their investment level – thereby achieving their goals of increasing fiscal revenue and the easing of financial crises when faced with financial distress, and continuous increases in investment, which inevitably leads to local SOEs' investment levels becoming mismatched with the present production, operation, and capital structures. This can result in an upward bias of investment scale and, eventually, in overinvestment. Furthermore, the probability and extent of such an upward bias should be higher when local governments have a stronger incentive to increase investments, leading to more severe overinvestment of local SOEs.

The above discussion leads to our first hypothesis:

H1. The level of overinvestment for local SOEs is positively related to the extent of local fiscal distress, whereas this relationship does not exist for non-SOEs.

From the perspective of the grabbing hand theory, the government has an incentive to exploit public firms. Thus, not only local governments have an incentive to raise fiscal revenue by forcing local SOEs under their control to raise their investment scales when the government faces financial distress, which supports H1, but also the motivation and effect of such intervention should be stronger for firms that contribute less to local finance.

Table 1
Tax revenue structure of local government (provincial level).

Year	Income Tax (%)	Turnover Tax (%)	Turnover Tax			
			Value-added Tax (%)	Business Tax and surcharges		
				Business Tax (%)	Surcharges (%)	Sum (%)
2002	20.19	79.81	26.45	40.08	33.46	73.55
2003	16.19	83.81	27.71	39.95	32.33	72.29
2004	17.87	82.13	24.23	44.08	31.69	75.77
2005	18.21	81.79	28.41	42.57	29.01	71.59
2006	18.44	81.56	28.13	42.45	29.42	71.87
2007	19.51	80.49	27.01	42.26	30.73	72.99
2008	20.10	79.90	25.71	41.34	32.95	74.29
2009	18.49	81.51	21.84	43.47	34.69	78.16
2010	18.95	81.05	20.07	43.87	36.06	79.93
Total	19.82	80.18	25.80	41.95	32.25	74.20

Note: The data is based on statistics collected from the *Finance Year Book of China* (2003–2011).

In the years before the 1994 tax system reform, the profits generated by SOEs should have been totally or partially turned over to the government. After the 1994 reform, SOEs paid the government business and income taxes instead of profits for a long period of time. In December 2007, the Ministry of Finance and the State-owned Assets Supervision and Administration issued the *Transient management regulation of the profits generated by the state-owned capital of central SOEs*, which requires central SOEs to turn over the profits they generate. But, local SOEs are not included in this regulation. So based on the institutional background suggesting that local SOEs need only pay taxes as opposed to turning over their profits, tax revenue becomes one of the most important sources of local fiscal revenue and a vital factor in balancing local fiscal revenue and expenditures. Without turning over profits, the notion that paying fewer taxes is equivalent to that of contributing less to local fiscal revenue. As a consequence, local governments have an incentive to force local SOEs that contribute less to local finance to increase their investment level, leading once again to an upward bias of investment and, ultimately, overinvestment. These predictions are consistent with Brennan and Buchanan's (1980) belief that the government is always seeking to maximize tax revenue, and thus, our second hypothesis is as follows:

H2. Fewer taxes paid by local SOEs enhance the positive relationship between the level of overinvestment for local SOEs and the extent of local fiscal distress, whereas this relationship does not exist for non-SOEs.

The factors affecting corporate investment are complicated (Jensen, 1986; Myers and Majluf, 1984; Narayanan, 1988; Malmendler and Tate, 2005; Chen et al., 2011, etc.), and they usually behave interactively, resulting in overinvestment or underinvestment depending on the interaction effects. The grabbing hand theory suggests that the government extracts value from local SOEs for their social or political sakes through tunneling (Frye and Shleifer, 1997), and the *leviathan hypothesis* developed by Brennan and Buchanan (1980) defines government as an agent that maximizes tax revenue. Thus, local governments have an incentive to force local SOEs under their control into increasing their investment levels to achieve their goal of increasing fiscal revenue. This results in a relief of underinvestment for firms that have already underinvested due to other factors, and the effects of such intervention should be stronger for the firms that contribute less to local finance. Finally, we have our third hypothesis:

H3. For underinvested firms, the extent of the local government's fiscal distress mitigates the level of local SOEs' underinvestment, and this negative relationship is stronger for firms that pay fewer taxes, whereas this relationship does not exist for non-SOEs.

3. Research design

3.1. Model construction and variable description

3.1.1. Overinvestment model

We construct our overinvestment model following Richardson (2006) and adjust it based on regional economic effects, *LocalEco*, according to the striking differences in investment opportunities across regions, see Model (1):

$$\begin{aligned} Invest_{i,t} = {} & \beta_0 + \beta_1 Grow_{i,t-1} + \beta_2 Lev_{i,t-1} + \beta_3 Cash_{i,t-1} + \beta_4 Age_{i,t-1} + \beta_5 Size_{i,t-1} + \beta_6 Ret_{i,t-1} \\ & + \beta_7 Invest_{i,t-1} + \sum Industry + \sum Year + \sum LocalEco + \varepsilon \end{aligned} \quad (1)$$

In Model (1), $Invest_{i,t}$ measures the investment level in year t, and the variables on the right are all measured in year $t-1$, with $Grow_{i,t-1}$ representing growth opportunities, $Lev_{i,t-1}$ representing the debt-to-asset ratio, $Cash_{i,t-1}$ representing cash flow, $Age_{i,t-1}$ representing the time in years since the firm went public, $Size_{i,t-1}$ representing corporate scale, $Ret_{i,t-1}$ representing stock returns and $Invest_{i,t-1}$ representing the investment level. We also use Σ *Industry*, Σ *Year,* and Σ *LocalEco* to control for industry, year, and regional effects, respectively. The regions comprise the east coastal, central, and the western frontier areas,[5] representing the

[5] The east coastal areas include the provinces and provincial-level autonomous regions and municipalities of Beijing, Tianjin, Hebei, Liaoning, Shanghai, Jiangsu, Zhejiang, Fujian, Shandong, Chongqing, Guangdong, Guangxi and Hainan. The central areas comprise Shanxi, Inner Mongolia, Jilin, Heilongjiang, Anhui, Jiangxi, Henan, Hubei and Hunan. The western frontier areas include Sichuan, Guizhou, Yunnan, Tibet, Shaanxi, Gansu, Qinghai, Ningxia and Xinjiang.

Table 2
Variable definitions and descriptions.

Variable	Name	Definition and Description
Panel A: Dependent Variables		
$OverInv_{i,t}$ ($UnderInv_{i,t}$)	Overinvestment (Underinvestment)	The gap between the observed value and the predicted value of corporate investment
Panel B: Independent Variables		
$Distress1_{i,t-1}$	Financial distress of local government	[(Local Expenditure - Local Revenue)/ Local Revenue] ×100%
$Distress1_{i,t-1} \times N\_Tax_{i,t-1}$	The interaction of $Distress1_{i,t-1}$ and $N\_Tax_{i,t-1}$	The interaction of financial distress and negative taxes paid
$Distress2_{i,t-1}$	Financial distress of local government	(Transfers from Central Government/ Total Revenue) ×100%
$Distress2_{i,t-1} \times N\_Tax_{i,t-1}$	The interaction of $Distress1_{i,t-1}$ and $N\_Tax_{i,t-1}$	The interaction of financial distress and negative taxes paid
$N\_Tax_{i,t-1}$	Negative corporate taxes paid	Negative logarithm of the sum of Income Tax Expense and Business Tax and Surcharges on income statement
Panel C: Control Variables		
$Size_{i,t}$	Scale of the firm	Logarithm of total assets
$Roa_{i,t}$	Return on total assets	Ratio of firm's net profit to total assets
$Fcf_{i,t}$	Free cash flow	Ratio of free cash flow to total assets
$Dual_{i,t}$	Duality	One if the board chairman is also the CEO of the corporation, otherwise zero
$Exeown_{i,t}$	Management stock ownership	Shareholding ratio of management
$Herf_{i,t}$	Ownership concentration	Sum of shareholdings of top three shareholders
$Divid_{i,t}$	Cash dividend per share	Ratio of cash dividends on total shares outstanding
$Debt_{i,t}$	Long-term debt ratio	(Long-term loan + Long-term bonds payable +Long-term account payable)/ Total assets
$Salary_{i,t}$	Executive salary	Logarithm of the sum of top three managers' salaries
$GDPgth_t$	GDP growth	GDP growth rate compared to the previous year
$GovIntvn_t$	Index of reducing government intervention to enterprises	The item "1c reducing government intervention to enterprises" in Fan Gang marketization index
Industry	Industry	Industry dummy variables
Year	Year	Year dummy variables

three economic regions of China. The residual ε in the model refers to the level of overinvestment or underinvestment, with positive or negative values, respectively. We define overinvestment as $OverInv_{i,t}$ and the absolute value of underinvestment as $UnderInv_{i,t}$ with a larger value to represent a more severe underinvestment situation.

Finally, regarding the model's systematic errors, there must be some difference between the predicted value and the corresponding observed value, and not all of the gaps between these two values are necessarily overinvestment or underinvestment. Therefore, we select the observations that are larger than the tenth percentile of $OverInv_{i,t}$ and $UnderInv_{i,t}$ as our research sample.

3.1.2. The empirical model

We construct Model (2) to test H1 and Model (3) to test H2 and H3. The definitions and descriptions of the variables are presented in Table 2. We perform cluster treatments on provincial effects.

$$\begin{aligned} OverInv_{i,t}(UnderInv_{i,t}) = {} & \beta_0 + \boldsymbol{\beta_1 Distress_{i,t-1}} + \beta_2 Size_{i,t} + \beta_3 Roa_{i,t} + \beta_4 Fcf_{i,t} + \beta_5 Dual_{i,t} + \beta_6 Exeown_{i,t} \\ & + \beta_7 Herf_{i,t} + \beta_8 Divid_{i,t} + \beta_9 Debt_{i,t} + \beta_{10} Salary_{i,t} + \beta_{11} GDPgth_t \\ & + \beta_{12} GovIntvn_t + \sum Industry + \sum Year + \varepsilon \end{aligned} \quad (2)$$

In Model (2), we construct two proxies for the measurement of local fiscal distress. In measuring corporate financial distress, Wu and Lu (2001) define a firm being ST or PT as an indicator of financial distress. Dahiya et al. (2003) define financial distress as a firm being unable to pay its matured debt with sufficient cash flow.

Liao and Chen (2007) classify financial distress as a firm's *EBITDA* being less than interest expense for two consecutive years, or becoming insolvent. One of the common features of these corporate financial distress criteria is that the firm cannot make end meet. Similarly, government finance includes fiscal revenue and expenditure, with a fiscal expenditure larger than the revenue referred to as a fiscal deficit. Regarding the determination of corporate financial distress, we define the existence of a fiscal deficit to be the criterion of government fiscal distress. Moreover, the extent of fiscal distress is considered more severe if the government has more fiscal expenditures than their counterparts with the same fiscal deficit. As a result, we use the percentage of fiscal deficit on *Local Expenditure* of the local government to measure the extent of local fiscal distress, defined as *Distress1*. From the perspective of fiscal revenue alone, in addition to *Taxes* and *Non-tax revenue*, the item of local *Total Revenue* also consists of *Transfers from Central Government (Including Tax Returns)*, *Revenue of Loans from National Debt,* and *Balance Revenue of Last Year*, etc., comprising the *Total Revenue* – the amount equivalent to that of *Total Expenditure*, comprising *Local Expenditure* and other items such as *Transfers to Central Government* and *Added Budgetary Revolving Fund*. *Transfers from Central Government (Including Tax Returns)* generally constitutes a great portion (from 12.41% to 86.34%) of the government's *Total Revenue*, which serves as supplementary funds when the local government cannot make ends meet. Therefore, we argue that the ratio of *Transfers from Central Government (Including Tax Returns)* on *Total Revenue* is a good proxy for the local government's fiscal distress, demonstrated as *Distress2*.

As Table 1 demonstrates, the objects of taxation for turnover taxes, which constitute 80% of local revenue, are the amount of transfers generated by the commodity production and circulation procedures and the amount of turnovers for non-commodities. Thus, it increases with corporate investment. In terms of income taxes, it is paid only after operating profits are generated, so there is usually a time lag between the increase in corporate investment and the corresponding payment of income taxes. However, since income tax comprises only 20% of total tax revenue for the local government, the problem of the time lag is not severe, and only 1 year lagged values of *Distress* are needed.

Incorporating the interaction term of local fiscal distress and corporate taxes paid into Model (2), we obtain Model (3).

$$\begin{aligned} OverInv_{i,t}(UnderInv_{i,t}) = {} & \beta_0 + \boldsymbol{\beta_1 Distress_{i,t-1}} + \boldsymbol{\beta_2 Distress_{i,t-1}} \times \boldsymbol{N\_Tax_{i,t-1}} + \beta_3 N\_Tax_{i,t-1} + \beta_4 Size_{i,t} \\ & + \beta_5 Roa_{i,t} + \beta_6 Fcf_{i,t} + \beta_7 Dual_{i,t} + \beta_8 Exeown_{i,t} + \beta_9 Herf_{i,t} + \beta_{10} Divid_{i,t} \\ & + \beta_{11} Debt_{i,t} + \beta_{12} Salary_{i,t} + \beta_{13} GDPgth_t + \beta_{14} GovIntvn_t + \sum Industry \\ & + \sum Year + \varepsilon \end{aligned} \tag{3}$$

Feltenstein and Iwata (2005) argue that all tax revenue is collected by the local government and then shared between the local and the central governments, so local governments in China have an incentive to reduce their efforts on the types of tax they must share with the central government under China's tax distribution system established after 1994. Wu et al. (2011) demonstrate that income taxes from enterprises, business taxes from sales and services and personal income taxes constitute local governments' major tax revenue. Under China's tax law, *Business Tax*, *Urban Maintenance and Construction Tax*, *Contract Tax*, *Housing Property Tax*, *Vehicle and Vessel Usage Tax*, *Stamp Tax*, *Tax on the Use of Arable Land*, *Tobacco Tax*, *Land Value-added Tax,* and *Urban Land Using Tax*, etc., comprise local governments' regular revenue – 100% of which is turned over to local governments along with *Resource Tax*, whereas *Income Tax* and *Value-added Tax* should be shared between local and central governments with 40% and 25%, respectively, taken away by the central government. In terms of the income statement, *Business Tax and Surcharges* consist of all tax items belonging to local governments' regular revenue, and *Income Tax* refers to the income taxes currently paid by the firm. Although the content of *Value-added Tax* is not provided in the income statement, it is not significant in this study because *Business Tax and Surcharges* account for 75% of the total turnover taxes, which constitute 80% of total local tax revenue, leaving the remaining 25% to be *Value-added Tax*.

Consequently, the *Business Tax and Surcharges* on the income statement, to some extent, could be a good proxy for turnover taxes with the sum of *Business Tax and Surcharges* and *Income Tax* properly measuring the taxes paid by the firm. The amount of taxes actually paid by the firm is usually affected by items such as *Deferred Income Tax Assets*, *Deferred Income Tax Liabilities,* and *Tax Returns*, etc., with *Tax Payments* on

the income statement consisting of *Payment of Previous Period Due*,*Payable Tax,* and *Prepaid Tax*. Thus, it is not appropriate to measure the amount of corporate taxes paid with *Tax Payable* on the balance sheet or with *Tax Payments* on the income statement. The sum of *Income Tax Expense* and *Business Tax and Surcharges* on the income statement appropriately measures the current taxes paid by the firm, and we use its negative logarithm value as a proxy for corporate taxes paid, denoted by *N_Tax*, to properly demonstrate the relationship in H2. Hence, we have a higher value of *N_Tax* with lower corporate taxes paid and vice versa.

For details regarding the selection of the control variables in Models (2) and (3), please refer to the Introduction.

3.2. Data source and sample procedure

We collect our financial data from the *Finance Year Book of China* (2003–2011) and all other firm-level data from the *China Stock Market and Accounting Research* database (CSMAR). Our sample comprises all A-share firms between 2002 and 2010, eliminating observations that are as follows: (i) attributed to the financial industry, (ii) listed less than 1 year, or (iii) have missing data. Finally, we obtain 10244 firm-year observations and winsorize the sample at the 1% and 99% levels.

4. Results

4.1. Descriptive statistics

Table 3 shows the descriptive statistics for local government fiscal distress. The minimum and maximum values for *Distress1* are 4.91% and 94.70%, respectively, and those for *Distress2* are 12.41% and 86.34%, respectively. The results show that there is no great difference between the two proxies of *Distress1* and *Distress2*.

Table 4 displays descriptive statistics for all of the variables. Tables 5 and 6 provide descriptive statistics for the subsamples of firm-years with overinvestment and underinvestment and for the subsamples of local SOEs and non-SOEs, respectively.

The results of the two-tailed *t*-tests shown in Table 5 reveal that the majority of variables for overinvested firms are significantly different from that for their underinvested counterparts and that overinvested firms are more concentrated in regions with more severe fiscal distress, compared to underinvested firms. The results of the two-tailed *t*-tests shown in Table 6 display that each variable for local SOEs is significantly different from that for non-SOEs, except for GDP growth. Likewise, local SOEs are more concentrated in regions with more severe fiscal distress, compared to non-SOEs.

Table 7 provides the Pearson correlation matrix for all of the variables. The results show that the absolute values of the correlations between most of the control variables are less than 0.3, which suggests that there are no collinearity problems between the control variables. Moreover, the correlation between the two proxies of

Table 3
Descriptive statistics for local fiscal distress.

		Distress1 (%)					Distress2 (%)				
Year	Obs	Mean	Median	S.D	Min	Max	Mean	Median	S.D	Min	Max
2002	898	38.75	31.36	18.87	15.02	94.70	37.18	27.55	13.98	20.17	85.16
2003	988	38.27	32.63	17.51	18.58	94.41	36.79	28.15	13.76	21.23	84.77
2004	1062	39.19	35.45	17.49	17.12	92.51	38.52	31.70	15.06	19.94	86.34
2005	1118	35.93	26.81	19.48	13.14	93.51	33.83	26.77	16.15	16.58	84.31
2006	1093	34.56	26.03	20.79	11.80	92.73	34.02	26.98	16.70	16.01	78.59
2007	1061	34.35	25.93	22.74	4.91	92.69	34.77	25.98	18.32	13.69	77.92
2008	1046	34.43	27.64	23.33	6.22	93.46	32.95	26.94	18.81	12.41	75.27
2009	1387	38.67	32.72	22.29	12.61	93.60	34.20	30.13	18.20	14.18	79.02
2010	1591	36.46	32.07	21.61	13.00	93.35	32.44	28.63	17.16	15.21	76.59
Total	10244	36.73	32.07	20.79	4.91	94.70	34.76	28.63	16.80	12.41	86.34

Table 4
Descriptive statistics for all variables.

Variable	Obs	Mean	Median	S.D	Min	Max
Distress1	10,244	36.73	32.07	20.79	4.91	94.70
Distress2	10,244	34.76	28.63	16.80	12.41	86.34
Size	10,244	21.42	21.32	1.05	19.07	24.60
Roa	10,244	0.03	0.03	0.07	−0.29	0.20
Fcf	10,216	0.04	0.06	0.15	−0.63	0.36
Dual	10,244	0.13	0.00	0.34	0.00	1.00
Exeown	9124	1.03	0.00	4.70	0.00	32.98
Herf	9346	50.04	50.76	15.04	16.40	84.55
Divid	9305	0.19	0.15	0.17	0.00	0.90
Debt	10,109	0.07	0.03	0.10	0.00	0.45
Salary	10,154	13.31	13.35	0.86	11.16	15.30
GDPgth	10,244	15.56	16.70	6.69	0.00	34.05
GovIntvn	10,244	6.19	6.85	3.05	−12.95	10.13

Table 5
Descriptive statistics for all variables for overinvestment and underinvestment groups.

	OverInv				UnderInv				Two-tailed
Variable	Obs	Mean	Median	S.D	Obs	Mean	Median	S.D	*t*-test
Distress1	3369	37.25	32.72	20.74	6875	36.48	32.05	20.80	1.7570*
Distress2	3369	35.24	29.65	16.71	6875	34.52	28.63	16.83	2.0465**
Size	3369	21.19	21.11	1.00	6875	21.54	21.44	1.06	−15.9115***
Roa	3369	0.04	0.04	0.07	6875	0.03	0.03	0.06	5.2949***
Fcf	3357	0.04	0.07	0.17	6859	0.04	0.06	0.14	0.0616
Dual	3369	0.15	0.00	0.35	6875	0.13	0.00	0.33	2.7432***
Exeown	2955	1.35	0.00	5.51	6169	0.88	0.00	4.26	4.5184***
Herf	3033	50.04	50.96	14.68	6313	50.04	50.69	15.21	0.0088
Divid	3020	0.18	0.14	0.16	6285	0.20	0.15	0.18	−5.1693***
Debt	3338	0.07	0.03	0.10	6771	0.07	0.03	0.10	0.3471
Salary	3343	13.22	13.27	0.82	6811	13.35	13.39	0.87	−6.7039***
GDPgth	3369	14.92	16.24	6.77	6875	15.87	17.02	6.64	−6.7828***
GovIntvn	2630	6.21	6.85	3.00	5670	6.18	6.85	3.08	0.8599

p-Values in parentheses.
* $p < 0.1$.
** $p < 0.05$.
*** $p < 0.01$.

Distress1 and *Distress2* is 0.9864, statistically significant at the 0.01 level, indicating that these two proxies are consistent measures of the same variable.

4.2. Empirical results

Table 8 shows the regression results for local fiscal distress and the extent of overinvestment among local SOEs and non-SOEs. The findings suggest that the coefficients of *Distress1* and *Distress2* for local SOEs are positive and statistically significant at the 0.01 level, whereas those for non-SOEs are not significant at all, which is consistent with H1.

Table 9 reports the results of the effect of corporate taxes paid on the positive relationship between local fiscal distress and the level of overinvestment demonstrated in Table 8. The results show that the coefficients of *Distress1* × *N_Tax* and *Distress2* × *N_Tax* for local SOEs are positive and statistically significant at the 0.05 and 0.01 levels, respectively, indicating that lower taxes paid by local SOEs strengthens the positive relationship between local fiscal distress and the extent of their overinvestment, while those for non-SOEs are not significant at all, which is consistent with H2.

Table 6
Descriptive statistics for all variables for local SOE and non-SOE groups.

	Local SOEs				Non-SOEs				Two-tailed
Variable	Obs	Mean	Median	S.D	Obs	Mean	Median	S.D	*t*-test
Distress1	4284	38.06	34.46	20.46	4016	35.19	26.03	20.78	6.3549***
Distress2	4284	35.99	34.21	16.44	4016	33.26	26.95	16.92	7.4721***
Size	4284	21.61	21.53	1.01	4016	21.08	21.01	0.94	24.8201***
Roa	4284	0.03	0.03	0.06	4016	0.03	0.03	0.08	1.9943**
Fcf	4275	0.06	0.06	0.13	8275	0.03	0.06	0.17	8.3922***
Dual	4284	0.11	0.00	0.31	4016	0.19	0.00	0.40	−11.0027***
Exeown	3792	0.12	0.00	1.27	3597	2.43	0.00	7.09	−19.7046***
Herf	3868	51.27	52.33	15.14	3701	47.29	47.35	14.65	11.6081***
Divid	3856	0.21	0.16	0.18	3681	0.17	0.13	0.15	9.5336***
Debt	4225	0.08	0.04	0.10	3975	0.06	0.01	0.09	10.5959***
Salary	4245	13.29	13.35	0.84	3989	13.26	13.27	0.87	1.8752*
GDPgth	4284	15.47	16.76	6.85	4016	15.58	16.94	6.51	−0.7570
GovIntvn	4284	6.06	6.58	3.05	4016	6.47	6.91	3.18	−5.9001***

p-Values in parentheses.
* $p < 0.1$.
** $p < 0.05$.
*** $p < 0.01$.

Table 7
The Pearson correlation matrix for all variables.

	Distress1	Distress2	Size	Roa	Fcf	Dual	Exeown	Herf	Divid	Debt	Salary	GDPgth	GovIntvn
Distress1	1.000												
Distress2	0.986***	1.000											
Size	−0.063***	−0.049***	1.000										
Roa	−0.007	−0.009	0.113***	1.000									
Fcf	0.009	0.012	0.074***	−0.051***	1.000								
Dual	−0.037***	−0.041***	−0.071***	0.000	−0.012	1.000							
Exeown	−0.116***	−0.132***	−0.124***	0.017	0.000	0.242***	1.000						
Herf	−0.024**	−0.026**	0.116***	0.023**	0.071***	−0.037***	0.039***	1.000					
Divid	−0.017	−0.016	0.466***	0.036***	0.091***	−0.059***	−0.015	0.130***	1.000				
Debt	0.089***	0.081***	0.322***	−0.001	−0.057***	−0.056***	−0.080***	0.036***	0.287***	1.000			
Salary	−0.282***	−0.294***	0.411***	0.063***	0.021*	0.041***	0.085***	−0.049***	0.255***	0.069***	1.000		
GDPgth	0.061***	0.068***	−0.067***	−0.010	0.016	0.006	0.019*	−0.040***	0.052***	−0.007	0.017	1.000	
GovIntvn	−0.738***	−0.727***	0.039***	0.006	−0.006	0.028**	0.107***	−0.022*	0.043***	−0.078***	0.256***	0.007	1.000

p-Values in parentheses.
* $p < 0.1$.
** $p < 0.05$.
*** $p < 0.01$.

Table 10 presents the results of the relationship between local fiscal distress and the extent of underinvestment for local SOEs, and the effect of corporate taxes paid on this relationship. The results show that the coefficients of *Distress1* and *Distress2* in columns 1 and 2 and *Distress1* × *N_Tax* and *Distress2* × *N_Tax* in columns 3 and 4 for local SOEs are all negative and statistically significant, whereas those for non-SOEs shown in columns 5–8 are not significant at all, indicating that local fiscal distress helps mitigate the extent of underinvestment for underinvested local SOEs and that this effect is stronger for the firms that pay fewer taxes, whereas this pattern does not exist for non-SOEs, which is consistent with H3.

In summary, the results shown in Tables 8–10 suggest that local fiscal distress is positively related to the extent of local SOEs' overinvestment and that this relationship is stronger when lower taxes are paid by local SOEs. Meanwhile, local fiscal distress is negatively related to the extent of local SOEs' underinvestment, and this negative relationship is also stronger when lower taxes are paid by local SOEs. However, the above rela-

Table 8
Local Fiscal distress and corporate overinvestment.

Variable	(1) Local SOEs	(2) Local SOEs	(3) Non-SOEs	(4) Non-SOEs
_cons	−0.8585**	−0.8335**	−0.3104	−0.2981
	(0.029)	(0.030)	(0.341)	(0.356)
$Distress1_{t-1}$	**0.0021*** **		**0.0002**	
	(0.007)		**(0.704)**	
$Distress2_{t-1}$		**0.0022*** **		**0.0001**
		(0.009)		**(0.879)**
$Size_t$	0.0512***	0.0504***	0.0287**	0.0288**
	(0.005)	(0.005)	(0.049)	(0.049)
Roa_t	0.3599	0.3641	−0.0834	−0.0837
	(0.129)	(0.122)	(0.603)	(0.602)
Fcf_t	0.1768	0.1795	0.0715*	0.0714*
	(0.202)	(0.195)	(0.084)	(0.085)
$Dual_t$	0.0057	0.0059	−0.0063	−0.0067
	(0.844)	(0.838)	(0.666)	(0.649)
$Exeown_t$	−0.0004	−0.0006	0.0001	0.0001
	(0.844)	(0.770)	(0.907)	(0.926)
$Herf_t$	0.0041***	0.0041***	0.0027**	0.0027**
	(0.001)	(0.001)	(0.017)	(0.017)
$Divid_t$	−0.1249	−0.1250	0.0835	0.0833
	(0.206)	(0.206)	(0.383)	(0.384)
$Debt_t$	0.3644***	0.3694***	0.1295	0.1297
	(0.003)	(0.002)	(0.285)	(0.282)
$Salary_t$	−0.0423***	−0.0426***	−0.0285**	−0.0289**
	(0.007)	(0.007)	(0.019)	(0.018)
$GDPgth_t$	0.0041	0.0042	0.0049**	0.0050**
	(0.119)	(0.111)	(0.049)	(0.045)
$GovIntvn_t$	0.0018	0.0001	−0.0043	−0.0050
	(0.676)	(0.982)	(0.257)	(0.206)
Industry	Y	Y	Y	Y
Year	Y	Y	Y	Y
N	1134	1134	977	977
adj. R^2	0.137	0.135	0.074	0.074

p-Values in parentheses.
* $p < 0.1$.
** $p < 0.05$.
*** $p < 0.01$.

tionships do not exist for non-SOEs. Therefore, we conclude from the empirical results that there is a positive relationship between the level of local fiscal distress and the extent of local SOEs' investment expenditure, such that local governments have an incentive to boost tax revenue by forcing the local SOEs under their control to raise investment scales. Local governments also have an incentive to exert greater pressure on the firms that contribute less to local fiscal revenue (those who pay fewer taxes), whereas the investment behavior of non-SOEs is of no relevance to local finances.

4.3. Further analysis

Based on the grabbing hand theory, local governments faced with fiscal distress have an incentive to increase fiscal revenue by forcing local SOEs to raise their investment expenditure, and the motivation and effect of such intervention are stronger among firms that contribute less to local finances – in line with previously stated logic. However, lower investment efficiency due to overinvestment or underinvestment would theoretically lower a firm's profitability, leading to less income tax paid by the firm. Turnover taxes, which make up local governments' major tax revenue, are affected by the amount of transfers generated by the commodity

Table 9
Effect of corporate taxes paid on local fiscal distress and corporate overinvestment.

Variable	(1) Local SOEs	(2) Local SOEs	(3) Non-SOEs	(4) Non-SOEs
_cons	−1.7517***	−1.8504***	−0.7797*	−0.7163
	(0.000)	(0.000)	(0.079)	(0.106)
$Distress1_{t-1}$	**0.0131*** **		**0.0023**	
	(0.005)		**(0.519)**	
$Distress1_{t-1} \times N\_Tax_{t-1}$	**0.0007** **		**0.0001**	
	(0.011)		**(0.509)**	
$Distress2_{t-1}$		**0.0170*** **		**0.0005**
		(0.004)		**(0.898)**
$Distress2_{t-1} \times N\_Tax_{t-1}$		**0.0009*** **		**0.0000**
		(0.007)		**(0.876)**
N_Tax_{t-1}	0.0701***	0.0638***	0.0494***	0.0532***
	(0.000)	(0.000)	(0.009)	(0.004)
$Size_t$	0.1331***	0.1328***	0.0772***	0.0779***
	(0.000)	(0.000)	(0.007)	(0.006)
Roa_t	0.9235***	0.9354***	0.1514	0.1514
	(0.001)	(0.001)	(0.464)	(0.466)
Fcf_t	0.2296*	0.2319*	0.0692	0.0710
	(0.079)	(0.075)	(0.131)	(0.119)
$Dual_t$	0.0131	0.0127	−0.0068	−0.0074
	(0.634)	(0.646)	(0.640)	(0.610)
$Exeown_t$	0.0001	−0.0001	0.0000	0.0000
	(0.971)	(0.983)	(0.980)	(0.992)
$Herf_t$	0.0038***	0.0038***	0.0025**	0.0026**
	(0.001)	(0.001)	(0.011)	(0.011)
$Divid_t$	−0.0518	−0.0524	0.1318	0.1317
	(0.565)	(0.559)	(0.187)	(0.189)
$Debt_t$	0.2982***	0.3040***	0.1261	0.1266
	(0.005)	(0.004)	(0.291)	(0.287)
$Salary_t$	−0.0263**	−0.0265**	−0.0132	−0.0137
	(0.044)	(0.042)	(0.269)	(0.250)
$GDPgth_t$	0.0058**	0.0060***	0.0053**	0.0052**
	(0.011)	(0.009)	(0.045)	(0.043)
$GovIntvn_t$	0.0015	0.0001	−0.0043	−0.0048
	(0.723)	(0.974)	(0.241)	(0.198)
Industry	Y	Y	Y	Y
Year	Y	Y	Y	Y
N	1134	1134	977	977
adj. R^2	0.224	0.223	0.117	0.117

p-Values in parentheses.
* $p < 0.1$.
** $p < 0.05$.
*** $p < 0.01$.

production and circulation procedure and the number of turnovers for non-commodities. However, a decline in profitability leads to a reduction in free cash flow and even financial distress, which impairs firms' commodity production, distribution, and operations to finally reduce local turnover revenue. Therefore, it is doubtful that local governmental intervention has achieved the prospective goal of increasing fiscal revenue by forcing local SOEs to raise their investment level, resulting in overinvestment or a reduction in underinvestment, given that intervention induces a bad effect on corporate performance. The following section addresses these issues.

We construct a set of nested models (Model (4)) and perform *F*-tests to examine whether there is a significant difference between the effects of actual and normal corporate investment levels on the taxes paid to the government. The effect of the normal investment level on corporate taxes paid is significantly greater than that of the actual level if the coefficient α_2 is significantly larger than α_1 in Model (4.1). Similarly, Model (5) is

Table 10
Local Fiscal Distress, Corporate Underinvestment and the Effect of Corporate Taxes Paid.

Variable	(1) Local SOEs	(2) Local SOEs	(3) Local SOEs	(4) Local SOEs	(5) Non-SOEs	(6) Non-SOEs	(7) Non-SOEs	(8) Non-SOEs
_cons	0.1960***	0.2442***	0.1995***	0.2629***	0.3827***	0.3571***	0.3835***	0.3666***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
$Distress1_{t-1}$	**−0.0001***	**−0.0015*****			**0.0000**	**−0.0001**		
	(0.061)	**(0.003)**			**(0.884)**	**(0.944)**		
$Distress1_{t-1} \times N\_Tax_{t-1}$		**−0.0001*****				**−0.0000**		
		(0.006)				**(0.929)**		
$Distress2_{t-1}$			**−0.0002****	**−0.0020*****			**0.0000**	**−0.0004**
			(0.030)	**(0.001)**			**(0.929)**	**(0.743)**
$Distress2_{t-1} \times N\_Tax_{t-1}$				**−0.0001*****				**−0.0000**
				(0.003)				**(0.736)**
N_Tax_{t-1}		0.0032		0.0041*		0.0041*		0.0047**
		(0.121)		(0.059)		(0.058)		(0.045)
$Size_t$	−0.0028	−0.0024	−0.0028	−0.0024	−0.0125***	−0.0089***	−0.0125***	−0.0088***
	(0.164)	(0.392)	(0.168)	(0.402)	(0.000)	(0.003)	(0.000)	(0.003)
Roa_t	−0.0479*	−0.0494*	−0.0477*	−0.0494*	−0.0110	−0.0064	−0.0110	−0.0064
	(0.054)	(0.059)	(0.055)	(0.058)	(0.621)	(0.766)	(0.620)	(0.765)
Fcf_t	−0.1321***	−0.1322***	−0.1321***	−0.1324***	−0.1347***	−0.1345***	−0.1347***	−0.1347***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
$Dual_t$	−0.0020	−0.0018	−0.0019	−0.0017	0.0000	−0.0007	0.0000	−0.0007
	(0.707)	(0.743)	(0.717)	(0.749)	(0.995)	(0.877)	(0.997)	(0.870)
$Exeown_t$	0.0017	0.0017	0.0017	0.0017	−0.0010***	−0.0010***	−0.0010***	−0.0010***
	(0.118)	(0.134)	(0.121)	(0.135)	(0.000)	(0.001)	(0.000)	(0.001)
$Herf_t$	−0.0000	−0.0000	−0.0000	−0.0000	−0.0001	−0.0001	−0.0001	−0.0001
	(0.897)	(0.958)	(0.866)	(0.936)	(0.442)	(0.495)	(0.441)	(0.496)
$Divid_t$	0.0010	0.0009	0.0011	0.0011	0.0218*	0.0260**	0.0218*	0.0259**
	(0.911)	(0.919)	(0.904)	(0.904)	(0.090)	(0.041)	(0.090)	(0.041)
$Debt_t$	0.0409**	0.0400*	0.0407**	0.0394*	0.0441	0.0430	0.0441	0.0430
	(0.042)	(0.051)	(0.043)	(0.054)	(0.148)	(0.163)	(0.148)	(0.162)
$Salary_t$	−0.0051**	−0.0051**	−0.0052**	−0.0053**	−0.0038	−0.0029	−0.0038	−0.0029
	(0.020)	(0.016)	(0.015)	(0.011)	(0.142)	(0.270)	(0.142)	(0.266)
$GDPgth_t$	0.0001	0.0001	0.0001	0.0001	0.0007	0.0008*	0.0007	0.0008*
	(0.795)	(0.888)	(0.811)	(0.908)	(0.145)	(0.088)	(0.142)	(0.088)
$GovIntvn_t$	0.0001	0.0001	0.0000	0.0001	−0.0001	−0.0001	−0.0001	−0.0001
	(0.830)	(0.835)	(0.904)	(0.894)	(0.888)	(0.872)	(0.834)	(0.833)
Industry	Y	Y	Y	Y	Y	Y	Y	Y
Year	Y	Y	Y	Y	Y	Y	Y	Y
N	2190	2190	2190	2190	1961	1961	1961	1961
adj. R^2	0.136	0.136	0.136	0.137	0.158	0.160	0.158	0.160

p-Values in parentheses.
* $p < 0.1$.
** $p < 0.05$.
*** $p < 0.01$.

constructed to determine whether there is a significant difference between the effects of actual and normal corporate investment levels on corporate performance. We construct three measurements of taxes in Model (4). One is for total taxes paid *Tax_total*, which is identical to that in Model (3), and the other two are for the levels of turnover *Tax_turnover* and income *Tax_income* taxes, with *Business Tax and Surcharges* and *Income Tax Expense* on the income statement as the proxies, respectively. Corporate performance in Model (5) has two proxies: return on assets (*Roa*) and operating profit margin (*Opr*), respectively.

The independent variables in the two sets of nested models are the level of actual corporate investment (Inv_{act}) and that of normal investment (Inv_{nor}) along with their sum ($Inv_{act} + Inv_{nor}$), in which the normal investment level is calculated with the overinvestment model, namely Model (1). The control variables in the two sets of nested models are as follows: firm size (*Size*), return on total assets (*Roa*), financial leverage

ratio (*Lev*), capital intensity (ratio of fixed assets on total assets, *CapInt*), inventory intensity (ratio of inventory on total assets, *InvInt*), intangible asset intensity (ratio of intangible assets on total assets, *IntInt*), investment opportunities (ratio of corporate market value on corporate book value, *MB*), ownership concentration (the shareholding of the first majority shareholder, *Herf*), CEO duality (*Dual*), corporate growth opportunities (*Growth*), and free cash flow (*Fcf*). Our selection of the control variables follows Zimmerman (1983), Derashid and Zhang (2003), Porcano (1986) and Gupta and Newberry (1997). Given the endogeneity problem between the control variables, we use 1-year lagged values of firm size, return on total assets and financial leverage ratios instead of current values.

$$\begin{cases} Tax = \alpha_0 + \alpha_1 Inv_{act} + \alpha_2 Inv_{nor} + \alpha_3 L\_Size + \alpha_4 L\_Roa + \alpha_5 L\_Lev + \alpha_6 CapInt \\ \quad +\alpha_7 InvInt + \alpha_8 IntInt + \alpha_9 MB + \sum Industry + \sum Year + \varepsilon \quad (4.1) \\ Tax = \beta_0 + \beta_1 (Inv_{act} + Inv_{nor}) + \beta_2 L\_Size + \beta_3 L\_Roa + \beta_4 L\_Lev + \beta_5 CapInt \\ \quad +\beta_6 InvInt + \beta_7 IntInt + \beta_8 MB + \sum Industry + \sum Year + \varepsilon \quad (4.2) \end{cases} \tag{4}$$

$$\begin{cases} Roa(Opr) = \alpha_0 + \alpha_1 Inv_{act} + \alpha_2 Inv_{nor} + \alpha_3 L\_Size + \alpha_4 L\_Roa + \alpha_5 L\_Lev \\ \quad +\alpha_6 Herf + \alpha_7 Dual + \alpha_8 Growth + \alpha_9 Fcf + \alpha_{10} CapInt + \alpha_{11} MB + \sum Industry + \sum Year + \varepsilon \quad (5.1) \\ Roa(Opr) = \beta_0 + \beta_1 (Inv_{act} + Inv_{nor}) + \beta_2 L\_Size + \beta_3 L\_Roa + \beta_4 L\_Lev + \beta_5 Herf \\ \quad +\beta_6 Dual + \beta_7 Growth + \beta_8 Fcf + \beta_9 CapInt + \beta_{10} MB + \sum Industry + \sum Year + \varepsilon \quad (5.2) \end{cases} \tag{5}$$

Table 11 demonstrates the difference in the effect of the level of actual investment and that of normal investment, as calculated with the overinvestment model (Model (1)), on corporate taxes paid. Due to this paper's length constraints, Table 11 only shows the empirical results of Model (4.1).

Table 11 reveals the following details. The coefficients of Inv_{act} in the whole sample and two subsamples are all significantly positive, indicating that an increase in actual investment does lead to an increase in both income and turnover taxes paid by the firm. For the turnover taxes (*Tax_turnover*) in each sample, none of the coefficients for Inv_{nor} are statistically significant, while those for Inv_{act} are all significantly larger than those for Inv_{nor}, with *F*-values of 8.74, 4.24, and 5.08, respectively, and *p*-values of 0.0031, 0.0395, and 0.0242, respectively. This suggests that turnover taxes paid by firms increase as actual corporate investment increases, but are irrelevant in relation to corporate investment efficiency. For income taxes (*Tax_income*) in the whole sample and the underinvestment subsample, the coefficients for Inv_{nor} are all significantly larger than those forInv_{act}, with *F*-values of 3.51 and 5.36, respectively, and *p*-values of 0.0612 and 0.0206, respectively. The coefficients for Inv_{nor} and Inv_{act} in the overinvestment subsample are not significantly different, with an *F*-value of 0.04 and a *p*-value of 0.8477, indicating that the income taxes paid by underinvested firms are significantly lower than those paid by their normally invested counterparts with the same investment scale and that overinvested firms do not pay more income taxes than their normally invested counterparts with the same investment scale.

These empirical results suggest that a higher investment level generally helps increase both income and turnover taxes paid by firms, but investment efficiency greatly influences corporate taxes paid. Specifically, for total taxes and income taxes, overinvestment does not induce more tax paid to the government than the normal level, whereas underinvested firms pay fewer income taxes than their normally invested counterparts with the same investment scale. Turnover taxes are positively related to the actual investment level but unrelated to the normal investment level, consistent with the theoretical analysis that the turnover taxes generated by a firm are irrelevant to its investment efficiency, but positively related to the level of actual investment.

Table A1 presents the differences in the effects of actual and normal investment levels on corporate performance. Due to length restrictions, Table A1 only shows the empirical results for Model (5.1).

Table A1 shows that the coefficients of Inv_{act} and Inv_{nor} are all positive and statistically significant in each group, and the coefficients for each Inv_{nor} are all significantly larger than those for the corresponding Inv_{act}. The results suggest that although an increase in the levels of actual and normal investment both lead to improvements in corporate performance, the performance improvements in underinvested firms are significantly smaller than those observed in normal-level firms with the same investment scale. The results also

Table 11
Differences in the Effects of Actual and Normal Investment Levels on Corporate Taxes Paid (Model (4.1)).

	The Whole Sample			Overinvestment Subsample			Underinvestment Subsample		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Variable	Tax_total	Tax_turnover	Tax_income	Tax_total	Tax_turnover	Tax_income	Tax_total	Tax_turnover	Tax_income
_cons	−6.8820***	−8.4032***	−6.9658***	−6.7846***	−8.0523***	−7.3977***	−7.0492***	−8.6716***	−6.7707***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Inv_{act}	**1.0399*** **	**0.6228*** **	**1.2301*** **	**1.0800*** **	**0.6636*** **	**1.3212*** **	**1.0111*** **	**0.6073*** **	**1.1734*** **
	(0.000)	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**
Inv_{nor}	**0.9475*** **	**−0.6406**	**2.1731*** **	**0.3464**	**−0.7975**	**1.1618**	**1.1572*** **	**−0.6047**	**2.6430*** **
	(0.007)	**(0.119)**	**(0.000)**	**(0.550)**	**(0.239)**	**(0.143)**	**(0.009)**	**(0.242)**	**(0.000)**
Size	1.0273***	1.0343***	0.9973***	1.0182***	1.0200***	1.0186***	1.0368***	1.0457***	0.9875***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Roa	5.2680***	3.0863***	8.0375***	5.5818***	3.1417***	8.4548***	4.9908***	3.0021***	7.7049***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Lev	−0.2300***	0.1765**	−0.4723***	0.0757	0.4780***	−0.2155	−0.3960***	0.0234	−0.6062***
	(0.000)	(0.016)	(0.000)	(0.470)	(0.000)	(0.150)	(0.000)	(0.799)	(0.000)
CapInt	0.1133	0.5703***	−0.2411**	0.3225**	0.5686***	0.1422	0.0305	0.5535***	−0.4015***
	(0.128)	(0.000)	(0.020)	(0.015)	(0.000)	(0.435)	(0.738)	(0.000)	(0.002)
InvInt	1.6678***	2.2889***	1.2053***	1.4639***	2.0239***	1.2081***	1.7620***	2.3918***	1.2259***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
IntInt	−0.3024	0.7017***	−1.2248***	0.0741	0.9686**	−0.1442	−0.4791*	0.5487*	−1.6874***
	(0.149)	(0.004)	(0.000)	(0.847)	(0.031)	(0.788)	(0.056)	(0.061)	(0.000)
MB	0.1265***	0.0627***	0.1553***	0.0858***	−0.0011	0.1315***	0.1530***	0.1058***	0.1744***
	(0.000)	(0.001)	(0.000)	(0.001)	(0.971)	(0.000)	(0.000)	(0.000)	(0.000)
Industry	Y	Y	Y	Y	Y	Y	Y	Y	Y
Year	Y	Y	Y	Y	Y	Y	Y	Y	Y
N	8599	8571	8258	2935	2920	2824	5664	5651	5434
adj. R^2	0.623	0.560	0.501	0.611	0.555	0.490	0.631	0.563	0.508
F	**0.06**	**8.74*** **	**3.51***	**1.46**	**4.24** **	**0.04**	**0.10**	**5.08** **	**5.36** **
porb > F	**0.8007**	**0.0031**	**0.0612**	**0.2266**	**0.0395**	**0.8477**	**0.7506**	**0.0242**	**0.0206**

p-Values in parentheses.
* $p < 0.1$.
** $p < 0.05$.
*** $p < 0.01$.

indicate that the performances of overinvested and underinvested firms are worse than those of normally invested firms with the same investment scale.

Raising a firm's investment scale increases local fiscal revenue by increasing the taxes paid by firms, and it results in improved corporate performance. Specifically, turnover taxes are not affected by corporate investment efficiency, whereas total and income taxes are greatly affected by corporate investment efficiency. Underinvested firms pay much fewer income taxes than their normal-level counterparts, but there is no significant difference between the income taxes paid by overinvested firms and those paid by normal-level invested firms with the same investment scale. This suggests that local governments should increase their tax revenue by increasing the investment scales of underinvested firms to normal levels and by helping overinvested firms adjust their production, operation, and capital structures to match the present investment level before expanding their investment scales.

4.4. Robustness checks

4.4.1. Alternative explanation of abundant investment opportunities

In addition to the political intervention of local governments and political promotion tournaments (Zhou, 2004), overinvestment in local SOEs may also be driven by abundant investment opportunities or other factors unrelated to such intervention or promotion. To rule out this alternative explanation, we rerun the above

empirical tests using the central SOEs subsample and present the results in Table A2 in the Appendix. The results show that almost every coefficient of *Distress1*, *Distress2*, *Distress1* × *N_Tax,* and *Distress2* × *N_Tax* is not statistically significant, in either the overinvestment or the underinvestment subsamples, which is definitely different from the results gained from the local SOEs subsample.

Central SOEs are confronted with the same investment opportunities experienced by local SOEs operating within the same province, but the former are almost free of local governmental intervention. Therefore, the results in Table A2 rule out the possibility that the overinvestment of local SOEs is driven by abundant investment opportunities or other factors unrelated to government intervention or political promotion tournaments, indirectly enhancing support for the perspective that local governments have an incentive to boost tax revenue by forcing local SOEs to raise their investment scales and to exert greater pressure on firms that contribute less to local fiscal revenue.

4.4.2. The probability of reverse causality between dependent and independent variables

Based on the grabbing hand theory, we assert that local governments have an incentive to boost tax revenue by forcing the local SOEs under their control to raise their investment scales and to exert greater pressure on firms that contribute less to local fiscal revenue. Our assertions are supported by the aforementioned empirical results. We also determine from the empirical findings in the Further Analysis section (Section 4.3) that a larger investment scale could help to increase fiscal revenue by increasing both the income and turnover taxes paid by the firm, which effectively rules out the potential reverse causality of the overinvestment of local SOEs leading to local fiscal distress. Finally, we perform Hausman tests on the dependent and two independent variables and get χ^2 values of 0.00 and 0.05, respectively, and a *p*-value of 1.0000 for each, suggesting that only OLS is theoretically needed in this paper. However, in the interests of robustness, we perform 2SLS robustness checks of the aforementioned empirical tests.

$$\begin{cases} OverInv_{i,t}(UnderInv_{i,t}) = \beta_0 + \boldsymbol{\beta_1 Distress_{i,t-1}} + \beta_2 Size_{i,t} + \beta_3 Roa_{i,t} + \beta_4 Fcf_{i,t} \\ \quad +\beta_5 Dual_{i,t} + \beta_6 Exeown_{i,t} + \beta_7 Herf_{i,t} + \beta_8 Divid_{i,t} + \beta_9 Debt_{i,t} + \beta_{10} Salary_{i,t} \\ \quad +\beta_{11} GDPgth_t + \beta_{12} GovIntvn_t + \sum Industry + \sum Year + \varepsilon \qquad (6.1) \\ Distress_{i,t} = \gamma_0 + \gamma_1 GovIntvn_t + \gamma_2 GDP_t + \gamma_3 Earthquake_t + \sum Year + \varepsilon \qquad (6.2) \end{cases} \tag{6}$$

$$\begin{cases} OverInv_{i,t}(UnderInv_{i,t}) = \beta_0 + \boldsymbol{\beta_1 Distress_{i,t-1}} + \boldsymbol{\beta_2 Distress_{i,t-1}} \times \boldsymbol{N\_Tax_{i,t-1}} \\ \quad +\beta_3 N\_Tax_{i,t-1} + \beta_4 Size_{i,t} + \beta_5 Roa_{i,t} + \beta_6 Fcf_{i,t} + \beta_7 Dual_{i,t} + \beta_8 Exeown_{i,t} + \beta_9 Herf_{i,t} + \beta_{10} Divid_{i,t} \\ \quad +\beta_{11} Debt_{i,t} + \beta_{12} Salary_{i,t} + \beta_{13} GDPgth_t + \beta_{14} GovIntvn_t + \sum Industry + \sum Year + \varepsilon \qquad (7.1) \\ Distress_{i,t} = \gamma_0 + \gamma_1 GovIntvn_t + \gamma_2 GDP_t + \gamma_3 Earthquake_t + \sum Year + \varepsilon \qquad (7.2) \end{cases} \tag{7}$$

Models (6) and (7) are the 2SLS models. Models (6.1) and (7.1) are the same as Models (2) and (3) in Section 3, respectively, and the instrument variables (IVs) in Models (6.2) and (7.2) are three provincial-level variables: the index of reducing government intervention to enterprises in the Fan Gang marketization index, the logarithm of the local GDP, and the number of earthquakes in the current year. We chose these three variables as IVs because the local governments with fiscal distress are likely to be those with poor governance and severe intervention into enterprises; because local governmental finance is generally highly correlated with local GDP, as the better developed regions usually have sufficient fiscal revenue, with low probability of being immersed in fiscal distress, and because earthquakes are strongly destructive, infrequent, and unpredictable natural disasters that significantly influence local finance. We perform a Pearson correlation analysis on the proxies of local fiscal distress and the IVs and present the results in Table 12.

As Table 12 reveals, the two proxies of local fiscal distress and the three IVs are all significantly correlated at the 0.01 level, which satisfies the basic assumptions for IVs. The results of 2SLS for local SOEs are presented in Table 13.

Table 13 shows that except for $Distress1_{t-1} \times N\_Tax_{t-1}$, the results of 2SLS for local SOEs do not differ greatly from those using OLS (Tables 8–10), suggesting the robustness of the results. Moreover, the 2SLS results rule out the potential reverse causality of the dependent and independent variables, supporting the grabbing hand theory. Due to length constraints, the 2SLS results for non-SOEs and central SOEs are

Table 12
Correlations of proxies for local fiscal distress and the IVs.

	Distress1	Distress2	GovIntvn	GDP	Earthquake
Distress1	1.0000				
Distress2	0.986***	1.0000			
	(0.0000)				
GovIntvn	**−0.735*** **	**−0.726*** **	1.0000		
	(0.0000)	**(0.0000)**			
GDP	**−0.563*** **	**−0.604*** **	0.545***	1.0000	
	(0.0000)	**(0.0000)**	(0.0000)		
Earthquake	**0.327*** **	**0.343*** **	−0.211***	−0.185***	1.0000
	(0.0000)	**(0.0000)**	(0.0000)	(0.0000)	

p-Values in parentheses, * $p < 0.1$, ** $p < 0.05$.
*** $p < 0.01$.

Table 13
Results of 2SLS for local SOEs.

Variable	(1) OverInv	(2) OverInv	(3) OverInv	(4) OverInv	(5) UnderInv	(6) UnderInv	(7) UnderInv	(8) UnderInv
Main Results								
_cons	−0.8392***	−1.0052	−0.8264***	−1.8494***	0.1989***	0.2290	0.2011***	0.2645***
	(0.002)	(0.348)	(0.002)	(0.000)	(0.000)	(0.278)	(0.000)	(0.000)
$Distress1_{t-1}$	**0.0017*** **	**−0.0050**			**−0.0002***	**−0.0011**		
	(0.009)	**(0.844)**			**(0.061)**	**(0.843)**		
$Distress1_{t-1} \times N\_Tax_{t-1}$		**−0.0004**				**−0.0001**		
		(0.804)				**(0.866)**		
$Distress2_{t-1}$			**0.0020*** **	**0.0169*** **			**−0.0002** **	**−0.0020** **
			(0.001)	**(0.004)**			**(0.014)**	**(0.017)**
$Distress2_{t-1} \times N\_Tax_{t-1}$				**0.0009*** **				**−0.0001** **
				(0.009)				**(0.033)**
N_Tax_{t-1}		0.1111*		0.0633***		0.0022		0.0040*
		(0.060)		(0.000)		(0.856)		(0.082)
$Size_t$	0.0514***	0.1349***	0.0506***	0.1331***	−0.0028*	−0.0025	−0.0028*	−0.0024
	(0.000)	(0.000)	(0.000)	(0.000)	(0.092)	(0.275)	(0.094)	(0.271)
Roa_t	0.3556*	0.8667***	0.3589*	0.9300***	−0.0479**	−0.0488**	−0.0476**	−0.0494**
	(0.099)	(0.000)	(0.095)	(0.000)	(0.013)	(0.021)	(0.014)	(0.013)
Fcf_t	0.1758**	0.2204***	0.1776**	0.2298***	−0.1323***	−0.1323***	−0.1322***	−0.1325***
	(0.015)	(0.002)	(0.014)	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)
$Dual_t$	0.0058	0.0141	0.0064	0.0132	−0.0020	−0.0019	−0.0020	−0.0017
	(0.841)	(0.612)	(0.824)	(0.628)	(0.627)	(0.667)	(0.640)	(0.679)
$Exeown_t$	−0.0004	0.0001	−0.0005	0.0000	0.0017	0.0017	0.0017	0.0017
	(0.959)	(0.988)	(0.945)	(0.995)	(0.187)	(0.183)	(0.190)	(0.185)
$Herf_t$	0.0041***	0.0039***	0.0041***	0.0038***	−0.0000	−0.0000	−0.0000	−0.0000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.930)	(0.966)	(0.895)	(0.953)
$Divid_t$	−0.1245**	−0.0555	−0.1246**	−0.0519	0.0010	0.0009	0.0010	0.0010
	(0.040)	(0.345)	(0.040)	(0.368)	(0.914)	(0.918)	(0.907)	(0.907)
$Debt_t$	0.3633***	0.2901***	0.3694***	0.3042***	0.0410***	0.0401**	0.0406***	0.0394**
	(0.000)	(0.002)	(0.000)	(0.001)	(0.010)	(0.012)	(0.010)	(0.013)
$Salary_t$	−0.0423***	−0.0291**	−0.0428***	−0.0268**	−0.0051**	−0.0051**	−0.0052**	−0.0053**
	(0.004)	(0.042)	(0.003)	(0.049)	(0.017)	(0.026)	(0.012)	(0.011)
$GDPgth_t$	0.0040	0.0052*	0.0042	0.0059**	0.0001	0.0001	0.0001	0.0000
	(0.190)	(0.082)	(0.171)	(0.041)	(0.797)	(0.877)	(0.812)	(0.917)
Industry	Y	Y	Y	Y	Y	Y	Y	Y
Year	Y	Y	Y	Y	Y	Y	Y	Y
N	1134	1134	1134	1134	2190	2190	2190	2190

p-Values in parentheses.
* $p < 0.1$.
** $p < 0.05$.
*** $p < 0.01$.

provided in Tables A3 and A4, which are also nonsignificantly different from those using OLS (Tables 8–10 and A2).

4.4.3. The alternative approach of tax enforcement

Our H2 argues that governments generate their fiscal revenue through taxes and that the incentive to extract from enterprises is stronger in the firms that make fewer contributions to local finance, following the grabbing hand theory, such that lower taxes paid by local SOEs enhances the positive relationship described by H1 between local fiscal distress and the overinvestment of local SOEs. However, in addition to the investment approach, local governments could achieve their finance goal by enhancing their tax enforcement or directly consulting with the enterprises under control. Theoretically, firms that pay fewer taxes are probably more aggressive when it comes to tax avoidance, so enhancing the tax enforcement of aggressive tax-avoiding firms may be a more effective way to generate local fiscal revenue than extracting from local SOEs.

Two frequently used proxies for the aggressiveness of tax avoidance are the Book-Tax difference (BTD) (Mills, 1998; Desai, 2003; Wilson, 2009) and the Effective Tax Rate (ETR) (Zimmerman, 1983; Gupta and Newberry, 1997; Wilson, 2009). However, tax preferences in China vary, which makes the measurement complex. Some tax preferences in China are linked to the tax basis, by reducing or exempting taxes on firms' operating results. For example, R&D expenditures could be additionally deducted or amortized at the 50% level,[6] and the production of high-tech enterprises is exempt from income taxes in the initial 2 years and must only pay half in the initial 8 years.[7] Other tax preferences are based on tax rates, such as the income tax rate for transitional firms in special zones and the high-tech enterprise certificate applicable tax rate.[8] The amount of tax reduction due to tax preferences cannot be totally viewed as the result of tax avoidance because for firms, the desire for self-development is more intense than that for tax avoidance, so most tax preferences are the side benefits of business strategies. For example, the main purpose of R&D activities should be innovation demands to increase firms' profitability, not for the tax savings from the additional 50% deduction or amortization. Moreover, some earnings management activities based on these accounting standards also serve the goal of tax deduction (Desai and Dharmapala, 2009; Hanlon and Heitzman, 2010).

Based on the above analysis, we construct Model (8), in which the residual ($\varepsilon_{i,t}$) represents the aggressiveness of corporate tax avoidance, following Desai and Dharmapala (2006, 2009). *BTD* in Model (8) represents the Book-Tax difference scaled by the 1-year lagged value of firm size. *TA* represents total accruals, including the change in (1) *Current Assets*, (2) *Current Liabilities*, (3) *Cash and Short-Term Investments,* and (4) *the Level in Depreciation and Amortization*, scaled by the 1-year lagged value of firm size following Desai and Dharmapala (2009). $\mu_{i,t}$ represents firm fixed effects. In addition, we incorporate the level of *R&D Expenditure*, also scaled by the 1-year lagged value of firm size, based on China's institutional environment. Finally, the residual $\varepsilon_{i,t}$ is defined as the portion of the Book-Tax difference that could not be explained by corporate earnings management or R&D activities, namely the aggressiveness of tax avoidance (Desai and Dharmapala, 2006, 2009), represented by *BTD1* (see Table 14).

In considering robustness, we also measure the level of earnings management with the Jones model of discretionary accruals, denoting *BTD11*, *BTD12*, *BTD21,* and *BTD22* as the discretionary accruals with operating profit under the Jones model, net profit under the Jones model, operating profit under the modified Jones model, and net profit under the modified Jones model, respectively. Panel A in Table 14 shows the Pearson correlation matrix of corporate taxes paid and tax avoidance aggressiveness for the sample between 2002 and 2010, in which *Tax_total* is calculated by the logarithm of corporate total taxes paid, including both income and turnover taxes, and *Tax_income* is calculated by the logarithm of income taxes.

Public firms in China did not disclose detailed nominal tax rate and tax preferences in the footnotes to financial statements of their annual reports until 2007, so we calculate the level of corporate tax avoidance in the 2007–2010 subsample in Model (9), in which *Tax_base* is a dummy variable representing the tax preferences linked to the tax basis, that takes the value one if there is an exemption or reduction in income taxes

[6] See details in *The tax law of the People's Republic of China* and *Accounting Standards for Business Enterprises.*
[7] See details in *The tax law of the People's Republic of China* and *Accounting Standards for Business Enterprises.*
[8] See details in *The tax law of the People's Republic of China* and *Accounting Standards for Business Enterprises.*

Table 14
Pearson correlations of corporate taxes paid with BTD and ETR.

Variable	Tax_total	Tax_income	BTD	BTD1	BTD11	BTD12	BTD21	BTD22
Panel A								
Tax_total	1.0000							
Tax_income	0.8842***	1.0000						
BTD	**0.0379***	**0.0561***	1.0000					
BTD1	**0.0277***	**0.0486***	0.8574***	1.0000				
BTD11	**0.0517***	**0.0726***	0.9891***	0.8384***	1.0000			
BTD12	**0.0198**	**0.0606***	0.7071***	0.6399***	0.7364***	1.0000		
BTD21	**0.0517***	**0.0707***	0.9822***	0.8347***	0.9946***	0.7220***	1.0000	
BTD22	**0.0179**	**0.0574***	0.6975***	0.6327***	0.7274***	0.9895***	0.7232***	1.0000
Panel B								
Tax_total	1.0000							
Tax_income	0.9003***	1.0000						
BTD	**0.0589***	**0.0692***	1.0000					
BTD1	**0.0346****	**0.0458***	0.8549***	1.0000				
BTD11	**0.0581***	**0.0704***	0.9881***	0.8351***	1.0000			
BTD12	**0.0283***	**0.0578***	0.7004***	0.6302***	0.7300***	1.0000		
BTD21	**0.0580***	**0.0685***	0.9812***	0.8313***	0.9945***	0.7151***	1.0000	
BTD22	**0.0263***	**0.0541***	0.6904***	0.6226***	0.7206***	0.9889***	0.7162***	1.0000

Variable	Tax_total	Tax_income	ETR	ETR1
Panel C				
Tax_total	1.0000			
Tax_income	0.8842***	1.0000		
ETR	**0.0080**	**0.0113**	1.0000	
ETR1	**0.0106**	**0.0136**	0.9993***	1.0000
Panel D				
Tax_total	1.0000			
Tax_income	0.9003***	1.0000		
ETR	**0.0015**	**0.0030**	1.0000	
ETR2	**0.0026**	**0.0040**	0.9939***	1.0000

p-Values in parentheses.
* $p < 0.1$.
** $p < 0.05$.
*** $p < 0.01$.

mentioned in the footnotes to financial statements, and zero otherwise. The other variables are identical to those in Model (8), and the Pearson correlation matrix of corporate tax paid and tax avoidance aggressiveness is presented in Panel B of Table 14.

$$BTD_{i,t} = \beta_0 + \beta_1 TA_{i,t} + \beta_2 R\&D_{i,t} + \mu_{i,t} + \varepsilon_{i,t} \quad (8)$$

$$BTD_{i,t} = \beta_0 + \beta_1 TA_{i,t} + \beta_2 R\&D_{i,t} + \beta_3 Tax\_base_{i,t} + \mu_{i,t} + \varepsilon_{i,t} \quad (9)$$

$$ETR_{i,t} = \beta_0 + \beta_1 Speczone_{i,t} + \beta_2 Hightec_{i,t} + \mu_{i,t} + \varepsilon_{i,t} \quad (10)$$

$$ETR_{i,t} = \beta_0 + \beta_1 Speczone_{i,t} + \beta_2 Tax\_rate_{i,t} + \mu_{i,t} + \varepsilon_{i,t} \quad (11)$$

Models (10) and (11) use the effective tax rate (ETR) to measure the level of tax avoidance. The theory is basically the same as that for Models (8) and (9), with *ETR* represented by the item *Effective Tax Rate* disclosed in the operating capacity file of financial reports. *Speczone* is a dummy variable representing special economic zones in China, equal to one if the corporation operates in the five special zones of Shenzhen, Zhuhai, Shantou, Xiamen, and Hainan, and zero otherwise. *Hightec* is a dummy variable that takes the value of one if the firm is a high-tech firm or if it applies a transitional income tax rate of 25%, and such is stated in the footnotes to financial statements, and zero otherwise. For the same reasons given for the models using BTD, we apply the 2002–2010 and 2007–2010 samples to Models (10) and (11), respectively, with the residuals $\varepsilon_{i,t}$ representing the level of corporate tax avoidance, denoted by *ETR1* and *ETR2*, respectively. The Pearson

correlation matrices of corporate tax paid and tax avoidance aggressiveness are presented in Panels C and D of Table 14, respectively.

As Panels A and B of Table 14 show, the BTD modified by earnings management and tax preferences (*BTD1* and *BTD11–BTD22*) or the unmodified BTD (*BTD*) is positively related or unrelated to corporate total taxes or income taxes paid, indicating no statistical evidence supporting the point of view that firms that pay fewer taxes exhibit more aggressive tax avoidance.

In Panels C and D, neither the ETR modified by tax preferences (*ETR1* and *ETR2*) nor the unmodified ETR (*ETR*) are correlated with corporate total taxes or income taxes paid, indicating no statistical evidence supporting the point of view that firms that pay fewer taxes exhibit more aggressive tax avoidance.

The results from Panels A–D provide no evidence to support the point of view that firms that pay fewer taxes exhibit more aggressive tax avoidance, furthering the assertion that governments increase tax revenue by enhancing their tax enforcement on the firms that pay fewer taxes, which indirectly supports H2.

4.4.4. The mediation of free cash flow

Jensen (1986) argues that high free cash flow triggers agency problems that result in overinvestment, but this problem could be mitigated by raising debt, which reduces firms' free cash flow – an argument supported by Tang et al. (2007). Wei and Liu (2007) and Tang et al. (2007) indirectly determine the positive relationship between corporate free cash flow and overinvestment by examining how cash dividends restrain the level of overinvestment. Therefore, to rule out the potential explanation that firms that pay fewer taxes are generally faced with the problem of overinvestment in response to their high free cash flow preserved in the firm due to tax saving activities, we scale total taxes paid (the sum of *Income Tax Expense* and *Business Tax and Surcharges* on the income statement) with total assets, denote corporate tax intensity and rerun the empirical tests in Table 9 with corporate tax intensity, represented by *N_TaxI*, instead of corporate taxes paid. The results presented in Table A5 show that none of the coefficients for the interaction terms of *Distress1* × *N_TaxI* and *Distress2* × *N_TaxI* and for *N_TaxI* are statistically significant, suggesting that corporate tax intensity has no effect on firms' overinvestment. Combined with the results in Table 9, our findings suggest that the positive effect that low corporate taxes paid has on the relationship between local fiscal distress and corporate overinvestment is triggered by the political intervention of local governments, thus ruling out the possibility of a mediating effect through free cash flow.

4.4.5. An alternative explanation for H2 – the helping hand theory

We have a potential competing theory for H2 – the helping hand theory. Local governments and local SOEs have innumerable links through funds and personnel issues, and local governments always have a tendency to protect and support the local SOEs under their control, which is generally called paternalism (Hu, 2001). Local governments may offer a helping hand by serving as an invisible underwriter to help local SOEs lessen financing constraints when applying for bank loans (Zhu and Li, 2008) or by seeking investment projects for local SOEs to help them out of dilemmas prompted by operational or financial problems, which results in overinvestment by local SOEs. The firms with low operating and financial performance generally have low profitability, with both low turnover taxes based on corporate operations and low income taxes based on profits, indicating their limited contribution to local finance.

While such governmental helping hands can decrease financing constraints in the loan application process or discover investment projects for local SOEs, the latter (discovering investment projects for local SOEs) is difficult to observe. However, both activities should exist simultaneously in capital markets and satisfy a certain distribution that will allow us to deduce the existence or even the intensity of governmental helping hands by observing the activities of the former (decreasing financing constraints in local SOEs' loan application process). Given the ubiquitous soft budget constraints of local SOEs, banks' requirements for accounting conservatism on SOEs are much lower than those for non-SOEs, which is clearly a reflection of the government's helping hand. Another type of soft budget constraint is for governments to serve as invisible underwriters by helping SOEs to lessen their financing constraints when applying for bank loans. Consequently, following Basu (1997), we construct a model of accounting conservatism to help rule out the competitive explanation of paternalism by investigating the effect of 1-year lagged values of corporate taxes paid on banks' requirements for accounting conservatism.

Model (12) is the model constructed by Basu (1997), with EPS_{it} as a firm's earnings per share in year t, P_{it-1} as the stock closing price in year $t-1$, Ret_{it} as the annual stock returns in year t and Dr_{it} as a dummy variable, that takes the value of one if $Ret_{it} < 0$, and zero otherwise. The coefficient of $Ret_{it} \times Dr_{it}$, β_3, determines the extent of accounting conservatism.

$$EPS_{it}/P_{it-1} = \beta_0 + \beta_1 Dr_{it} + \beta_2 Ret_{it} + \beta_3 Ret_{it} \times Dr_{it} + \varepsilon \quad (12)$$

Models (13)–(15) measure the effects of the interactions of other variables with corporate accounting conservatism by incorporating interaction terms into Basu's (1997) basic model. Model (13) adds the interactions of corporate liability levels N_t and other variables in year t on the basis of Model (12), representing the total debt-to-asset ratio *Lev*, the ratio of long-term debt on total assets *Ldebt* and the ratio of short-term debt on total assets *Sdebt*, respectively. Hence, the coefficient of $Ret_t \times Dr_t \times N_t$, β_7 represents the effect of corporate capital structure on accounting conservatism.

Table 15
Corporate tax payment, capital structure and accounting conservatism for local SOEs.

Variable	(1)	(2) Lev_t	(3) $Ldebt_t$	(4) $Sdebt_t$
_cons	0.0351***	0.0616***	0.0371***	0.0518***
	(0.000)	(0.000)	(0.000)	(0.000)
Dr_t	0.0072	−0.0098	0.0058	−0.0052
	(0.113)	(0.391)	(0.303)	(0.437)
Ret_t	0.0183***	0.0053	0.0159***	0.0158***
	(0.000)	(0.226)	(0.000)	(0.000)
Low_{t-1}	−0.0351***	−0.0273***	−0.0331***	−0.0257***
	(0.000)	(0.000)	(0.000)	(0.000)
$Ret_t \times Dr_t$	0.0235**	0.0312	0.0291**	0.0231
	(0.021)	(0.284)	(0.028)	(0.135)
$Ret_t \times Low_{t-1}$	−0.0144***	−0.0004	−0.0095***	−0.0141***
	(0.000)	(0.926)	(0.000)	(0.000)
$Dr_t \times Low_{t-1}$	0.0005	−0.0163	−0.0021	−0.0045
	(0.927)	(0.159)	(0.761)	(0.570)
$Ret_t \times Dr_t \times Low_{t-1}$	**0.0301****	−0.0308	0.0094	−0.0066
	(0.043)	(0.337)	(0.603)	(0.751)
N_t		−0.0422***	0.0113	−0.0864***
		(0.000)	(0.693)	(0.000)
$Ret_t \times N_t$		0.0199**	0.0137	−0.0059
		(0.014)	(0.497)	(0.694)
$Dr_t \times N_t$		0.0172	−0.0246	0.0439
		(0.449)	(0.635)	(0.254)
$Ret_t \times Dr_t \times N_t$		−0.0169	−0.0532	0.0246
		(0.753)	(0.632)	(0.774)
$N_t \times Low_{t-1}$		−0.0438***	−0.1766***	−0.0944***
		(0.000)	(0.000)	(0.000)
$Ret_t \times N_t \times Low_{t-1}$		−0.0087	−0.0085	0.0422**
		(0.318)	(0.754)	(0.021)
$Dr_t \times N_t \times Low_{t-1}$		0.0649***	0.1867***	0.0966**
		(0.004)	(0.007)	(0.021)
$Ret_t \times Dr_t \times N_t \times Low_{t-1}$		**0.0887**	**0.2546***	**0.1149**
		(0.111)	**(0.088)**	**(0.230)**
Industry	Y	Y	Y	Y
Year	Y	Y	Y	Y
N	5142	5142	5118	5142
Adj. R-sq	0.131	0.184	0.139	0.185

p-Values in parentheses.
* $p < 0.1$.
** $p < 0.05$.
*** $p < 0.01$.

$$EPS_{it}/P_{it-1} = \beta_0 + \beta_1 Dr_{it} + \beta_2 Ret_{it} + \beta_3 N_{it} + \beta_4 Ret_{it} \times Dr_{it} + \beta_5 Ret_t \times N_t + \beta_6 Dr_t \times N_t + \beta_7 Ret_t \times Dr_t \times N_t + \varepsilon \quad (13)$$

Model (14) adds the interactions of a low level of corporate taxes paid and other variables to Model (12), in which Low_{t-1} is a dummy variable that takes the value of one if the taxes paid by the firm in year $t-1$ are lower than the median value of the total SOE subsample in the corresponding year, and zero otherwise. Thus, the coefficient of $Ret_t \times Dr_t \times Low_{t-1}$, β_7 represents the effect of low corporate taxes paid on accounting conservatism.

$$EPS_{it}/P_{it-1} = \beta_0 + \beta_1 Dr_{it} + \beta_2 Ret_{it} + \beta_3 Low_{it-1} + \beta_4 Ret_{it} \times Dr_{it} + \beta_5 Ret_t \times Low_{t-1} + \beta_6 Dr_t \times Low_{t-1} + \beta_7 Ret_t \times Dr_t \times Low_{t-1} + \varepsilon \quad (14)$$

$$EPS_{it}/P_{it-1} = \beta_0 + \beta_1 Dr_{it} + \beta_2 Ret_{it} + \beta_3 Low_{it-1} + \beta_4 Ret_{it} \times Dr_{it} + \beta_5 Ret_t \times Low_{t-1} + \beta_6 Dr_t \times Low_{t-1} + \beta_7 Ret_t \times Dr_t \times Low_{t-1} + \beta_8 N_t + \beta_9 Ret_t \times N_t + \beta_{10} Dr_t \times N_t + \beta_{11} Ret_t \times Dr_t \times N_t + \beta_{12} N_t \times Low_{t-1} + \beta_{13} Ret_t \times N_t \times Low_{t-1} + \beta_{14} Dr_t \times N_t \times Low_{t-1} + \beta_{15} Ret_t \times Dr_t \times N_t \times Low_{t-1} + \varepsilon \quad (15)$$

Table A1
Differences in the effects of actual and normal investment levels on corporate performance (Model (5.1)).

	The whole sample		Overinvestment subsample		Underinvestment subsample	
	(1)	(2)	(3)	(4)	(5)	(6)
Variable	Roa	Opr	Roa	Opr	Roa	Opr
_cons	−0.0826***	−0.3796***	−0.0850**	−0.4046***	−0.1075***	−0.4232***
	(0.000)	(0.000)	(0.019)	(0.002)	(0.000)	(0.000)
Inv_{act}	**0.0299*** **	**0.1386*** **	**0.0422*** **	**0.1857*** **	**0.0224*** **	**0.1085*** **
	(0.000)	**(0.000)**	**(0.000)**	**(0.000)**	**(0.001)**	**(0.000)**
Inv_{nor}	**0.2854*** **	**0.7469*** **	**0.2572*** **	**0.5619*** **	**0.2840*** **	**0.8039*** **
	(0.000)	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**	**(0.000)**
L_Size	0.0035***	0.0219***	0.0040**	0.0270***	0.0047***	0.0225***
	(0.001)	(0.000)	(0.020)	(0.000)	(0.001)	(0.000)
L_Lev	−0.0642***	−0.3734***	−0.0488***	−0.3449***	−0.0729***	−0.3912***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Herf	0.0003***	0.0008***	0.0003***	0.0007**	0.0004***	0.0009***
	(0.000)	(0.000)	(0.000)	(0.026)	(0.000)	(0.000)
Dual	−0.0028	−0.0192**	−0.0061*	−0.0276**	-0.0008	−0.0139
	(0.205)	(0.013)	(0.084)	(0.033)	(0.780)	(0.149)
Growth	0.0231***	0.0704***	0.0172***	0.0508***	0.0264***	0.0820***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Fcf	0.0600***	0.1006***	0.0358***	−0.0139	0.0772***	0.1819***
	(0.000)	(0.000)	(0.000)	(0.654)	(0.000)	(0.000)
CapInt	−0.0496***	−0.1183***	−0.0440***	−0.0993***	−0.0493***	−0.1218***
	(0.000)	(0.000)	(0.000)	(0.001)	(0.000)	(0.000)
MB	0.0131***	−0.0036	0.0142***	0.0003	0.0118***	−0.0084*
	(0.000)	(0.344)	(0.000)	(0.964)	(0.000)	(0.097)
Industry	Y	Y	Y	Y	Y	Y
Year	Y	Y	Y	Y	Y	Y
N	7082	7082	2475	2475	4607	4607
adj. R^2	0.200	0.225	0.168	0.187	0.216	0.250
F	**89.74*** **	**40.44*** **	**23.42*** **	**5.27** **	**58.56*** **	**34.21*** **
porb > F	**0.000**	**0.000**	**0.000**	**0.022**	**0.000**	**0.000**

p-Values in parentheses.
* $p < 0.1$.
** $p < 0.05$.
*** $p < 0.01$.

Table A2
Local fiscal distress, corporate overinvestment and the effect of corporate taxes paid for central SOEs.

Variable	(1) OverInv	(2) OverInv	(3) OverInv	(4) OverInv	(5) UnderInv	(6) UnderInv	(7) UnderInv	(8) UnderInv
_cons	0.4295	0.4032	0.3387	0.2143	0.1327**	0.1322**	0.1266*	0.1265*
	(0.372)	(0.399)	(0.519)	(0.735)	(0.032)	(0.034)	(0.076)	(0.083)
$Distress1_{t-1}$	**−0.0013***		**−0.0082**		**0.0001**		**0.0015***	
	(0.085)		**(0.115)**		**(0.366)**		**(0.063)**	
$Distress1_{t-1} \times N\_Tax_{t-1}$			**−0.0004**				**0.0001***	
			(0.240)				**(0.086)**	
$Distress2_{t-1}$		**−0.0014**		**−0.0057**		**0.0001**		**0.0015***
		(0.108)		**(0.479)**		**(0.365)**		**(0.098)**
$Distress2_{t-1} \times N\_Tax_{t-1}$				**−0.0002**				**0.0001**
				(0.626)				**(0.133)**
N_Tax_{t-1}			0.0494**	0.0415*			−0.0074***	−0.0072***
			(0.026)	(0.083)			(0.007)	(0.008)
$Size_t$	0.0090	0.0090	0.0430**	0.0410**	−0.0005	−0.0005	−0.0051	−0.0050
	(0.553)	(0.554)	(0.021)	(0.024)	(0.854)	(0.859)	(0.142)	(0.155)
Roa_t	0.1832	0.1806	0.3134	0.3016	−0.1209**	−0.1209**	−0.1320**	−0.1320**
	(0.384)	(0.388)	(0.120)	(0.132)	(0.021)	(0.021)	(0.012)	(0.012)
Fcf_t	0.1335	0.1329	0.1586**	0.1586**	−0.1628***	−0.1629***	−0.1677***	−0.1674***
	(0.105)	(0.109)	(0.037)	(0.040)	(0.000)	(0.000)	(0.000)	(0.000)
$Dual_t$	0.0034	0.0035	0.0006	0.0009	0.0011	0.0010	0.0013	0.0013
	(0.923)	(0.920)	(0.987)	(0.981)	(0.824)	(0.836)	(0.787)	(0.783)
$Exeown_t$	0.0017	0.0017	0.0021	0.0020	−0.0019	−0.0019	−0.0021	−0.0021
	(0.357)	(0.351)	(0.155)	(0.208)	(0.376)	(0.383)	(0.310)	(0.318)
$Herf_t$	0.0001	0.0002	−0.0000	0.0000	0.0000	0.0000	−0.0000	−0.0000
	(0.903)	(0.862)	(0.988)	(0.975)	(0.883)	(0.888)	(0.952)	(0.964)
$Divid_t$	0.1716	0.1700	0.1774	0.1732	−0.0006	−0.0007	−0.0024	−0.0024
	(0.149)	(0.150)	(0.135)	(0.144)	(0.943)	(0.942)	(0.787)	(0.791)
$Debt_t$	0.1765*	0.1728*	0.1520	0.1579	0.0477**	0.0475**	0.0544***	0.0541***
	(0.080)	(0.083)	(0.129)	(0.119)	(0.022)	(0.023)	(0.008)	(0.009)
$Salary_t$	−0.0412*	−0.0400*	−0.0347	−0.0323	−0.0062**	−0.0062**	−0.0069**	−0.0069**
	(0.067)	(0.079)	(0.196)	(0.236)	(0.046)	(0.043)	(0.027)	(0.024)
$GDPgth_t$	0.0039*	0.0035	0.0026	0.0024	0.0007	0.0007	0.0007	0.0007
	(0.091)	(0.114)	(0.300)	(0.312)	(0.447)	(0.432)	(0.440)	(0.437)
$GovIntvn_t$	−0.0162*	−0.0151*	−0.0176*	−0.0164*	0.0004	0.0004	0.0006	0.0006
	(0.066)	(0.058)	(0.063)	(0.051)	(0.687)	(0.699)	(0.605)	(0.617)
Industry	Y	Y	Y	Y	Y	Y	Y	Y
Year	Y	Y	Y	Y	Y	Y	Y	Y
N	505	505	505	505	973	973	973	973
adj. R^2	0.074	0.072	0.086	0.083	0.173	0.173	0.176	0.175

p-Values in parentheses.
* $p < 0.1$.
** $p < 0.05$.
*** $p < 0.01$.

Model (15) adds the interactions of Low_{t-1} and other variables to Model (13), so the coefficient of $Ret_t \times Dr_t \times N_t \times Low_{t-1}$, β_{15} represents the effect of low corporate taxes paid on the relationship between corporate capital structure and accounting conservatism.

The results for the effect of low corporate taxes paid on the relationship between corporate capital structure and accounting conservatism are presented in Table 15 and reveal that the coefficient of $Ret_t \times Dr_t \times Low_{t-1}$ in column (1) is positive and statistically significant, indicating that banks raise their requirements for accounting conservatism on those local SOEs with low operating and financial performance. N_t in columns (2), (3) and (4), respectively, represents Lev_t, $Ldebt_t$ and $Sdebt_t$, in which the coefficients of $Ret_t \times Dr_t \times N_t \times Low_{t-1}$ in columns (2) and (4) are positive, but statistically insignificant while that in column (3) is significantly positive, indicating that the low taxes paid by local SOEs have no effect on the relationship between total liabilities and short-term debt and accounting conservatism. They do, however, raise banks' requirements for the accounting

Table A3
Results of 2SLS for non-SOEs.

Variable	(1) OverInv	(2) OverInv	(3) OverInv	(4) OverInv	(5) UnderInv	(6) UnderInv	(7) UnderInv	(8) UnderInv
Main results								
_cons	−0.3516	−0.6661	−0.3417	−0.7559***	0.3816***	0.4274*	0.3817***	0.3655***
	(0.136)	(0.411)	(0.144)	(0.006)	(0.000)	(0.055)	(0.000)	(0.000)
$Distress1_{t-1}$	**0.0007**	**−0.0021**			**0.0000**	**−0.0022**		
	(0.127)	**(0.930)**			**(0.963)**	**(0.729)**		
$Distress1_{t-1} \times N\_Tax_{t-1}$		**−0.0002**				**−0.0001**		
		(0.910)				**(0.730)**		
$Distress2_{t-1}$			**0.0008**	**0.0009**			**0.0000**	**−0.0004**
			(0.124)	**(0.848)**			**(0.904)**	**(0.687)**
$Distress2_{t-1} \times N\_Tax_{t-1}$				**0.0000**				**−0.0000**
				(0.950)				**(0.673)**
N_Tax_{t-1}		0.0608		0.0541***		0.0090		0.0048*
		(0.259)		(0.000)		(0.549)		(0.071)
$Size_t$	0.0288***	0.0794***	0.0287***	0.0783***	−0.0125***	−0.0082**	−0.0125***	−0.0088***
	(0.006)	(0.000)	(0.006)	(0.000)	(0.000)	(0.011)	(0.000)	(0.000)
Roa_t	−0.0788	0.1563	−0.0768	0.1580	−0.0108	−0.0055	−0.0108	−0.0062
	(0.592)	(0.289)	(0.602)	(0.283)	(0.473)	(0.722)	(0.471)	(0.680)
Fcf_t	0.0727	0.0757	0.0734	0.0731	−0.1347***	−0.1356***	−0.1347***	−0.1347***
	(0.120)	(0.149)	(0.117)	(0.110)	(0.000)	(0.000)	(0.000)	(0.000)
$Dual_t$	−0.0053	−0.0068	−0.0054	−0.0062	0.0000	−0.0011	0.0000	−0.0007
	(0.790)	(0.736)	(0.787)	(0.749)	(0.999)	(0.797)	(0.997)	(0.850)
$Exeown_t$	0.0002	0.0001	0.0001	0.0000	−0.0010***	−0.0010***	−0.0010***	−0.0010***
	(0.913)	(0.965)	(0.940)	(0.985)	(0.004)	(0.007)	(0.004)	(0.006)
$Herf_t$	0.0027***	0.0026***	0.0026***	0.0025***	−0.0001	−0.0001	−0.0001	−0.0001
	(0.000)	(0.000)	(0.000)	(0.000)	(0.312)	(0.348)	(0.311)	(0.357)
$Divid_t$	0.0812	0.1289**	0.0803	0.1287**	0.0214*	0.0250**	0.0215*	0.0256**
	(0.152)	(0.021)	(0.157)	(0.021)	(0.082)	(0.049)	(0.081)	(0.039)
$Debt_t$	0.1352	0.1335	0.1388	0.1351	0.0443**	0.0438**	0.0443**	0.0432**
	(0.143)	(0.140)	(0.131)	(0.132)	(0.025)	(0.029)	(0.024)	(0.027)
$Salary_t$	−0.0289**	−0.0144	−0.0293**	−0.0141	−0.0038*	−0.0032	−0.0038*	−0.0029
	(0.017)	(0.254)	(0.014)	(0.232)	(0.082)	(0.186)	(0.079)	(0.179)
$GDPgth_t$	0.0051**	0.0053**	0.0052**	0.0055**	0.0007	0.0007	0.0007	0.0008
	(0.045)	(0.039)	(0.040)	(0.027)	(0.180)	(0.156)	(0.176)	(0.125)
Industry	Y	Y	Y	Y	Y	Y	Y	Y
Year	Y	Y	Y	Y	Y	Y	Y	Y
N	977	977	977	977	1961	1961	1961	1961

p-Values in parentheses.
* $p < 0.1$.
** $p < 0.05$.
*** $p < 0.01$.

conservatism of local SOEs on long-term debt. In summary, the results suggest that there is no evidence that banks lessen their requirements for accounting conservatism on local SOEs with low operating and financial performance. Local governments never offer a helping hand on this issue, thus ruling out the possibility that the paternalism of local governments politically intervenes in the investment activities of local SOEs, resulting in a greater extent of overinvestment for those SOEs with lower taxes paid.

4.4.6. Systematic errors of the overinvestment model

Given the systematic errors of the overinvestment model, there must be a different predicted value from the corresponding observed value, and not all gaps between these two values are necessarily overinvestment or underinvestment, so we select the observations that are larger than the tenth percentile of $OverInv_{i,t}$, and $UnderInv_{i,t}$ to be our research sample and obtain the above empirical results. To determine the robustness of our sample selection procedure, we (1) expand the sample to include the whole sample with no percentile selection

Table A4
Results of 2SLS for central SOEs.

Variable	(1) OverInv	(2) OverInv	(3) OverInv	(4) OverInv	(5) UnderInv	(6) UnderInv	(7) UnderInv	(8) UnderInv
Main results								
_cons	0.2809	−1.0418	0.2762	0.0819	0.1397**	0.2522	0.1364**	0.1322**
	(0.443)	(0.640)	(0.437)	(0.859)	(0.014)	(0.192)	(0.012)	(0.049)
$Distress1_{t-1}$	**0.0010**	**0.0269**			**−0.0000**	**−0.0023**		
	(0.227)	**(0.639)**			**(0.943)**	**(0.680)**		
$Distress1_{t-1} \times N\_Tax_{t-1}$		**0.0015**				**−0.0001**		
		(0.651)				**(0.681)**		
$Distress2_{t-1}$			**0.0009**	**−0.0029**			**0.0000**	**0.0013**
			(0.193)	**(0.708)**			**(0.766)**	**(0.247)**
$Distress2_{t-1} \times N\_Tax_{t-1}$				**−0.0002**				**0.0001**
				(0.624)				**(0.260)**
N_Tax_{t-1}		−0.0369		0.0389*		0.0014		−0.0072**
		(0.805)		(0.072)		(0.918)		(0.032)
$Size_t$	0.0085	0.0250	0.0090	0.0392**	−0.0005	−0.0038	−0.0005	−0.0050*
	(0.516)	(0.470)	(0.489)	(0.023)	(0.825)	(0.298)	(0.815)	(0.096)
Roa_t	0.1966	0.2526	0.1986	0.3142	−0.1212***	−0.1352***	−0.1209***	−0.1320***
	(0.407)	(0.422)	(0.402)	(0.189)	(0.000)	(0.000)	(0.000)	(0.000)
Fcf_t	0.1260*	0.1534*	0.1195*	0.1424**	−0.1628***	−0.1640***	−0.1627***	−0.1671***
	(0.057)	(0.058)	(0.070)	(0.031)	(0.000)	(0.000)	(0.000)	(0.000)
$Dual_t$	0.0014	−0.0036	−0.0013	−0.0043	0.0011	0.0020	0.0011	0.0014
	(0.972)	(0.941)	(0.975)	(0.915)	(0.880)	(0.788)	(0.881)	(0.845)
$Exeown_t$	0.0024	0.0017	0.0024	0.0027	−0.0019	−0.0024	−0.0019	−0.0022
	(0.702)	(0.827)	(0.698)	(0.661)	(0.709)	(0.650)	(0.708)	(0.673)
$Herf_t$	0.0001	0.0000	0.0002	0.0001	0.0000	0.0000	0.0000	−0.0000
	(0.863)	(0.999)	(0.817)	(0.940)	(0.881)	(0.858)	(0.872)	(0.985)
$Divid_t$	0.1660**	0.1524*	0.1684***	0.1713***	−0.0008	−0.0010	−0.0007	−0.0025
	(0.010)	(0.071)	(0.009)	(0.008)	(0.948)	(0.940)	(0.951)	(0.838)
$Debt_t$	0.1878*	0.2500	0.1792	0.1657	0.0486**	0.0525**	0.0478**	0.0543**
	(0.098)	(0.218)	(0.110)	(0.142)	(0.043)	(0.034)	(0.045)	(0.023)
$Salary_t$	−0.0424**	−0.0242	−0.0428**	−0.0358**	−0.0062*	−0.0075**	−0.0061**	−0.0068**
	(0.022)	(0.437)	(0.016)	(0.048)	(0.054)	(0.023)	(0.044)	(0.025)
$GDPgth_t$	0.0044	0.0049	0.0046	0.0037	0.0007	0.0006	0.0007	0.0007
	(0.206)	(0.325)	(0.172)	(0.274)	(0.236)	(0.358)	(0.238)	(0.230)
Industry	Y	Y	Y	Y	Y	Y	Y	Y
Year	Y	Y	Y	Y	Y	Y	Y	Y
N	505	505	505	505	973	973	973	973

p-Values in parentheses.
* $p < 0.1$.
** $p < 0.05$.
*** $p < 0.01$.

and (2) shrink it to include only observations that are larger than the twenty-fifth percentile of $OverInv_{i,t}$, and $UnderInv_{i,t}$. We rerun the previous empirical tests with these two samples and find that the results are consistent with those in Tables 8–10, ruling out the possibility of bias induced by the sample selection procedure.

5. Conclusion

Our empirical tests and robustness checks support the following conclusions. The extent of local SOEs overinvestment (underinvestment) is positively (negatively) related to the level of local fiscal distress, and the positive (negative) relationship is enhanced when fewer taxes are paid by local SOEs. There is no evidence that the investment behavior of non-SOEs or central SOEs is related to local finance or corporate taxes paid, with the results for non-SOEs demonstrating the existence of political intervention and the results of central SOEs ruling out the possibility of abundant investment opportunities. Increasing firms' investment scales

Table A5
Effect of corporate tax intensity on local fiscal distress and corporate overinvestment.

Variable	(1) Local SOEs	(2) Local SOEs	(3) Non-SOEs	(4) Non-SOEs
_cons	−1.0098***	−1.0074***	−0.2926	−0.2872
	(0.001)	(0.001)	(0.129)	(0.138)
$Distress1_{t-1}$	**0.0022*** **		**0.0005**	
	(0.006)		**(0.315)**	
$Distress1_{t-1} \times N\_TaxI_{t-1}$	**0.0236**		**0.0011**	
	(0.419)		**(0.952)**	
$Distress2_{t-1}$		**0.0026*** **		**0.0005**
		(0.007)		**(0.393)**
$Distress2_{t-1} \times N\_TaxI_{t-1}$		**0.0324**		**0.0000**
		(0.366)		**(1.000)**
N_Tax_{t-1}	0.0988	−0.1679	−0.4874	−0.4491
	(0.939)	(0.909)	(0.522)	(0.599)
$Size_t$	0.0614***	0.0607***	0.0249***	0.0249***
	0.000	0.000	(0.003)	(0.003)
Roa_t	0.5622**	0.5690**	−0.0939	−0.0925
	(0.026)	(0.025)	(0.316)	(0.323)
Fcf_t	0.2093**	0.2109**	0.0566	0.0573
	(0.014)	(0.014)	(0.157)	(0.151)
$Dual_t$	0.0048	0.0052	−0.0100	−0.0100
	(0.882)	(0.871)	(0.563)	(0.562)
$Exeown_t$	0.0187	0.0186	0.0002	0.0001
	(0.712)	(0.715)	(0.886)	(0.899)
$Herf_t$	0.0046***	0.0046***	0.0019***	0.0018***
	(0.000)	(0.000)	(0.000)	(0.000)
$Divid_t$	−0.1182	−0.1181	0.0599	0.0588
	(0.102)	(0.102)	(0.262)	(0.271)
$Debt_t$	0.4231***	0.4285***	0.1383*	0.1409*
	(0.000)	(0.000)	(0.098)	(0.091)
$Salary_t$	−0.0502***	−0.0505***	−0.0226**	−0.0230**
	(0.003)	(0.003)	(0.025)	(0.022)
$GDPgth_t$	0.0029	0.0031	0.0048**	0.0049**
	(0.405)	(0.373)	(0.033)	(0.030)
Industry	Y	Y	Y	Y
Year	Y	Y	Y	Y
N	1161	1161	1048	1048
adj. R^2	0.130	0.129	0.052	0.051

p-Values in parentheses.
* $p < 0.1$.
** $p < 0.05$.
*** $p < 0.01$.

could help to increase the total taxes paid, including both income and turnover taxes, further resulting in higher local fiscal revenue. Turnover taxes paid by firms are not affected by corporate investment efficiency and the income taxes paid by underinvested firms are much lower than those paid by their normal-level counterparts. Local governments should increase their tax revenue by increasing the investment scales of underinvested firms to meet the normal levels and by helping overinvested firms to adjust their production, operation and capital structures to match the present investment level before expanding their investment scale. The empirical results suggest that local governments could achieve the goal of raising fiscal revenue by increasing the investment scales of local SOEs, which directly results in an increase in total taxes paid. Hausman tests and 2SLS with IVs also exclude the possibility that the overinvestment of local SOEs leads to local fiscal distress. There is no evidence supporting the assertion that local governments increase their tax revenue by enhancing their tax enforcement on firms who pay fewer taxes, thus indirectly supporting the hypothesis that local governments increase their tax revenue by forcing firms paying lower taxes to raise their investment scales. There

is no evidence that the tax intensity of local SOEs or non-SOEs influences the relationship between corporate overinvestment and local finance, thus ruling out the possibility that overinvestment induced by a difference in the amount of tax payment is mediated by changes in free cash flow. There is no evidence that governmental helping hands play a role in helping SOEs with low operating and finance performance, thus ruling out the possibility that local governments offer a helping hand by serving as an invisible underwriter to help local SOEs lessen financing constraints when applying for bank loans or by seeking investment projects for local SOEs. This also indirectly verifies that the intensifying effect of the lower contribution made by local SOEs to the positive relationship between local fiscal distress and the overinvestment of local SOEs is due to the political intervention of a local governmental grabbing hand.

Above all, we conclude that local governments have an incentive to increase fiscal revenue when faced with financial distress, by forcing the local SOEs under their control to raise their investment scales, resulting in either overinvestment or lowering the level of underinvestment due to other reasons. Likewise, the incentive and effect of such intervention appear to be stronger on firms that contribute less to local finance.

This study enriches the literature on government intervention and investment efficiency, providing empirical evidence of the grabbing hand theory through the perspectives of local public finance and enterprise investment, in addition to a new research perspective to apply to the problems of fiscal issues from the firm-level view. In practice, we discover a relationship between local public finance and the investment behavior of local SOEs, and provide theoretical bases and references for the ways in which local governments make fiscal policies and improve the supervisory roles they have over local SOEs.

Appendix A

See Tables A1–A5.

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